Government of Sindh

Drinking Water, Sanitation and Hygiene

Sindh Strategic Sector Plan 2016 – 2026

Final Draft 6.0 dated 29th December 2016

SINDH STRATEGIC SECTOR PLAN 2016 – 2026

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Government of Sindh

Local Government and Housing Town Planning Department
Planning and Development Department
Public Health Engineering and Rural Development Department
Health Department
School Education Department

Final Draft 6.0 – 29th December 2016

MESSAGE OF CHIEF MINISTER

The province of Sindh is home to the Indus waterway before it enters the Arabian Sea. Despite having a large riverine source of water, the province of Sindh faces many challenges in provision of potable drinking water owing to the growing urban population and presence of desert and brackish zones for its rural population. The Government of Sindh is making tireless efforts to ensure there is adequate infrastructure and capacity for supply of clean drinking water and availability of adequate sanitation to its population.

The Government of Sindh has initiated a number of projects for water and sanitation and has planned to increase investments in water and sanitation in the future.

It is a matter of great satisfaction to learn that many water and sanitation projects are under way in collaboration with national and international development partners. I assure you that the Government of Sindh shall extend all possible assistance to further enhance this collaboration so that we can achieve our ultimate goal of water and sanitation for all.

I am pleased to learn that a well-conceived and forward looking sector development plan has been formulated that provides a clear and strategic direction for the sector. Provision of clean and safely managed drinking water of acceptable quality and adequate and safely managed sanitation are not only basic necessities of life, they have an enormous impact on preventing needless mortality and nutritional deficiency because of diarrhoea. Furthermore, they also address many environmental issues.

I look forward to seeing the implementation of this sector development plan in fulfilment of the Sustainable Development Goal on water and sanitation, and welcome national and international partners to join hands with the Government of Sindh in making this a reality.

MESSAGE OF CHIEF SECRETARY

Access to safely managed drinking water and sanitation are two of the benchmarks of development in any country. Today, Pakistan in general, and Sindh province in particular, still faces many challenges of providing access to these basic services to all its citizens. There are many reasons for this, not the least of which are a burgeoning population especially in urban and peri-urban areas, multi-dimensional poverty, and low prioritisation of services in rural areas to name a few.

Today, Sindh province is undergoing a massive transition. On one hand, there is rapid urbanisation with people flocking to cities and towns, while on the other, municipal services are not able to cope with the demand especially with the mushroom growth of new housing schemes, industrial estates and commercial zones. This is further compounded by limited resources and increasing priorities each clamouring for more allocations.

Inadequate water and sanitation has adverse impacts on health and nutrition, and Sindh province today still has unacceptably high child mortality rates and high nutritional deficiency among its children. This is unacceptable.

Taking these issues into consideration, and recognising the urgency of the problems, the Government of `Sindh has developed its ten-years sector development plan for water, sanitation and hygiene, which shall usher in a new era of sectoral development based on sound evidence, clear strategic directions and multi-sectoral engagement to achieve the Sustainable Development Goal on water and sanitation.

I urge the concerned line departments to implement this plan in letter and spirit, and am confident that the new sector development plan will also provide a platform for enhanced collaboration and cooperation with national and international development partners.

ACKNOWLEDGEMENTS

This enormous task of developing a sector development plan for water, sanitation and hygiene in Sindh was made possible by the collaborative efforts of Local Government and Housing Town Planning Department, Public Health Engineering and Rural Development Department, Planning and Development Department, Health Department and Education and Literacy Department.

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The periodic South Asia Conference on Sanitation (SACOSAN) and biennial meeting of Sanitation and Water for All has repeatedly identified sanitation issues in Pakistan, especially for rural communities. Country participation at high-level meetings on Sanitation and Water for All in April 2014 reiterated the government's commitment to the preparation of provincial sector plans for water and sanitation. The recent MICS 2014 indicators for WASH in Sindh have highlighted the urgency for improving WASH systems. Further, the worrisome state of nutritional deficiency demands an accelerated plan to improve WASH as poor sanitation and contaminated drinking water are important causative factors of poor nutrition and child morbidity and mortality. The LG&HTPD and PHE&RDD in collaboration with P&DD, Education and Health provided strategic guidance and facilitation for the development of a WASH Sector Development Plan 2016-2026 with support of UNICEF and technical consultants.

Demographics

Sindh is a densely populated and most urbanised province of Pakistan accounting for 24% of the country's total population. The population of Sindh increased from 41.248 million in 2010, to 45.998 million in 2015, and is expected to reach 70 million or more by 2050[1]. About 52.5% of the population is male and 47.5% is female. Similar proportions are found in all divisions. The trend of urbanisation and a growing population will continue to increase demands for sector and sub-sector services.

Policies and Institutions

Sindh has a draft Drinking Water Policy 2016, draft Municipal Water Act 2012 and draft Sanitation Policy 2016. The National Sanitation Policy 2006 and National Drinking Water Policy 2009 guided the development of these provincial policies. The Water Sanitation and Hygiene (WASH) sector is overseen by a number of departments, including Local Government and Housing Town Planning Department (LG&HTPD), Public Health Engineering and Rural Development Department (PHE&RDD), General Services, Health, and Education for WASH in schools. These provincial departments are now working through an integrated approach to envision and design common implementation plans that are owned by multiple departments and supported by all major support organisations working in the sector. Several national and international partners collaborate with the Government and include UNICEF, WSP, WaterAid, Plan International, RSPN, etc.

Strategic Actions

Finalise the Sindh Municipal Water Act; approve drinking water and sanitation policies; formulate a legal framework and operationalise the Sindh Water Commission to govern municipal water in addition to implementing the Local Government Act 2013.

[1] Bloom, David, Zeba A. Sathar, and Maqsood Sadiq. "Prospects for Economic Growth in Sindh under Alternative Demographic Scenarios: The Case for a Rapid Fertility Decline," Policy Brief. Islamabad, Pakistan: Population Council, Evidence Project. 2015.

Water Resources

Pakistan is considered to be a water-stressed country (rapidly moving to water-deficit) and many of its regions are categorised as arid. Pakistan lies in an arid and semi-arid climate zone. Most of Sindh receives less than 140 millimetres of rainfall a year. (By contrast, among nations of similar area, Nigeria receives more than 1,500 millimetres, Venezuela more than 900, Turkey nearly 700.) Per capita water availability has declined rapidly since 1951 and is currently only 1050 cubic metres/capita, which puts Pakistan in the category of a high water-stress country[2].

Strategic Actions

Improve water resource utilisation through efficient project design and execution; strengthen municipal capacities in climate change adaptation, mitigation and resilience; develop district level preparedness for water safety and disaster risk reduction; develop and enhance rainwater harvesting interventions in areas with ample precipitation.

Drinking Water

Overall, 90.5% of household members use an improved[3] source of drinking water, while 12.8% of household members in households using unimproved drinking water use an appropriate water treatment method. About 90% of urban and 91% of rural household members use an improved drinking water source. Piped water into dwelling is found mostly in Karachi division (65.0%), followed by Hyderabad (20.0%) and Mirpur Khas (15.1%) divisions. The rest of Sindh indicates a high use of water from a protected well with highest rates found in Larkana division (86.3%) and Sukkur division (77.3%). The results of Sindh MICS 2014 indicate that other than Karachi districts that attain about 20%-30% water treatment, all other districts rate less than 20% for water treatment, even though a large proportion of districts are using improved water for drinking. About 25.5% of the proportion of households in Sindh do not have drinking water on premises. Tharparkar has the highest percentage of households without drinking water on premises (89.7%).

Strategic Actions

Enhance coverage of Improved and safely managed water supply to meet access gap; rehabilitate and maintain dysfunctional and non-functional schemes; upgrade water supply schemes in towns; enhance community awareness about water use, safety, maintenance and preservation in all districts through an effective BCC strategy.

Water Quality

The Sindh MICS 2014 found that 3.0% of household members in Sindh drink water contaminated above WHO standards for arsenic, 5.5% for Nitrate, 4.5% for Fluoride, 2.9% for Iron, 8.9% for hard water and 23.6% for TDS. Further, 38.8% of household members drink water contaminated with

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[2] State of the Environment Report (draft) 2005. Government of Pakistan, Ministry of Environment

[3] Improved sources of drinking water are those using any of the following types of supply: piped water (into dwelling, compound, yard or plot, to neighbor, public tap/standpipe), tube well/borehole, protected well, protected spring, and rainwater collection. Bottled water is considered as an improved water source only if the household is using an improved water source for hand washing and cooking.

E.coli, while 66.0% drink water contaminated with coliforms. This indicates a serious water quality issue in Sindh.

Strategic Actions

Conduct quarterly water quality testing at water source and distribution network; establish district level water quality testing laboratories; enhance community awareness about water quality (including adoption of treatment of safe drinking water in the household) enhanced in all districts through an effective BCC strategy.

Sanitation

According to Sindh MICS 2014, on average 54.9% use improved sanitation, while 56.1% have a place for hand washing. There is a general awareness about the need for a place for handwashing since many districts that have low rates for improved sanitation have higher rates for a place for handwashing. About 90.0% of urban, 22.1% of rural and 97.9% of households in Karachi division use flush/pour flush latrines connected to piped sewer system. About 39.9% of household population in rural areas practice open defecation, which is highest in Mirpur Khas division at 49.2%. The percentage of household population using improved sanitation that is not shared is highest in Karachi (98.0%) and least in Tando Muhammad Khan (17.7%).

Strategic Actions

Enhance improved and safely managed sanitation services coverage to reduce access gap in urban areas and rural areas, especially in those that are also nutrition-sensitive; establish wastewater treatment plants established in towns; increase proportion of treated industrial wastewater; ensure improved and systematic management of Operation and Maintenance of sewerage and drainage systems; enhance community awareness and social mobilisation regarding sanitation, nutrition and hygiene in all UCs through effective implementation of BCC strategy; and promote safe sanitation practices in high open defecation zones, nutrition-sensitive and polio priority areas.

Solid Waste

A study[4] estimated that the Solid Waste Generation Rate (kg/C/Day) for Karachi was 0.613 kg/C/Day, while for Hyderabad, it was 0.563 kg/C/Day. Using the current estimated population of Karachi of 24 million[5], at least 14,712 tons per day or 5.37 million tons per year. Using an arbitrary mean Solid Waste Generation Rate of 0.330 kg/C/Day (average of urban and rural rates), the total solid waste generated per day in Sindh for a population of 44.807 million is about 14,786 tons per day, and about 5.397 million tons per year. Clearly, most of the solid waste is generated in Karachi. Only 31% of Sindh has proper disposal of waste solids (collected by any municipal institution, disposed of by solid waste management department or a private company vehicle collected from home). This ranges from 56% in urban to 4% in rural areas[6].

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[4] (Draft) Guideline for Solid Waste Management June 2005. Pakistan Environment Protection Agency

[5] http://worldpopulationreview.com/world-cities/karachi-population/ accessed on 27 April 2016

[6] Pakistan Social and Living Standards Measurement Survey, 2013-14

Strategic Actions

Implement integrated solid waste management implemented in districts; improve solid waste collection and disposal; improve the efficiency of solid waste disposal and recycling; enhance safe hospital high risk waste disposal; and enforce safe and hygienic Slaughterhouses.

Health, Hygiene and Nutrition

The Infant Mortality Rate (IMR) and Under 5 Mortality Rate (U5MR) remain high in Sindh. The Sindh MICS 2014 found an IMR of 82 per 1000 live births and U5MR of 104 per 1000 live births. Sindh MICS 2014 found that the lowest quintile is the most vulnerable to health risks and has the least access to improved drinking water and improved sanitation. Further, high prevalence rates of no toilet are found in the poorer quintiles compared to the richer ones. The issue of no toilet is found predominantly in the rural compared to urban areas. Recent data from Sindh MICS 2014 shows that more than four out of ten children under the age of five years in Sindh are underweight (42%) and 17% are classified as severely underweight. Almost half of children under five years (48%) are stunted or short for their age and one fourth (24%) children are severely stunted. Evidence from Sindh MICS 2014 indicates that nutritional deficiency rates show an increasing trend when use of improved sanitation decreases further suggesting that low use of improved sanitation is a risk factor for poor nutrition status

Strategic Actions

Improve and make fully functional water and sanitation services in health facilities; implement Hospital Waste Management Rules; implement multi-sector nutrition-sensitive WASH programmes in nutritionally deficient districts; integrate nutrition-sensitive WASH in health promotion in primary health care; and integrate nutrition-sensitive WASH in health advocacy and BCC campaigns and health weeks.

Education

Sindh Education Management Information System (SEMIS) found that 45% of schools had no toilet facilities and 53% had no drinking water facility; both presenting particular barriers for girls. The Sindh Education Sector Plan identified lack of basic facilities (e.g. proper classrooms, washrooms, drinking water, security, etc.), especially in rural areas as one of the top seven key issues in the provision of primary and elementary education. Of 46,039 educational institutions, only 22,724 (just under 50%) have water facilities and 24,937 (just under 55%) have latrines. Presently, there is no module on WASH in either pre-service or in-service teacher training programmes. There is need for a curriculum review to incorporate a separate section/module on nutrition-sensitive WASH. A study[7] conducted at the national level showed WASH facilities in schools are not supportive to menstrual hygiene management (MHM); majority of the girls rely on mothers and sisters for MHM related information; and little information is provided or discussed at school level. At present, there is no menstrual hygiene education for girls in middle and high schools in Sindh.

Strategic Actions

Integrate nutrition-sensitive WASH in teacher training programme; integrate nutrition-sensitive WASH in schools' curriculum; integrate menstrual hygiene management in health and hygiene for

[7] Menstrual Hygiene Management for Adolescent School Girls in KP and PAK, Pakistan, May 2013, UNICEF Pakistan

girls; and ensure 100% of schools with missing facilities have safely managed drinking water and latrines.

Sector Efficiency and Capacity

Over the last decade, the per capita total sectoral expenditure has increased marginally from PKR 149 in 2005-06 to PKR 164 in 2014-15, but when considered in the context of inflation, it is negligible. Further, the per capita sectoral development spend has actually decreased from PKR 137 in 2005-06 to PKR 117. This indicates diminishing prioritisation of public spending in the sector. On average, the proportion of per capita development spend to overall per capita sectoral spend between 2010-2015 is just under three-fourths (73%). The service efficiency of different water and sanitation agencies shows that KW&SB underperforms in most of the indicators only second to WASA Quetta. It has low billing and collection ratios, a high staffing ratio, and no fee for new sewerage connection. NSUSC has the lowest average unit production cost and staffing ratio. A comparison of the basic structure in Local Government and Public Health Engineering indicates that the technical capacity for water supply and sewerage and drainage lies in public health engineering, while administrative capacity lies with Local Government. This presents a major challenge to Local Government for providing O&M services as per current regulations. This anomaly needs to be corrected so that both installation and O&M of water supply and sewerage and drainage schemes rest with Public Health Engineering, while solid waste management and general sanitation services rest solely with Local Government.

Strategic Actions

Reduce systems leakages of Non Revenue Water and Unaccounted for Water; increase household water metering; improve and enhance efficient Billing and Collection; undertake systematic Human Resource Development for the sub-sectors; and develop capacities of CBOs and civil society for integrated water supply, sanitation, hygiene and solid waste management.

Sector Financing

On analysis of sectoral expenditure trends, current expenditure as a percentage of total sectoral expenditure has increased from 20.0% in 2010-11 to 28.9% in 2014-15. Conversely, development expenditure as a percentage of total sectoral expenditure has decreased from 80.0% in 2010-11 to 71.1% in 2014-15. The year on year change in development expenditure from the preceding year has vacillated from a -9.5% decrease in 2011-12, a 7.5% increase in 2012-13, followed by a -20.0% decrease in 2013-14, and then a 13.6% increase in 2014-15. These figures suggest that while there has been an overall increase in sectoral funding for water and sanitation, overall investment in the sector in relation to total pro-poor development spending has actually reduced. Further, there is diminishing prioritisation of investment in the sector compared to other sectors.

Strategic Actions

Stratify sectoral budgeting and expenditure reporting separately for each sub-sector (environment, water supply, sewerage and drainage); increase Own Source Revenue (OSR) in sub-sectors by Town Councils; increase regulated private sector participation in sub-sectors; and increase development expenditure allocation to and spending by sub-sectors.

Sector Coordination

Presently, there are two ways of managing the water supply schemes in Sindh. Generally, in urban areas, LG&HTPD manages the schemes through its staff but has poor revenue collection from the users or community based organisations (CBOs). Whereas in rural areas, the schemes are designed and executed by PHE&RDD, but on completion require to be handed over to LG&HTPD or entrusted to the local CBOs that includes operation and maintenance of the schemes. PHE&RDD does not have sufficient community mobilisation capacity, and requires additional capacity development support followed by policy reforms for appropriate well-defined community sharing and mobilisation mechanisms, and for O&M. The function of sanitation falls under the purview of LG&HTPD, which is also involved in implementing the large drainage and sanitation schemes. It is also involved in street payment and road construction in the villages. LG&HTPD has just initiated the Saaf Suthro Sindh programme through in which it shall implement the Pakistan Approaches to Total Sanitation (PATS) in selected districts in association with local community organisations in collaboration with national and international partners. There is lack of clarity about the roles and responsibilities among the stakeholders that has emerged as a result of SLGA 2014 and 18th Constitutional Amendment.

Strategic Actions

Streamline and enhance provincial level coordination and programme management for WASH by broadening the scope of the Multi-Sectoral Nutrition Steering Committee to encompass WASH, establish a Sector Coordination and Monitoring Unit in the Nutrition Unit, notify District WASH Committees, and establish a District Coordination and Monitoring Unit for WASH under the DC Office.

Sector Monitoring

Monitoring and reporting activities in the sector and sub-sector take place at various levels but are fragmented. Furthermore, there are challenges of coordination for monitoring and reporting due to complexities in the roles and responsibilities of different stakeholders in the government, cantonment boards and defence housing authorities, non-government and private sectors. Monitoring and reporting activities in the sector and sub-sector take place at various levels but are fragmented. Furthermore, there are challenges of coordination for monitoring and reporting due to complexities in the roles and responsibilities of different stakeholders in the government, cantonment boards and defence housing authorities, non-government and private sectors. There is no mechanism to collate and synthesise this information and disseminate to policy, management and operational level stakeholders. There is also no systematic approach for the monitoring and evaluation of sanitation projects.

Strategic Actions

Develop monitoring and reporting mechanisms for water and sanitation schemes; improve and establish the infrastructure for monitoring and reporting for water supply and sewerage and drainage schemes; and enhance the monitoring and reporting capacity for water and sanitation.

PREAMBLE

Water and sanitation have been and are a priority for the Government of Sindh particularly because of the arid and hot climate and brackish ground water.

In recent times, several key steps have been taken by the Government of Sindh. These include the following:

- Sindh Water Management (Amendment) Act 2005 – this Act is derived from and replaces the Sindh Water Management Ordinance, 2002, which established the Sindh Irrigation and Drainage Authority (SIDA) and repealed the Sindh Irrigation and Drainage Authority Act, 1997 and the Sindh Irrigation Water Users' Association Ordinance, 1982
- Sindh Municipal Water Act (Draft) 2012 – this draft Act has proposed the establishment of a regulatory authority called the Sindh Municipal Water Commission. Upon establishment of the Commission, the responsibility for regulating the conservation, protection, utilisation, exploitation, development of water resources and the regulation of all municipal water services, including quality assurance of water, water services and tariff shall vest with the Commission
- Sindh Environmental Protection Act 2013 – that lays special emphasis on management of water resources
- Sindh Local Government Act 2013 – through which municipal functions include laying and maintaining intra-city network of water supply and sanitation; conservancy; garbage, sewer or storm water, solid or liquid waste, drainage, public toilets etc
- Sindh Solid Waste Management Board Act 2014 – this Act led to establishment of a Board called as the Sindh Solid Waste Management Board for the collection and disposal of solid and other waste in the Province of Sindh
- Development of a draft Sindh Policy for Drinking Water, revision of the Sindh Sanitation Policy, and a draft strategy for Behavioural Change Communication (BCC) in 2015-16

Other important events have also been taking place at the same time.

At the regional level, the periodic South Asia Conference on Sanitation (SACOSAN) has highlighted sanitation issues in Pakistan, especially for rural communities. These forums have given impetus to the formulation of national and provincial drinking water and sanitation policies and strategies, and the development of Pakistan Approaches to Total Sanitation (PATS).

The National Water Quality Monitoring Programme[8] (NWQMP) initiated by the Pakistan Council of Research in Water Resources (PCRWR) found that of the bacterial contamination level (2002 - 2006) was in the range of 73% - 100% for Hyderabad, 61% - 100% for Karachi and 67% - 83% for Sukkur.

[8] National Water Quality Monitoring Programme, Water Quality Status in Pakistan, Phase I-V, 2001-2006, Pakistan Council of Research in Water Resources

The Water Sanitation Programme (WSP), supported by the World Bank, helped establish the Pakistan Water Operators Network[9] (P-WON), produced its first directory and facilitated development of a monitoring and reporting system for the network.

Sindh was severely affected by the massive floods in 2010-11 and this event alerted attention to the vulnerability of water supply and sanitation system to climatic events. Urgent interventions by UN Agencies, international and national non-government organisations in water and sanitation adopted the Pakistan Approach to Total Sanitation (PATS), as they launched a massive programme on rural sanitation that would reach 7 million people in the country affected by floods.

In 2012, a national sector review report[10] on water, sanitation and hygiene was produced that emphasised the need for provinces to develop sector plans, approach the sector holistically in a sector wide approach, conduct sector capacity development needs assessment, and strengthen provincial monitoring frameworks for the sub-sectors.

Pakistan submitted its first GLAAS report[11] in 2012 that helped stakeholders to identify information gaps in the sector, human resource capacity status and encouraging trends of provincial governments for gradually increasing allocations to the sector.

In 2012, two other national reports were produced that looked at urban water supply and sanitation[12], and rural water supply and sanitation[13]. The reports reinforced issues regarding efficiency and called for better coordination, improved sector financing and establishing a regulatory body.

Pakistan participated at the fifth SACOSAN meeting in Nepal in 2013 where it reiterated previous commitments and identified research in water and sanitation as one of its emerging priorities[14].

In 2014, national consultations were held by the Ministry of Planning, Development and Reforms and the Pakistan Water Partnership[15] to discuss the post-2015 development agenda on water and sanitation, having recognised that Pakistan was off-track to meet its international obligations on sanitation and access to safe drinking water was still an issue due to poor quality. The consultation made special emphasis on the need to improve by (15%) the sustainable use and development of water resources in Pakistan and reduce untreated wastewater by (2.5%), nutrient pollution by (5%) and increase wastewater reuse by (7%). The report highlighted the need to 'Reduce, Recycle and Reuse' wastewater to the extent possible.

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[9] http://pwon.org.pk/ accessed on 31st March 2015

[10] Investing Wisely - Sanitation and Water - Saving Lives. Pakistan Sector Status Report 2012, Government of Pakistan

[11] UN-Water global annual assessment of sanitation and drinking-water (GLAAS) 2012 report: the challenge of extending and sustaining services. WHO 2012

[12] Pakistan Water Supply and Sanitation Sector, Volume I. Urban Water Supply and Sanitation, 2012. The World Bank

[13] Pakistan Water Supply and Sanitation Sector, Volume II. Rural Water Supply and Sanitation, 2012. The World Bank

[14] Pakistan Sanitation Country Paper SACOSAN-V 2013. Government of Pakistan

[15] UN Process Towards a Post-2015 Development Agenda. Report on Pakistan National Consultations February 2014. Global Water Partnership, 2014

An extensive international consultation was facilitated by the UN for goals and targets for the post-2015 agenda, which resulted in formulation of Sustainable Development Goals[16].

The status of water and sanitation in Pakistan when compared with other regional countries indicates that while Pakistan has made good progress with regards to provision of water, it lags behind with respect to improved sanitation (**Tables 1 and 2**).

Pakistan has a commitment for Millennium Development Goals (MDGs)[17], and specifically MDG Goal 7 that aims to promote sustainable development with a focus on sustainable access to safe drinking water and basic sanitation. Pakistan is on track regarding improving access to safe drinking water (919% against the target of 93%) and it is off track on access to sanitation (64% against the target of 90%). The province of Sindh is lagging slightly behind both the target of improved 'source' of water with 90.5% coverage against the target of 93%, and on access to improved sanitation with an achievement of 64.6% against the target of 90%[18].

Table 1 - Use of Drinking Water Sources

Country	Improved (%)			Unimproved (%)	
	Total Improved	Piped on Premises	Others Improved	Other Unimproved	Surface Water
Afghanistan	55	12	43	39	6
Bangladesh	87	12	75	13	0
India	94	28	66	5	1
Nepal	92	24	68	6	2
Pakistan	91	39	52	7	2
Sri Lanka	96	34	62	4	0

(Source: JMP Report 2015)

[16] https://sustainabledevelopment.un.org/sdgsproposal accessed on 31st March 2015

[17] Pakistan Millennium Development Goals Report 2013. Planning Commission, Government of Pakistan

[18] Multiple Indicator Cluster Survey 2014. Government of Sindh and UNICEF

Table 2 - Use of Sanitation Facilities

Country	Improved (%)	Shared (%)	Unimproved (%)	Open Defecation (%)
Afghanistan	32	12	43	13
Bangladesh	61	28	10	1
India	40	10	6	44
Nepal	46	18	4	32
Pakistan	64	9	14	13
Sri Lanka	95	4	1	0

(Source: JMP Report 2015)

In pursuance of the goals of the Government of Sindh to provide safe and improved drinking water and improved sanitation to its population, and the recommendations ensuing from the various documents, reports, conferences and technical consultations, the Local Government and Housing Town Planning Department (LG&HTPD) in collaboration with the Planning and Development Department (P&DD), the Public Health Engineering and Rural Development Department (PHED), facilitated by UNICEF, sought to develop a sector development plan for Water, Sanitation and Hygiene (WASH) for the province of Sindh.

The process was initiated with a visioneering exercise held under the auspices of the LG&HTPD, where senior government officials from P&DD, PHE&RDD, Irrigation, School Education, and Health participated together with UNICEF and consultants who facilitated the process. This inceptive meeting provided a strategic direction to guide and steer the process of developing a sector plan.

A wide stakeholder consultation was undertaken to determine emerging priorities, develop an insight into strategy, and synthesise common themes that would guide formulation of a sector plan.

This 10-years WASH sector development plan incorporates resource mapping, sector analysis, prioritisation and proposed strategic actions. It also includes an institutional framework, plan of action for sectors and sub sectors, investment and sector financing, coordination and partnership mechanism, resource mobilisation plan, and an M&E framework.

INTRODUCTION

Source: FAO. (In this map, the new district of Sujawal is shown within Thatta District)

Figure 1 - District map of Sindh

The province of Sindh (Fig 1) in Pakistan is the most urbanised of the four provinces in the country. The province has a land area of 140,915 sq. km and comprises of almost 16% of the country's land area. The province is located in the south-east of Pakistan. Sindh province is bounded by the Thar desert to its east, the Kirthar mountains in the west, and the Arabian Sea to the south. The Indus River runs through its centre across a fertile plain. The climate is mainly tropical to sub-tropical and Sindh is divided into three climatic regions - Siro (the upper region, centred on Jacobabad), Wicholo (the middle region, centred on Hyderabad), and Lar (the lower region, centred on Karachi).

Sindh receives an average annual rainfall of about seven inches, falling mainly during July and August. The southwest monsoon wind begins in mid-February and continues until the end of September, whereas the cool northerly wind blows during the winter months from October to January.

The population is mainly comprised of Sindhis, Sindhis of Pashtun origin, Sindhis of Balochi origin, Urdu-speaking Mohajirs and their descendants, Punjabis and Pashtuns.

Administratively, the province is divided into Districts, Sub-districts (Talukas) and Union Councils. The districts are further grouped into seven divisions. The administrative units in the province are as follows:

Division	Districts
Karachi	Karachi Central, Karachi East, Karachi South, Karachi West, Korangi, Malir
Banbhore	Badin, Thatta, Sujawal
Hyderabad	Dadu, Hyderabad, Jamshoro, Matiari, Tando Allah Yar, Tando Muhammad Khan
Sukkur	Ghotki, Khairpur, Sukkur
Larkana	Jacobabad, Kashmore, Larkana, Qambar Shahdadkot, Shikarpur
Mirpur Khas	Mirpur Khas, Sanghar, Tharparkar, Umerkot
Shaheed Benazir Abad	Naushahro Feroze, Shaheed Benazir Abad

- 29 Districts
- 119 Towns
- 1297 Union Councils

Furthermore, the province has the following educational and health institutions[19]:

- Education (2009-10):
    - 45,044 primary schools
    - 2,668 middle schools
    - 1,893 secondary schools
    - 225 Intermediate and Degree Colleges
- Health (2012):
    - 6 Teaching Hospitals
    - 82 Civil, Major Specialised and Taluka Hospitals
    - 108 Rural Health Centres
    - 308 Basic Health Units (BHUs)
    - 520 Dispensaries
    - 40 Mother and Child Health Centres and 186 Tuberculosis Clinics

[19] Development Statistics of Sindh 2013. Sindh Bureau of Statistics, Government of Sindh

Population

The population of the province is estimated to be 44.807 million people[20] (about 318 persons per sq. km) in 2012 and constitutes about 24% of the population of Pakistan. About 49.5% of the population is urban and 50.5% is rural. According to the 1998 population census, the male to female population ratio is about 1.12:1, with a growth rate of 2.80%. Nearly 53.26% of Sindh's population is under 20 years, and about 70.90% is under 30 years[21]. This indicates that Sindh has a large youth dividend and is expected to dominate the population for another 30-35 years.

Health

Health indicators in Pakistan have shown relative improvements in the context of South Asia, but remain far from satisfactory. Pakistan ranks 147th in the Human Development Index (HDI)[22], with a national HDI of 0.538 (Sindh's HDI was reported as 0.507 in 2006-07 when the national HDI was 0.561[23]), a Maternal Mortality Rate of 214[24], Infant Mortality Rate of 82, Under 5 Mortality Rate of 104, 42.0% children under five years with moderate and severe underweight, 48.0% children under five years with moderate and severe stunting, 15.4% children under five years with moderate and severe wasting, and skilled birth attendance at 65.7%[25].

Public sector current expenditure for health in Sindh has grown from PKR 18.549 billion in 2010-11, PKR 30.587 billion in 2011-12, PKR 32.366 billion in 2012-13, PKR 35.514 billion in 2013-14, to PKR 40.107 billion in 2014-15. However, development expenditure on health grew from PKR 4.388 billion in 2010-11, PKR 6.267 billion in 2011-12, PKR 11.143 billion in 2012-13, PKR 11.115 billion in 2013-14, and PKR 11.031 billion in 2014-15[26]. Between 2012 to 2015, the development expenditure has averaged at PKR 11 billion per year with no significant change year on year during this period.

Education

Sindh has an overall literacy rate of 56% in 10+ years population, with 67% in males and 43% in females, 37% in rural and 72% in urban areas. In rural areas, 53% of males were literate as compared to 21% in females[27]. In rural Sindh[28], about 37% of children aged 3-5 years are enrolled in pre-primary education, while 73% children aged 6-16 years are enrolled in school (82% in

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[20] Development Statistics of Sindh 2013. Sindh Bureau of Statistics, Government of Sindh

[21] Development Statistics of Sindh 2013. Sindh Bureau of Statistics, Government of Sindh

[22] Human Development Report 2015. UNDP

[23] http://unpo.org/article/10253 accessed on 21 May 2016

[24] Sathar, Zeba A., Maqsood Sadiq, and Seemin Ashfaq. "Reducing maternal and child mortality in Sindh: The untapped potential of family planning," Policy Brief. Islamabad, Pakistan: Population Council, Evidence Project 2015.

[25] Multiple Indicator Cluster Survey (MICS) Sindh 2014. Government of Sindh

[26] Annual PRSP Budgetary Expenditures for FY 2010-11, FY 2011-12, FY 2012-13, FY 2013-14, and FY 2014-15 (Provisional). Ministry of Finance, Government of Pakistan

[27] Pakistan Social and Living Standards Measurement Survey 2013-14. Pakistan Bureau of Statistics

[28] Sindh (Rural) Education Scorecard. ASER 2014

government schools and 18% in non-state schools). Of the 27% aged 6-16 years who are out of school, 52% are girls.

Overall[29], the situation in Sindh is worrisome, with a net enrolment rate of 48% of children aged 5-9 years (excluding Katchi class) at the primary level, with 61% in urban and 39% in rural Sindh. Overall, 7% of children aged 10-18 years old left school before completing primary level.

Currently, in children aged 6-16 years, 5.9% in urban Sindh[30] and 25.7% in rural Sindh[31] are out of school. About 19.4% of children aged 6-16 years in rural Sindh have never attended school, while 6.3% drop out of school[32].

According to the ASER 2015 Report (Sindh Rural)[33], 59.0% of primary, 68.8% of elementary and 80.0% of high schools had useable water in government schools. Further, only 46.2% of primary, 81.2% of elementary and 70.0% of high schools had useable toilet in government schools.

Poverty

During the period of 2000s to 2013-14, the annual unemployment rate has ranged from 6.8 million to 6.0 million and stabilising at about 3.6 million unemployed labour force[34], while per capita income growth has fallen from 7% to under 0.5%[35].

Although Pakistan has made significant progress in human development and poverty reduction over the past three decades, it is considered relatively slow over a long horizon. Social and economic exclusion has resulted in multiple deprivations for more than 50% of Pakistan's population. This situation has only been worsened by the recent deluge of floods in 2010, 2011 and 2013. Inflation reduced from a high 17.03% in FY 2008-09 to 4.81% in FY 2014-15[36].

Multi-dimensional Poverty

It is now established that poverty is not determined by a single factor, but is the result of several factors. Poverty indicators are considered under a broad theme known as multi-dimensional poverty.

Multi-dimensional poverty in Pakistan (**Table 3**) has been estimated by using four main dimensions (income, education, health, housing and services) and eleven sub-dimensions (income – unidimension, years of education, read and write, immunisation, purity of water, pre-natal

[29] Pakistan Social and Living Standards Measurement Survey 2013-14. Pakistan Bureau of Statistics

[30] Annual Status of Education Report – Pakistan 2014

[31] Annual Status of Education Report – Pakistan National Report (Rural) 2015

[32] Annual Status of Education Report – Pakistan National Report (Rural) 2015

[33] Annual Status of Education Report – Pakistan National Report (Rural) 2015

[34] Economic Survey of Pakistan 2014-15. Ministry of Finance, Government of Pakistan

[35] Analytical Review of the PSDP portfolio, Planning Commission, Government of Pakistan, 2011

[36] Economic Survey of Pakistan 2014-15. Ministry of Finance, Government of Pakistan

consultation, occupancy status, electricity connection, gas connection, telephone connection, toilet)[37].

Table 3 - Multi-dimensional poverty in Pakistan - incidence, depth and severity

Group	% Incidence M_0	Contribution %	% Depth M_1	Contribution %	% Severity M_2	Contribution %
Punjab	35.56	22.67	17.42	22.74	8.54	22.82
Urban	25.62	22.30	12.61	22.34	6.20	22.37
Rural	42.38	23.22	20.77	23.33	10.18	23.44
Sindh	38.40	24.48	18.85	24.61	9.26	24.75
Urban	25.50	22.19	12.55	22.24	6.17	22.26
Rural	47.29	25.91	23.17	26.02	11.35	26.13
Khyber Pakhtunkhwa	38.39	24.48	18.66	24.36	9.07	24.24
Urban	29.73	25.87	14.60	25.87	7.17	25.87
Rural	42.54	23.30	20.63	23.17	10.01	23.05
Balochistan	44.49	28.37	21.67	28.29	10.55	28.19
Urban	34.05	29.63	16.68	29.55	8.18	29.51
Rural	50.33	27.57	24.46	27.47	11.89	27.38
Pakistan	38.31	100.00	18.73	100.00	9.16	100.00
Urban	27.64	100.00	13.57	100.00	6.66	100.00
Rural	44.80	100.00	21.86	100.00	10.67	100.00

(Source: Khan A et al. Mapping and Measuring of Multidimensional Poverty in Pakistan: Empirical Investigations, 2011)

On assessment of poverty with non-income deprivation indicators (Table 4), it was found that 57.30% of the population was in a state of multi-dimension poverty[38]. In the case of Sindh, it was 47.63% overall, and 26.66% for urban and 67.44% for rural.

[37] Khan A et al. Mapping and Measuring of Multidimensional Poverty in Pakistan: Empirical Investigations, 2011

[38] Jamal H. Assessing Poverty with Non-Income Deprivation Indicators: Pakistan, 2008-09. The Pakistan Development Review 50:4 Part II (Winter 2011) pp.913–927

Table 4 - Non-income multi-dimensional poverty incidence

Area	% Overall M_0	% Urban M_0	% Rural M_0
Pakistan	57.30	25.68	53.35
Punjab	36.93	22.42	43.58
Sindh	47.63	26.66	67.44
Khyber Pakhtunkhwa	56.10	36.53	60.00
Balochistan	78.53	44.83	88.61

(Source: Jamal H. Assessing Poverty with Non-Income Deprivation Indicators: Pakistan, 2008-09. The Pakistan Development Review 50:4 Part II (Winter 2011) pp.913–927)

Table 5 summarises key results from the recent Household Integrated Economic Survey 2010-11[39], in which the sample population was divided into five quintiles. The 1st quintile corresponds to the poorest 20% of the population, while the 5th quintile corresponds to the most affluent 20% of the population. There is over three times difference in average monthly income between the 1st and 5th quintiles. In the case of Sindh, it shows that the households in the 1st to 4th quintiles are in a state of deficit for the end of month household budgetary position.

A recent study[40] by Sustainable Development Policy Institute has revealed the following in Sindh:

- After Balochistan, Sindh has the second highest incidence of poverty where 33% of households are living in poverty, with 46% in rural and 20% in urban areas
- Poor households in Sindh, on average, experience deprivation in 51% of the weighted dimensions
- After Balochistan, Sindh has the second highest Multi-dimensional Poverty Index (MPI) score of 0.17; MPI for rural Sindh is 0.25 which is two and half times higher than for urban Sindh (0.1)
- 21% of households in Sindh are severely poor (34% rural and 8% urban)

[39] Household Integrated Economic Survey 2010-11. Pakistan Bureau of Statistics

[40] Arif Naveed and Nazim Ali. Clustered Deprivation: District Profile of Poverty in Pakistan, 2012. Sustainable Development Policy Institute

Table 5 - Household economic situation by quintiles

		Quintiles					
		Total	1st	2nd	3rd	4th	5th
Percentage Households		100	15.86	17.63	19.07	21.52	25.92
Average Monthly Income per Household in Rupees		21785	11386	14274	16841	20784	37728
Members per Household	Pakistan	6.38	8.05	7.24	6.70	5.93	4.92
	Balochistan	7.08	8.09	7.65	7.19	6.55	5.64
	Khyber Pakhtunkhwa	7.17	9.33	8.08	7.42	6.50	5.09
	Punjab	6.16	7.66	6.89	6.39	5.69	5.05
	Sindh	6.39	8.43	7.43	6.90	6.13	4.50
End of Month Household Budgetary Position in Rupees Deficit (-) Surplus (+)	Pakistan	1955.9	258.52	435.89	661.67	1444.70	5405.07
	Balochistan	752.88	-100.24	169.45	1103.05	884.79	1855.53
	Khyber Pakhtunkhwa	1357.67	544.16	563.48	992.99	482.73	4130.98
	Punjab	3060.07	825.89	804.42	1292.04	2253.15	7610.56
	Sindh	-266.70	-1376.44	-455.46	-1155.09	-40.39	883.08
Average Monthly Per Capita Expenditure Housing and Rent in Rupees (includes water and conservancy charges)	Pakistan	421.96	121.6	186.71	259.95	381.28	1160.41
	Balochistan	274.81	136.3	183.89	247.38	340.48	647.61
	Khyber Pakhtunkhwa	273.34	90.9	139.35	192.94	299.32	826.88
	Punjab	405.39	122.54	192.29	262.18	370.88	994.6
	Sindh	582.09	134.56	208.53	300.18	466.68	1815.87

(Source: Computation from Household Integrated Economic Survey 2010-11)

Urbanisation

Pakistan is one of the fastest urbanising countries in South Asia and the share of urban population is increasing significantly. The population in rural areas decreased from 61.4% in 2014 to 60.8% in 2015, whereas the population in urban areas increased from 38.5% in 2014 to 39.2% in 2015[41]. In Pakistan, the rural population is moving towards the cities due to reduction in the work opportunities in agriculture sector because of modern technology used in the sector and to search better work openings especially in informal sector in cities. For these reasons, small and medium sized cities of Pakistan are growing at a higher rate.

With an increasing population, Pakistan is the fifth most populous country in the world and second largest in South Asia. Pakistan's urbanisation is expected to reach over 50% by 2025. However, actual urbanisation is probably much higher since the definitions used in Pakistan are administrative rather than density based. By employing an amended definition, estimates of actual urbanisation at present place 50% in cities.

[41] Economic Survey of Pakistan 2014-15. Ministry of Finance, Government of Pakistan

While increasing urbanisation is considered useful for economic growth in Pakistan, where cities produce up to 80% of GDP, rising urban poverty, quantitative shortage, inequitable coverage and poor quality of service delivery lead to further degradation of the urban environment. Three of the top fifteen cities with populations of more than 1 million in 2030 are located in Sindh (Table 6).

While underground sewerage systems have been developed and do exist in the urban areas, a high proportion of the sewers are open drains (24%)[42]. These carry untreated effluent and pose serious health and environmental hazards.

Table 6 - Growing population in cities

City with more than 1 million population	Population 2030 ('000)
Karachi	27,993
Lahore	14,626
Faisalabad	6,192
Rawalpindi	4,149
Multan	3,025
Hyderabad	3,005
Gujranwala	3,143
Peshawar	2,778
Islamabad	3,175
Quetta	2,038
Sargodha	1,074
Bahawalpur	1,903
Sialkot	1,087
Larkana	1,174
Sheikhupura	1,019

(Source: Pakistan: Framework for Economic Growth, 2011. Planning Commission, Government of Pakistan)

Solid Waste Management (SWM) is one of the rapidly growing challenges facing both urban and rural areas of Sindh. Recent estimates suggest that there is no garbage collection system in about 44% of urban areas and 97% of rural areas in Sindh[43]. Municipal services only provide coverage of garbage collection to about a third (33%) of households in urban areas and to18% in rural areas.

An area of rising concern is the inadequate and unsafe disposal of hospital waste. The common finding is either of no hospital waste management system or where it does exit, incineration technology is the main mode, which has its own hazards since it produces ash and emits acidic and toxic gases. Other methods practiced include being disposed off by municipal landfills and burning

[42] Pakistan Social and Living Standards Measurement Survey 2013-14. Pakistan Bureau of Statistics

[43] Pakistan Social and Living Standards Measurement Survey 2013-14. Pakistan Bureau of Statistics

waste in open air without any specific treatment[44]. There is need for introducing non-burning technologies for safe hospital waste disposal.

[44] Shahida Rasheed, Saira Iqbal, Lubna A. Baig, Kehkashan Mufti. Hospital Waste Management in the Teaching Hospitals of Karachi. JPMA 55:192;2005

POLICY SHIFT FROM MDGS TO SDGS

Member states decided on a single SDG goal for water and sanitation, that looks at the entire water cycle from the resource, to services, and back to the resource.

Goal 6: Ensure availability and sustainable management of water and sanitation for all

The decision of member states is informed by the fact that all aspects of water touch on human development, and none should be looked at in complete isolation. The six key components of this goal include:

- Drinking Water
- Sanitation and Hygiene
- Water Quality
- Water-use Efficiency
- Water Resource Management
- Eco-Systems

Two sub-components include 'international cooperation and capacity development', and 'local participation'.

The indicator for SDG target 6.1 is 'Proportion of population using safely managed drinking water services'. This represents a higher service threshold and a new 'rung' at the top of the drinking water service ladder used by JMP during the MDGs. The ladder aims to capture progressive improvements from no service at all (surface water) and use of unimproved water sources (no protection against contamination), to using an improved water source (helps protect against contamination) which was the old MDG standard. If you have an improved facility close to home (within 30 minutes) this is now classed as a basic level of service (accessibility, quality, quantity) but the SDGs aim higher. In order to be classed as safely managed the improved facility should firstly be located on premises (accessibility), secondly water should be available when needed (available), and thirdly it should be free from contamination (quality).

The indicator for SDG target 6.2 is 'Proportion of population using safely managed sanitation services including a handwashing facility with soap and water'. This represents a higher service threshold and a new 'rung' at the top of the sanitation ladder used by Joint Monitoring Programme during the MDGs.

The purpose of the ladder is to capture progressive improvements from no service at all (open defecation) and use of unimproved latrines (fixed point defecation), to using a basic sanitation facility (which safely separates excreta from human contact). This was the old MDG standard and it is important to distinguish between facilities which are private and those which are shared with other households. In order to meet the new SDG standard, one not only needs to use an improved facility which is not shared with other households (now classed as basic) but the faecal wastes produced should either be safely disposed on site, or transported and treated offsite. This reflects a consensus that needs to address management of faecal wastes along the entire sanitation chain.

Last but not least, the proposed global SDG indicator combines use of safely managed sanitation services and the presence of handwashing facilities with soap and water. This means that there is need to monitor handwashing much more systematically in future.

This is summarised in the matrices below.

MDG/SDG	Service ladder	Progressive realization
SDG 6.1	Safely managed drinking water	Improved facility located on premises, available when needed, and free from contamination
MDG continuity	Basic water	Improved facility within 30 minutes round trip collection time
	Unimproved water	Unimproved facility does not protect against contamination
	No service	Surface water

Realisation

Progressive

MDG/SDG	Service ladder	Progressive realization
SDG 6.2	Safely managed sanitation	Private improved facility where faecal wastes are safely disposed on site or transported and treated off-site; plus a handwashing facility with soap and water
MDG continuity	Basic sanitation	Private improved facility which separates excreta from human contact
	Shared sanitation	Improved facility shared with other households
	Unimproved sanitation	Unimproved facility does not separate excreta from human contact
	No service	Open defecation

Realisation

Progressive

The key differences between the MDGs and SDGs are presented in the matrix below.

Aspect	MDGs	SDGs
Targets	**MDG target (1990 – 2015)** Halve the proportion of people without sustainable access to safe drinking water and basic sanitation	**SDG targets (2016 – 2030)** Achieve universal and equitable access to safe and affordable drinking water for all Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation paying special attention to the needs of women and girls and those in vulnerable situations
Indicators	**MDG target indicators** ▪ Proportion of population using an improved drinking water source ▪ Proportion of population using an improved sanitation facility	**SDG targets indicators** ▪ Percentage of the population using safely managed drinking water services ▪ Percentage of the population using safely managed sanitation services, including a hand-washing facility with water and soap

Definitions	**MDG target indictors - definitions**
	▪ Water supply: households taking their drinking water from a household connection (piped water), a public standpipe, a borehole, a protected dug well, a protected spring, rain water collection.
	▪ Limitations: water safety and sustainability not reflected
	▪ Sanitation: households using toilets connected to a public sewer or a septic tank, using a pour-flush toilet, a pit latrine, a ventilated improved pit latrine. Households sharing an improved toilet NOT included.
	▪ Limitations: open disposal of sewage, pit content not reflected
		SDG target indicators – definitions
		o Water Supply: Population using an improved drinking water source which is:
		  o Accessible: located on premises
		  o Available: available when needed
		  o Safe: free of faecal and priority chemical contamination
		o Sanitation: Population using an improved sanitation facility (including a handwashing facility with water and soap) that is:
		  o not shared with other households
		  o excreta are safely disposed in situ or transported and treated off-site

The Sindh WASH Sector Development Plan is designed to be SDG compliant and aims to meet SDG targets, while recognising that some aspects like quality, safely managed, on-premises, not shared etc. may take some time to be achieved.

SECTOR OVERVIEW

Demographics

Sindh is a densely populated and most urbanised province of Pakistan accounting for 24% of the country's total population. The population of Sindh increased from 41.248 million in 2010, to 45.998 million in 2015, and is expected to reach 70 million or more by 2050[45]. The population growth rate in 1998 was 2.80%, and the highest was for Karachi district with 3.56%[46]. Between 1981 and 1998, the population of Karachi district almost doubled from 5.437 million to 9.856 million. Karachi City district alone had an estimated population of 16.459 million in 2012. The largest districts after Karachi district with a population over 1.5 million in 2012 are Larkana, Ghotki, Khairpur, Shaheed Benazirabad (previously Nawabshah), Dadu, Hyderabad, Badin, Thatta and Sanghar, while all the rest are under 1.5 million with Tando Mohammad Khan being the smallest district with 0.6 million. About 52.5% of the population is male and 47.5% is female. Similar proportions are found in all divisions. The trend of urbanisation and a growing population will continue to increase demands for sector and sub-sector services.

Institutions

At provincial level, the four main departments/agencies responsible for water and sanitation are Local Government and Town Planning Department (LG&TPD), Public Health Engineering and Rural Development (PHE&RDD), Karachi Water and Sewerage Board (KW&SB) and Hyderabad Water and Sanitation Authority (H-WASA). Generally, water supply schemes in urban areas are developed and maintained by the LG&TPD, while schemes for rural areas are developed by PHE&RDD and then handed over to the communities. Further, KW&SB is responsible for production, transmission and distribution of potable water to the citizens of Karachi, while the Northern Sindh Urban Services Corporation (NSUSC) develops and maintains water supply schemes for seven cities (Khairpur Mirs, Sukkur, New Sukkur, Rohri, Larkana, Shikarpur and Jacobabad). The Water and Sanitation Authority (WASA) Hyderabad has the responsibility to provide water to the urban localities of Hyderabad. Coordination mechanisms between the departments/agencies need to be improved owing to the inter-dependence between the services required. Several national and international partners collaborate with the Government and include UNICEF, Sindh Rural Support Programme (SRSP), WSP, Plan International, etc.

With regards to governance of water and sanitation, the institutional structure is as follows:

- At the provincial level – Local Government and Housing Town Planning Department (LG&HTPD), Public Health Engineering and Rural Development Department (PHE&RDD), Karachi Water and Sewerage Board (KW&SB); Karachi Development Authority; Karachi Metropolitan Corporation; Northern Sindh Urban Services Corporation (NSUSC); Hyderabad

[45] Bloom, David, Zeba A. Sathar, and Maqsood Sadiq. "Prospects for Economic Growth in Sindh under Alternative Demographic Scenarios: The Case for a Rapid Fertility Decline," Policy Brief. Islamabad, Pakistan: Population Council, Evidence Project. 2015.
[46] Sindh Development Statistics 2013. Sindh Bureau of Statistics, Government of Sindh

Water and Sanitation Authority (H-WASA); Community Development Programme (CDP); Special Initiatives by Planning and Development Department (P&DD)

- Local governments – Metropolitan Corporation; District Councils; Municipal Corporation; Municipal Committees and Union Administration are responsible
- Rural Water Supply Schemes – planned, designed and executed by PHE&RDD, while operation and maintenance (O&M) is the responsibility of LG&HTPD and Community Based Organisations (CBOs)

Drinking Water

Figure 2 - Main supply of drinking water trends 2007-08 to 2013-14 in Sindh

	07-08 Urban	10-11 Urban	11-12 Urban	12-13 Urban	13-14 Urban	07-08 Rural	10-11 Rural	11-12 Rural	12-13 Rural	13-14 Rural	07-08 Overall	10-11 Overall	11-12 Overall	12-13 Overall	13-14 Overall
Others	7%	4%	5%	9%	8%	10%	10%	8%	11%	9%	9%	7%	7%	10%	10%
Dug Well	0%	0%	0%	1%	1%	8%	8%	5%	7%	7%	4%	4%	3%	4%	3%
Motor Pump	10%	17%	11%	10%	10%	8%	6%	8%	8%	7%	9%	12%	9%	9%	8%
Hand Pump	10%	7%	7%	8%	8%	57%	62%	73%	63%	69%	33%	34%	39%	34%	37%
Tap Water	73%	72%	77%	72%	73%	17%	14%	6%	11%	8%	45%	43%	42%	43%	42%

(Source: Pakistan Social and Living Standards Measurement Surveys 2007-08, 2010-11, 2011-12, 2012-13 and 2013-14)

Overall in Sindh, 42% of households are using tap water as the main supply of drinking water in 2013-14 as compared to 43% in 2010-11, followed by hand pump[47] with 37% in 2013-14 as compared to 34% in 2010-11 and motor pump with 8% in 2013-14 as compared to 12% in 2010-11[48]. The proportion of households using tap water as a main supply of drinking water is higher in urban areas, 73% as compared to only 8% in rural areas. Fig 2 illustrates that there is an increasing

[47] "Other" includes public standpipe (supplied by tanker), water seller, canal, river, spring, stream, pond, mineral water, Filtration Plant and other

[48] Pakistan Social and Living Standards Measurement survey 2012-2013 and 2013-14. Pakistan Bureau of Statistics, Government of Pakistan

trend of 'others' in urban areas and hand pump being used as a main supply of drinking water in rural areas.

While comparing districts, 73% of households in Hyderabad and 86% in Karachi districts use tap water as the main supply of drinking water, followed by Jamshoro with 38%, Mirpur Khas with 35% and Sukkur with 33%. On the other hand, Dadu, Matiari, Tando Allah Yar, Tando Mohammad Khan, Jacobabad, Kashmore, Larkana, Shikarpur, Tharparkar, Khairpur and Nawabshah (Shaheed Benazirabad) have 10% or less of tap water.

The main supply of drinking water in rural areas is hand pump in 69%, followed 'others' by in 9%.

The Multiple Indicator Cluster Survey 2014 in Sindh[49] reveals that overall 90.5% of household members use an improved source of drinking water[50]. About 3.0% of household members use drinking water with over 10 ppb Arsenic concentration.

Both surveys do not address the issue of quality of drinking water, which is an area of critical concern.

Of those households that use an unimproved source of drinking water supply (9.5%), only 12.8% household members use an appropriate water treatment method.

Sanitation

In Sindh[51], about 65% households have flush toilet, with 98% in urban and 29% in rural areas. About 23% of households have non-flush toilet facilities, while 12% of households reported no toilet. In rural areas, 24% households reported having no toilet compared to 1% in urban areas.

With regards to districts, Tharparkar had the highest proportion of households with no toilet (47%), followed by Umer Kot with 35%, Badin with 32% and Thatta with 24%.

Figure 3 illustrates a rising trend of use of flush toilet in both overall and rural areas, although it seems very gradual in urban areas. Furthermore, there has been a 20% reduction in 'No toilet' category in rural areas and 20% reduction overall in Sindh in the last five years.

[49] Multiple Indicator Cluster Survey (MICS) Sindh 2014. Government of Sindh

[50] Includes piped water (into dwelling, compound, yard or plot, to neighbor, public tap/standpipe), tube well/borehole, protected well, protected spring, and rainwater collection. Bottled water is considered as an improved water source only if the household is using an improved water source for hand washing and cooking.

[51] Pakistan Social and Living Standards Measurement survey 2013-2014. Pakistan Bureau of Statistics, Government of Pakistan

Figure 3 - Sanitation trends 2007-08 to 2013-14 in Sindh

	07-08 Urban	10-11 Urban	11-12 Urban	12-13 Urban	13-14 Urban	07-08 Rural	10-11 Rural	11-12 Rural	12-13 Rural	13-14 Rural	07-08 Overall	10-11 Overall	11-12 Overall	12-13 Overall	13-14 Overall
No Toilet	1%	1%	0%	1%	1%	30%	14%	26%	17%	24%	15%	7%	12%	8%	12%
Non Flush	4%	4%	3%	3%	1%	51%	60%	52%	57%	47%	28%	31%	27%	29%	23%
Flush	95%	95%	97%	96%	98%	19%	26%	22%	26%	29%	57%	62%	61%	63%	65%

(Source: Pakistan Social and Living Standards Measurement Surveys 2007-08, 2010-11, 2011-12, 2012-13 and 2013-14)

LEGISLATION AND POLICIES

The key legislations and policies and their salient features that relate to water and sanitation are presented below.

Pakistan EPA Act, 1997

The Pakistan Environmental Protection Act 1997 was enacted on December 3, 1997. Some of its salient features are as follows:

Pakistan Environmental Protection Council

Apart from ensuring environmental protection, the council is authorised to:

1. Approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time
2. Provide guidelines for the protection and conservation of species, habitats, and Biodiversity in general, and for the conservation of renewable and non-renewable resources
3. Consider the National Environment Report and give appropriate directions thereon

The Council may, either itself or on the request of any person or organisation, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any specified aspect of environment.

Pakistan Environmental Protection Agency

Among its major activities, the agency is also responsible for:

1. Prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council
2. Prepare and publish an annual National Environment Report on the state of the environment
3. Prepare or revise, and establish the National Environmental Quality Standards (NEQS) with approval of the Council
4. Ensure enforcement of the National Environmental Quality Standards
5. Establishing standards for the quality of the ambient air, water and land, by notification in the official Gazette, in consultation with the Provincial Agency concerned
6. Establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors

Prohibition of Certain Discharges or Emissions

Subject to the provisions of this Act and the rules and regulations made there under, no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable.

No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.

Initial Environmental Examination and Environmental Impact Assessment

No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained from the Federal Agency approval in respect thereof.

Environmental Protection Order

Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring or has occurred in violation of the provisions of this Act, rules or regulations or of the conditions of a license, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

In particular and without prejudice to the generality of the foregoing power, such measures may include:

1. Immediate to stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimise or remedy the adverse environmental effect
2. Installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or Commission
3. Action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances
4. Action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency

Further sections lay out the penalties applied to the various stakeholders in case of non-compliance with the Act.

Sindh Water Management (Amendment) Act, 2005

This Act is derived from and replaces the Sindh Water Management Ordinance, 2002, which established the Sindh Irrigation and Drainage Authority (SIDA) and repealed the Sindh Irrigation and Drainage Authority Act, 1997 and the Sindh Irrigation Water Users' Association Ordinance, 1982. The functions of SIDA shall be to:

- Operate and maintain the parts of the irrigation system such as barrages and outlets assigned to it
- Operate and maintain the parts of the drainage system assigned to it including spinal drains and inter-Area Water Board (AWB) drains
- Carry out river flood protection and maintain the infrastructure in the Province of Sindh
- Advise the Government on any matter strategic or tactical, related to its functions and tasks or to the water management system as a whole e.g. irrigation or drainage contribution rates, drought management and sea water intrusion
- Manage the transition process, to promote the formation, growth and development of the AWBs and Farmer organisations (FOs) into self-supporting and financially self-sustaining entities within a period of seven to ten years of their establishment
- Perform any other function conferred to it under this Act

Under this Act, the Government may constitute Area Water Boards (AWBs), together with their respective territorial jurisdiction, provided that the AWBs existing immediately before the commencement of this Act shall continue to function until replaced by new AWBs under this Act.

Each AWB shall establish and maintain a Water Allocation Committee (WAC). If the AWB has branch canals taking off from the main canal and conveying water to FOs, the AWB shall also establish and maintain WACs at branch level. For the purpose of a smooth interaction with the local communities in which the AWBs operate, each AWB may establish a Community Advisory Committee (CAC).

In every local area, a group of non-elected farmers may, for energising the farming community and improving service delivery, set a Water Course Association (WCA) and undertake voluntary, proactive and self-help initiatives. The WCA shall register with the respective FO.

In every local area, a group of non-elected farmers, who are interested, may undertake voluntary, proactive and self-help initiatives in connection with the drainage system and form a Drainage Beneficiaries' Group (DBG) and register it with the FO.

The Act also proposes the establishment of a Regulatory Authority of Irrigation, Drainage and Flood Protection. The functions of the Regulatory Authority shall be to ensure compliance with the statutory provisions laid down in this Act. In addition, the Regulatory Authority shall promote effective interaction and collaboration between SIDA, AWBs, FOs and their various support bodies as well as fair dealing between FOs, WCAs, DBGs and their members. It shall, when invited to do so, arbitrate between them. Until the Regulatory Authority is established, SIDA shall perform the functions of the Regulatory Authority under this Act.

Sindh Municipal Water Act (Draft), 2012

This states that all water used, or intended to be used for drinking, domestic, recreational, horticultural, industrial or commercial purposes and such other purposes as may be prescribed shall be declared as municipal water. This categorises water into potable domestic for drinking, non-potable domestic, commercial, industrial, amenity, environmental and institutional.

The draft Act has proposed the establishment of a regulatory authority called the Sindh Municipal Water Commission. Upon establishment of the Commission, the responsibility for regulating the conservation, protection, utilisation, exploitation, development of water resources and the regulation of all municipal water services, including quality assurance of water, water services and tariff shall vest with the Commission.

The Commission shall perform the following functions:

- Manage all sources (shall be the custodian) of municipal water, on behalf of the provincial government
- Maintaining a comprehensive database of all sources of municipal water
- maintaining a comprehensive database of all the bulk and retail service providers in the province
- Setting and notification of standards of water quality and quality of services delivered for all municipal purposes
- Setting and notification of standards and norms for maintaining the quality of water taken from or discharged into any water body
- Suggesting and notifying the measures and means for the effective and sustainable use of water resources for water supply services
- Prescribing the regulations and methodologies for improving the nature, operation, sustainability, operational efficiency and economic viability of water services
- Prescribing the requirements for persons who may install and operate water services works and provide assistance and coordinate with the water utilities and water users for developing and improving the appropriation, usage and disposal of water
- Present an annual report to the Government regarding the overall management and administration of water, including recommendations on measures to be taken by the Government to enhance the quality or quantity of available water
- Develop, promote and support training and professional development of officials and other persons engaged in provision or regulation of water supply and sanitation services
- Carry out research and development, by itself or in collaboration with the specialised institutions of research and higher education, either in the public sector or in the private sector; aimed at conserving, improving and extending the water sources and water services in the province
- Advise the Government on all policy and planning matters related to municipal water

In prescribing standards, the Commission must consider:

- The need for everyone to have a reasonable quality of life
- The need for equitable access to water services
- The operational efficiency and economic viability of water services

- Any norms and standards for applicable tariffs for water services
- Any other laws or any standards set by other governmental or federal government agencies
- Any guidelines and standards prescribed under the Punjab Environmental Protection Act
- Any impact which the municipal water supply services might have on the environment
- The obligations of the Provincial Government as custodian of water resources

Water Services

Under water services, the draft Act further proposes the following:

1. **Water and Sanitation Master Plan:** Every local government must, within one year after the commencement of this Act;

(a) As part of the city or regional master plan; or
(b) Separately, if no process for city or regional master plan has been initiated, prepare
(i) A draft water & sanitation master plan for its area of jurisdiction: and
(ii) A summary of that plan
(c) The contents of the master plan and summary shall be in accordance with the rules
(d) The draft plan shall be circulated and approved by the council, after vetting by the Commission
(e) The master plan shall be published on the website as well as printed and shall be made available to the consumers at a reasonable cost
(f) The summary of the plan shall be printed in sufficient numbers and shall be distributed free of cost to all the consumers or potential consumers

2. **Deviation from the Master Plan:** No substantial deviation from the master plan is valid unless it is embodied in a new master plan adopted in accordance with the procedure set out in the rules.

3. **Reporting on Implementation of Local Government Plans:**

(1) A local government must report on the implementation of its plans in such manner and form as may be prescribed during each financial year
(2) The report must be:
(a) Made within four months after the end of each financial year, and
(b) Submitted to the Commission and the Department of Local Government
(3) The Local Government must publicise a summary of its report
(4) A copy of the report and of its summary must be available at the offices of the local government for inspection upon payment of such fee as may be prescribed

Sindh Environmental Protection Act, 2014

Some of the salient features of the Sindh Environmental Protection Act 2014 are as follows:

The Government of Sindh shall, by notification in the official Gazette, establish a Council to be known as the Sindh Environmental Protection Council, which shall among other provisions, approve the Sindh Environmental Quality Standards, and co-ordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programmes at the provincial, district and local levels.

The Government shall by a notification in the official Gazette establish the Sindh Environmental Protection Agency to exercise the powers and perform the functions assigned to it under the provisions of this Act. The Sindh Environmental Protection Agency shall prepare and publish an Annual Environment Report on the state of the environment in the province; establish standards for the quality of the ambient air, water and land, by notification in the official Gazette in consultation with the other relevant Government Departments/ Agencies; and revise the Environmental Quality Standards with approval of the Council.

Sindh Local Government Act, 2014

The main legislation at present that governs drinking water and sanitation is the Sindh Local Government Act 2014. Some of the main provisions for water and sanitation under this Act are highlighted below.

Functions to be Performed by the Metropolitan Corporation exclusively

Planning development and maintenance of Inter-district roads, bridges, street lights and storm water drains.

Functions to be Performed by Corporations, other than Metropolitan Corporation Municipal Committees and Town Committees

A Corporation, Municipal Committee or Town Committee shall, within the limits of the funds at its disposal provide or cause to be provided, a supply of wholesome water sufficient for public and private purpose.

Private Source of water supply

All private sources of water supply within the Local Area concerned shall be subject to control, regulation and inspection by the Corporation, Municipal Committee or Town Committee.

Drainage

A Corporation, Municipal Committee or Town Committee shall, within the limits of the funds at its disposal provide adequate system of public drains in the Local Area and all such drains shall be

constructed, maintained kept cleared and emptied with due regard to the health and convenience of the public.

A Corporation, Municipal Committee or Town Committee may, and if required by Government, shall, in the prescribed manner, frame and execute a water supply scheme for the construction and maintenance of such works for the provision, storage and distribution of water as may be necessary.

Where a piped water supply is provided, the Council concerned may supply water to private and public premises in such manner and on payment of such charges as the bye-laws may provide.

Private sources of water supply

- No new well, water-pump or any other sources of water for drinking purposes shall be dug, constructed, or provided except with the sanction of the Council concerned
- The Council concerned may by notice require the owner or any person having the control of any private source of water supply used for drinking-
  - to keep the same in good order and to clear these from silt, refuse and decaying matter from time to time;
  - to protect the same from contamination in such manner as the Council concerned may direct, and
  - if the water therein is proved to the satisfaction of the Council concerned to be unfit for drinking purposes, to take such measures as may be specified in the notice to prevent the use of such water for drinking purposes.

Drainage

Every owner or occupier of any land or building within the Local Area may, with the previous permission of the Council concerned and subject to such terms and conditions, including the payment of fees, as the Council may impose, cause his drains to be emptied into public drains.

All private drains shall be subject to control, regulation and inspection by the Council concerned and the Council may, in such manner as the bye-laws may provide, require the provision, alteration, covering, clearing and closing of private drains.

Drainage Schemes

A Corporation, Municipal Committee or Town Committee may, and if so required by Government, shall prepare a drainage scheme in the prescribed manner for the construction of drains at public and private expenses, and other works for the effective drainage and disposal of sullage.

A drainage scheme prepared under clause (1) shall be submitted for approval to Government which may approve it, reject it, or approve it subject to such modifications as it may deem fit.

The drainage scheme as approved by Government shall be executed and implemented in such manner within such period and by such authority as may be specified by Government.

The Council concerned may, by notice, require the owner of any building or land within the local area -

- to construct such drains within the building or land or the street adjoining such building or land, as may be specified in the notice;

- to remove, alter, or improve any such drains; and
- to take such other steps for the effective drainage of the building or land as may be specified.

Functions of District Councils

To discharge the overall responsibility for the identification of projects and appraisal and approval of projects prepared and to be constructed by Union Councils in the following sub-section:-

- Primary, Middle and Secondary Schools
- Rural Health Centres
- Basic Health Units
- Family Welfare Clinics
- Piped Water Supply
- Potable Water Storage Tanks
- Hand Pumps
- Sanitation
- Rural Roads

Functions of Union Councils

To act as construction agency for the following sub- sectors:-

- Primary, Middle and Secondary Schools
- Rural Health Centres
- Family Welfare Clinics
- Basic Health Units
- Piped Water Supply
- Potable Water/Storage Tanks/Tube-wells, and Wells
- Hand Pumps
- Sanitation
- Rural Roads

To encourage and to facilitate the formation of associations for collective use and collection of charges for services such as electric supply and water course management, co-operative tubewell development, co-operative for input supplies and output marketing, water-course management, etc.

Provision and maintenance of wells, water pumps, tanks, ponds, and other works for the supply of water.

Adoption of measures for preventing the contamination of the sources of water supply for drinking.

Prohibition of the use of the water of wells, ponds, and other sources of water supply suspected to be dangerous to Public Health.

Regulation or prohibition of the watering of cattle, bathing or washing at or near wells, ponds or other sources of water reserved tor drinking purposes.

Regulation or prohibition of the steeping of hemp jute or other plants in or near ponds or other sources of water supply.

Taxes, Rates, Tolls and Fees to be Levied by Karachi Metropolitan Corporation

- Conservancy Tax.
- Drainage Tax.

Taxes, Rates, Tolls and Fees which may be Levied by Municipal Committees, Town Committees and Corporations excluding the Metropolitan Corporations

- Conservancy Rate.
- Rate for the execution of any work of Public Utility.
- Rate for the provision of water works or the supply of water.

Taxes, Rates, Tolls and Fees to be Levied by District Councils and Union Councils

- Drainage Rate.
- Rate for the execution of any works of Public Utility.
- Conservancy Rate.
- Rate for the provision of water works or the supply of water.

Sindh Solid Waste Management Board Act, 2014

The Sindh Solid Waste Management Board Act 2014 provides for the establishment of a Board called as the Sindh Solid Waste Management Board for the collection and disposal of solid and other waste in the Province of Sindh.

Some of the salient features and functions of the Board are as follows:

- The Board shall have the right over the solid waste related issues, assets, funds and liabilities of the Councils and shall possess sole rights on all kinds of solid waste within the limits of all Councils
- The Board shall have the authority to grant permission to individuals, institutions industries, factories, workshops, furnaces, compost making and power generation from the solid waste, for segregation of the recyclable material from the waste, collection, treatment, sale and purchase, recycling or disposal of any kinds of waste

Various legislations, rules and regulations impact on water and sanitation services in the province of Sindh. These are summarised in **Table 7** below.

Table 7 - Additional Processes and Institutions affecting Water and Sanitation

FRESH WATER	
Sindh Water Management Ordinance 2002 (No. XL)	This Ordinance establishes a framework for executing and managing schemes for irrigation, drainage and flood management. Water is defined broadly in section 2(r) as "any water standing or flowing on surface [sic] or found in the soil at any place in the province".
Sindh Irrigation and Drainage Authority Rules 1999	These Rules were framed under the Sindh Irrigation and Drainage Authority Act 1997. Although the 1997 Act has been repealed by the Sindh Water Management Ordinance 2002, rules framed under the 1997 Act are not specifically repealed or saved by the 2002 Ordinance. The Rules specify terms and conditions related to the supply of water, including the individual share of each canal command area, and allow the Authority to determine charges for water supply as well as "non-water services" provided (sections 8–10). Criteria according to which the aggregate water entitlement of each canal command area is determined include an "increased requirement for industrial, domestic, environmental, or health-related water usage" (section 10(2)).
Coastal Development Authority Act 1994 (No. XXVIII)	This Act establishes an Authority that is responsible for the development, improvement and beautification of the coastal areas of Thatta and Badin districts (section 7(1)). The Authority may plan and execute schemes related to a number of sectors including drinking water (section 7(2)(a)).
Port Qasim Authority Act 1973 (No. XLIII)	This federal Act establishes an Authority to oversee the planning, development and management of Port Qasim. The Authority is charged with preparing a master plan for the port area (section 10), and may call upon government agencies and local bodies to prepare and execute schemes in the port area related to matters over which these agencies ordinarily hold authority (section 11(2)). Among other activities, such schemes may provide for the utilisation of water and "other natural resources" (section 11(2)(f)), as well as environmental control and the prevention of pollution (section 11(2)(j)).
COASTAL AND MARINE	
Karachi Building and Town Planning Regulations 2002 Notification No. SO(Land)HTP/KBCA-3-39/2000	These Regulations, issued under the Sindh Buildings Control Ordinance 1979, provide exhaustive rules and procedures for construction and development activities in the city (section 1-2). They apply to all of Karachi except for cantonment areas (section 1-1.3).
URBAN AND RURAL DEVELOPMENT	
Sindh Development Authorities Laws (Amendment) Ordinance 2007	This Ordinance revives the Larkana and Sehwan development authorities.
Sindh Development Authorities Laws (Revival	This Ordinance revives the Lyari and Malir development

and Amending) Ordinance 2006	authorities.
Badin Development Authority Act 1995 (No. VII)	This Act establishes the Badin Development Authority, which is responsible for public works (section 7), including the supply and distribution of potable water (section 21).
Larkana Development Authority Act 1994 (No. XXI)	This Act establishes the Larkana Development Authority, which maintains public works, conducts research and provides technical guidance for development activities, and collaborates with federal, provincial or private-sector agencies engaged in development work (section 9).
Lyari Development Authority Act 1993 (No. X of 1994 [sic])	This law establishes the Lyari Development Authority, which maintains public works, conducts research and provides technical guidance for development activities, and collaborates with federal, provincial or private-sector agencies engaged in development work (section 8).
Malir Development Authority Act 1993 (No. XI of 1994 [sic])	This Act establishes the Malir Development Authority, which is responsible for a wide range of development activities. These include implementing schemes for the development of urban, rural and industrial areas (section 8(1)(viii)), and the provision of "public works" (section 8(1)(ix)).
Sehwan Development Authority Act 1993 (No. V of 1994 [sic])	This law establishes the Sehwan Development Authority, which is responsible for development activities in the taluka of Sehwan, as well as other areas of Dadu district (section 1(2)). The Authority is responsible for the "overall development, improvement and modification" of areas that lie within its jurisdiction (section 7(i)). It formulates and enforces "schemes" (section 7(ii)), builds and operates facilities for water supply, drainage, sewerage and solid waste disposal (section 7(iii)), and performs "other functions" assigned to it by the provincial government (section 7(v)). The Authority is also responsible for the production and supply of potable water to "Government agency" of (section 21).
Sindh Katchi Abadis Act 1987 (No. II)	This law establishes an Authority to develop, improve and 'regularise' squatter settlements, known as katchi abadis. The Authority is responsible for providing "civic amenities and civic services" to katchi abadis (section 11(2)(xiii)). This includes preparing schemes for the supply of water, gas and electricity; the construction of roads and streets; and arrangements for waste disposal (section 21).
Sindh Arid Zone Development Authority Act 1985 (No. II)	This Act provides for the establishment of an Authority to develop "arid zones" throughout the province. Such areas are defined in section 2(a) simply as those areas "declared as such" under section 3. The Authority is responsible for developing "lands" and water resources, as well as roads and public amenities (section 12(2)(iii)).
Sindh Buildings Control Ordinance 1979 (No. V)	This law provides for the regulation and control of construction activities, and the establishment of area building control authorities (section 4). Builders and property developers cannot operate without a licence (section 9). The building authority also grants licences to architects, planners, inspectors and engineers (section 8). The Karachi Building Control Authority (KBCA) was created under section 4 of this Ordinance.
Karachi Building and Town Planning Regulations 2002 Notification No.	These Regulations, issued by the KBCA under section 21-A of the Sindh Buildings Control Ordinance 1979, provide

SO(Land)HTP/KBCA-3-39/2000	exhaustive rules and procedures for construction and development activities in the city (section 1-2). They apply to all of Karachi except for cantonment areas (section 1-1.3).
Hyderabad Development Authority Act 1976 (No. XIII)	This Ordinance establishes the Hyderabad Development Authority, which is responsible for the "overall development, improvement and beautification" of urban areas (section 9(1)(i)) in the now-defunct Hyderabad Division.
Karachi Development Authority Order 1957 (No. 5)	This order, which establishes the Karachi Development Authority, or KDA (section 3), provides for the development and improvement of certain areas in the city. The KDA is responsible for water supply to "constituent bodies" (section 113) as well as individual consumers (section 114).

(Adapted from Environmental Law in Pakistan Governing Natural Resources and the Processes and Institutions that affect them – Sindh. Part V. IUCN, 2007)

Karachi Water and Sewerage Board Act, 1996

The Karachi Water and Sewerage Board Act 1996 provides for the establishment of a Board for supply of water and disposal of sewerage in the Karachi Division.

The main functions of the Board include the following:

(i) sanction in the manner and on payment of fees as may be prescribed by regulations:
- (a) water connection
- (b) water supply to tankers and
- (c) sewerage connection

(ii) levy, collect or recover rates, charges of fees for water supply and sewerage service, including arrears thereof

(iii) have the power to reduce, suspend or disconnect the water supply in the event of contravention of the provisions of this Act or regulations

(iv) have the power to impose surcharge, not exceeding double the amount due, if rates, charges or fees for water supply or sewerage service or the arrears thereof are not paid within the time fixed by the Board

(v) have full financial powers within the budget grant

(vi) make regulations with the approval of the Government

(vii) undertake construction improvement, maintenance and operation of:
- (a) water works including wells and recharge facilities for collecting, purifying, pumping, storing and distributing water to all types of consumers.
- (b) Sewerage works for collecting, pumping, treating and disposing of sewerage and industrial waste,

(viii) Assess the position of water supply from time to time and regulate water supply.

(ix) Review the existing schemes or prepare new schemes relating to water works and sewerage work and undertake execution thereof with the approval of the Government,

(x) Regulate, control or inspect water connection, sewer lines and service lines including internal fittings.
(xi) maintain accounts and records of the Board
(xii) prepare and submit to Government schedule of water and sewerage tariff, rates, charges or fees to be levied by it,
(xiii) prepare and revise schedule of posts for the Board and submit it to the Government for approval,
(xiv) produce and supply potable water
(xv) place, maintain aqueducts, conduits, sewers etc.

Supply of water and execution of schemes

(1) The Board shall be responsible for bulk production of potable water and its distribution in accordance with the provisions of this Act.
(2) The Board shall ensure that the water supplied by it is duly filtered, treated and tested and is fit for human consumption.
(3) The Bard shall arrange retail distribution of water within its jurisdiction excluding the areas receiving water supply through constituent Bodies.
(4) The Board may, subject to availability, supply water to any person or authority in the area or areas notified under this Act.
(5) The Board shall continue to make bulk water supply to the constituent Bodies at such rates and subject to such terms and conditions as may be determined by the Board.
(6) A standing committee consisting of the Chairman or his nominee, Commissioner Karachi Division and the Managing Director shall allocate and determine quantity of water to be supplied to each constituent Body.

Provided that until such terms or conditions or quantity of water is determined, the Board shall continue the bulk water supply according to the arrangements existing immediately before the commencement of this Act.

(7) If the Board does not accept the decision of the standing committee, the Managing Director shall report the matter to Government for appropriate orders and the orders issued by Government shall be complied with by the Board.

Explanation:- The tem “Constituent Bodies” shall mean and include the Karachi Development Authority, Karachi Port Trust, Cantonment Board of Karachi, Sindh Industrial & Trading Estate, Karachi Pakistan Steel Mills Corporation Defence Service or any other body or organisation notified by Government.

(8) Until otherwise notified by Government, the Authority shall continue to execute the Hub Dam Water Supply Stage I and Phase-IV of the Greater Karachi Bulk Water Supply Stage I and Sewerage Disposal Projects.
(9) The Board or any person authorised by it shall have right to place and maintain aqueducts, conduits and lines of mains, drains, sewers or pipes, over, under, along or across any immovable property without acquiring such property, and to enter on such property for the purpose of examining, repairing, altering or removing any aqueducts, conduits or lines of mains, sewers or pipes.

Pakistan Water Sector Strategy, 2002

The National Water Policy was one of the initiatives taken by the Government of Pakistan at the beginning of the current millennium for the development of water sector in the country. The Pakistan Water Sector Strategy 2002 provided the road map for implementing the policy framed for development of the water sector. The Strategy comprises three independent documents as under:

1. The 'National Water Sector Profile' which summarises and details all aspects of water availability and utilisation as they exist. As such it will become a standard source document for all future work in water sector
2. The 'National Water Sector Strategy', which identifies the key issues and objectives for the water sector and proposals for planning, development and management of water resources and their use in all water sub-sectors
3. The 'Medium Term Investment Plan' which identifies the key programmes and projects which should be undertaken up to 2011 as the initial contribution to achieve the objectives of the strategy

As in the case of the National Water Policy, the Water Sector Strategy is also mainly focused on irrigation, which is the predominant user of water. However domestic water supply having the first priority in any water allocation the Strategy has given due importance to this sub-sector in its discussions.

The following key factors have been identified by the Strategy as the driving force for development of water resources in the country:

1. Population growth
2. Increasing agricultural demands
3. Domestic water supply needs
4. Dwindling water resources; and
5. Cross cutting issues

Linking the discussion on water resources and domestic water supply is the factor of additional demand of water for domestic needs by 2025. This would result in a shortfall of 11.3 million acre feet of water per annum available for irrigation if additional water resources are not developed.

Water conservation is a key component of the strategy. Most of the water saving will have to come from the irrigation sub-sector because it is by far the largest user of water.

Water quality has been identified as one of the main issues in water sector in Pakistan and its improvement a key component of the strategy. Poor water quality affects all sub-sectors as well as the quality of life of the people. Pollution of water sources is caused mainly by municipal and industrial waste water disposal and disposal of saline and chemically polluted agricultural runoff. Attacking this problem will require the cooperation of several agencies including municipal service providers and industrial sector.

Institutional and management issues also cut across the whole of the water sector. The lack of financial sustainability in water service delivery, caused by low levels of water tariff and their collection, has led to a strain on governmental resources and deteriorating infrastructure in domestic as well as irrigation sub-sectors. Failure to improve this will result in continued deterioration and poor service delivery.

The water sector strategy lays out a road map to guide the management and development of water sector and service delivery in water industry.

The Strategy divides the primary issues in the water sector into three categories, namely, Institutional and Management issues, Social and Financial Issues and Technical Issues.

The Institutional and Management issues include- inadequate coordination between various organisations of various sub-sector of water; Absence of an inter-ministerial, inter-provincial body to oversee water sector planning, management and development; changing administration under the devolution plan and uncertainty in technical capacity during transition, particularly in domestic water supply and sanitation sub-sectors; and need for improvement of water sector infrastructure and activities.

Social and Financial Issues include: Limited availability of funds for the water sector; lack of financial sustainability in water sector services due to low level of public sector funds for O&M and insufficient cost recovery; limited private sector investment or participation; and inadequate public awareness of water sector issues.

Technical Issues include: Increasing demand for water; inefficient use of water; inadequate domestic water supply and sanitation coverage and quality of service; deteriorating water quality; and deteriorating infrastructure.

The key elements of the strategy for the water sector comprise water conservation, stakeholder participation in management, improving public awareness and understanding of issues, a good quality MIS for water, improving cooperation and coordination amongst various agencies in the water sector, ensuring long terms financial sustainability of infrastructure and services through reasonable cost recovery, improvement of water quality, and involvement of the private sector.

The details of the strategy relating to domestic water supply and sanitation sub-sectors are as follows.

Overall Objectives

The main objectives of the strategy are to:

1. Increase coverage of clean water supply for urban population to 96%
2. Increase coverage of functional sanitation for urban population to 80%
3. Achieve full compliance with EPA standards for drinking water
4. Achieve full compliance with EPA standards for wastewater disposal
5. Develop a water quality Information Management System

Financial Objectives

Achieve financial sustainability in all water sector developments through:

1. Appropriate levels of cost recovery to make operating agencies financially viable
2. Appropriate tariffs to ensure provision of adequate services to all users, including poor and disadvantaged
3. Urban wastewater charges based on cost recovery and "polluter to pay" principle
4. Private sector participation in appropriate areas of water management

Water Quality Objectives

Water quality objectives based on:

1. Establishing and maintaining water quality standards for potable water
2. Ensuring that wastewater effluent is treated before disposal
3. Preservation of surface and groundwater resource to ensure sustainability of supply

Management Measures

1. Establishing a Coordinating and Support body on a country-wide basis for urban water supply and sanitation sub-sector
2. Developing a strategy and medium and long-term plan including tariff levels, improved collection methods, demand management measures, participation by the private sector, and infrastructure improvement and expansion
3. Formulating appropriate institutional arrangements for smaller cities and towns in the light of Devolution Plan

Technical Measures

1. Renew the existing operational assets to address the maintenance backlog
2. Expand water supply and sanitation networks to increase coverage to the stated targets
3. Develop additional surface and groundwater resources to meet growth in demand
4. Construct new sewage disposal networks in line with EPA"s effluent disposal regulations

National Drinking Water Policy, 2009

The policy provides a framework to the federal government, provincial governments, Azad Jammu Kashmir, Federally Administered Tribal Areas, local governments and development authorities to address the issues and challenges facing Pakistan in terms of access to safe drinking water.

The goal of the policy is to provide clean and safe drinking water to improve the quality of life of people through decreased death and illness caused by water borne diseases at an affordable cost and in an equitable, efficient and sustainable manner by 2020. The key principles of the policy include:

1. Providing access to safe drinking water to every citizen of Pakistan by developing new and water supply systems in urban and rural areas especially the neglected areas by using improved technology and standardisation
2. Allocate water for domestic purposes such as drinking, hygiene, sanitation etc. on priority basis
3. Take measures to protect and conserve the surface and groundwater resources by developing ambient water quality standards, rain water harvesting, community management of local resources, recycling of water, etc.
4. Using water treatment systems and methods to ensure provision of safe drinking water
5. Involving communities especially women and children in planning, implementation, monitoring, and operation and maintenance of water supply systems
6. Creating public awareness through intensive information, education and communication campaigns to promote water safety and conservation, and sage hygienic practices
7. Carry out capacity development efforts to streamline and upgrade the roles and responsibilities of various agencies concerned with the water sector at the provincial and federal levels
8. Promote public private partnerships for enhancing access to safe water, O & M of water supply systems, resource mobilisation and capacity development
9. Carry out continuous research and development initiatives to develop new approaches and innovative ideas

National Sanitation Policy, 2006

The policy provides broad framework and guidelines to all governments to enhance and support sanitation coverage in the country through the formulation of sanitation strategies, plans and programs for improving the quality of life of people and a providing a healthy work environment.

The overall sanitation and sewerage coverage in Pakistan is very low. The urban areas fare slightly better than the rural areas. Yet data on the occurrence of cases of diarrhoea suggests that people suffer repeated and continuous exposure to polluted water. Almost 40% of all reported diseases and 30% of all deaths in the country are attributable to faecal contamination of water due to mixing up of water supply and sewerage lines.

The provision of water supply and sanitation facilities in rural areas has considerably increased in the past few years. Apart from reducing health problems this has also considerably improved the financial and economic condition of the poor. There is marked improvement in infant mortality rates due to supply of safer water. There is noticeable reduction in diseases like diarrhoea, typhoid and cholera due to successful implementation of rural water supply and sanitation schemes in Khyber Pakhtunkhwa, Punjab and Sindh. However, the coverage is still low and concerted efforts are needed throughout the country to continue improvement in coverage as well as quality of water supply and sanitation in the rural areas to promote health and hygiene.

The policy primarily focuses on the following activities/premises:

1. Safe disposal of excreta by using sanitary latrines, creating a open defecation free environment, industrial and agricultural wastes, safe disposal of liquid and solid wastes, and promotion of health and hygienic practices in the country

2. Develop and utilise sewage and water treatment facilities for domestic and industrial use
3. Promote the concept of Community Led Total Sanitation
4. Develop an institutional and financial framework for the agencies concerned in this sector, along with capacity building initiatives
5. Carry out public awareness programmes
6. Using appropriate, low cost, easy and cost effective technology
7. Achieve sustainable development through the above initiatives
8. The sanitation initiatives will be financed by the government
9. For monitoring the industrial and municipal effluents, EPA will be the responsible body
10. Increasing numbers and access to public toilets
11. Promoting public private partnership
12. Safe disposal of hospital waste by following the Hospital Waste Management Rules 2005
13. Provision of incentives and rewards to tehsils/towns for the implementation of the sanitation policy

National Climate Change Policy, 2012

The Ministry of Climate Change launched Pakistan's new climate change policy in 2012. Pakistan has been identified as one of the top 16 countries with a high climate change vulnerability index. Many sectors like water resources, agriculture and livestock, human health, forestry, biodiversity, ecosystems, are at great risk of being affected by climate change.

The new policy recommends policy measures and proposes mitigation strategies in particular for energy, transport, town planning, industries, agriculture and livestock and forestry sectors.

While mitigation for water resources is a much broader area, beyond the scope of this review, introduction of climate change mitigation strategies in town planning particularly for water, sanitation and solid waste management is particularly pertinent. Two policy measures recommended, among others, that have a direct bearing on water supply, sanitation and solid waste are:

- Make installation of wastewater treatment plants an integral part of all sewerage schemes
- Ensure separate collection, disposal and re-use of recyclable, composite and biodegradable waste, preferably at source
- Introduce local rainwater harvesting measures

Hospital Waste Management Rules, 2005

Under these Rules, every hospital is responsible for proper management of waste generated by it till its final disposal in accordance with provisions given in these Rules. The Rules require each healthcare facility to constitute a waste management team, and to prepare and implement a waste management plan. The Rules also include guidelines for waste segregation, collection, transportation, storage, and disposal. The Government of Sindh has developed its Sindh Hospital Waste Management Rules, 2014 adapted from the Hospital Waste Management Rules, 2005.

Draft Sindh Drinking Water Policy, 2016

The Vision and Mission of the draft Policy are as follows:

Vision

Our vision for the population of Sindh is to provide safely managed drinking water whose supply is adequate, well maintained and sustainable; and to enhance public awareness about health, nutrition and hygiene related to safe drinking water.

Principles

The main principles of Sindh Drinking Water Policy, adapted from the National Drinking Water Policy 2009 and aligned with the Sustainable Development Goals, are as follows:

- Access to safely managed drinking water is a fundamental right of every citizen and that it is the responsibility of the Government to ensure its provision to all citizens
- Water allocation for drinking purposes shall be given priority over other uses
- In order to ensure equitable access, special attention shall be given to removing the existing disparities in coverage of safe drinking and for addressing the needs of the poor and the vulnerable
- Recognising that inadequate and unsafe water supply and sanitation are a major cause of diarrhoea and nutritional deficiency in children, which as a consequence contribute towards child mortality, safely managed drinking water supply and sanitation shall be integrated in health, nutrition and school health programmes
- Access shall be increased to high quality nutrition-sensitive services, including access to water, sanitation facilities, and hygiene
- Key hygiene actions (safe drinking water, handwashing with soap, safe disposal of excreta, and food hygiene) shall be integrated as essential components in all nutrition programmes
- Realising the fact that access and availability of safe drinking water affects all aspects of life of citizen, a multi sectoral approach, involving different departments of the government, shall be adopted to address the issues related to safe drinking water
- Being cognisant of the fact that women are the main providers of domestic water supply and maintainers of hygienic household environment, their participation in planning, implementation, monitoring and operation & maintenance of water supply systems shall be ensured, and WASH shall be integrated in maternal and neonatal health programmes
- Responsibilities and resources shall be delegated to local authorities to enable them to discharge their assigned functions with regard to provision of safe water supply
- A supportive policy framework shall be developed that encourages alternate options through private provision, public-private partnerships, the role of NGOs and community organisations
- The execution of component-sharing model for government programmes and projects shall be promoted to ensure financial sustainability and community and private sector involvement in development and O&M
- Low cost technologies in water and sanitation, that are easy and cost-effective to maintain shall be developed and used

The Goals and Objectives of this Policy are highlighted below.

Goals and Objectives

Overall Goal: The goal of the Sindh Drinking Water Policy is to improve the quality of life of people of Sindh by reducing morbidity and mortality caused by water-borne diseases through provision of safely managed and potable drinking water to the entire population that is located on premises, available when needed, and free from contamination, affordable and of sufficient quantity, and in a way that is efficient, equitable and sustainable.

The specific objectives of the Policy are as follows:

Objectives:

1. Introduce legislative measures and regulations to create an enabling framework for safely managed drinking water supply, regulation of water usage, extraction, treatment, transportation and distribution
2. Ensure that all drinking water resources and supply systems are protected with community involvement
3. Develop district level drinking water availability plans for urban and rural areas to ensure improved planning for equitable access
4. Enhance the coverage of safely managed drinking water supply in the province to achieve that Sustainable Development Goals (SDGs) targets of universal access
5. Develop criteria for installation of new drinking water supply schemes and ensure that all new schemes are safely managed, rationalised and constructed through need based criteria so that all areas and communities are served
6. Develop standardised service delivery models for both urban and rural drinking water supply schemes to improve efficiency, cost-effectiveness, improve monitoring and sustainability
7. Develop mechanisms for reuse, recycle and recharge of wastewater for other municipal and productive uses
8. Ensure that all drinking water supply systems are designed and constructed in line with the national drinking water quality standards and all municipal discharges comply with National Environment Quality Standards (NEQS)
9. Install water treatment plants at existing drinking water supply schemes where required and incorporate water treatment facilities in all new drinking water supply schemes
10. Ensure development of water safety plans for all drinking water supply systems
11. Develop and sustain regular drinking water quality monitoring and surveillance, and institute mechanisms for remedial action
12. Increase public awareness about water borne and water-related diseases (including polio), nutrition and hygiene, and enhance the role of communities for household water treatment/storage, water safety and conservation, and safe hygiene practices
13. Ensure that drinking water supply projects are nutrition sensitive and integrated in health, nutrition and school health programmes

14. Institutionalise WASH in schools (infrastructure and 3 stars) and introduce curricular change to incorporate health, nutrition and hygiene and improved and safe water and sanitation practices among school children
15. Institute adaptation measures and disaster risk reduction and mitigation strategies to minimise the impact of climatic events on drinking water supply systems

Draft Sindh Sanitation Policy, 2016

The Goal and Targets of the draft Policy are as follows:

Goal

The goal of the Provincial Sanitation policy is to ensure that the entire population of Sindh has access to a safely managed sanitation service and sanitary environment that is also nutrition-sensitive and hygienic. The motto of this policy is 'Saaf Suthro Sindh'.

Targets

Its key targets are:

1. Eradicate Open Defecation from Sindh Province by 2025, while 70% villages of 13 high priority districts achieve the status of open defecation free by 2020.
2. 100% households in Sindh have access to and use sanitary latrines by 2025, while 70% of rural households in high priority districts will achieve this by 2020.
3. Strengthen and implement liquid waste management with sewer lanes and covered/improved drains with 85% coverage of urban areas and 60% coverage in rural areas.
4. Create and develop wastewater treatment mechanisms to cover 75% of urban areas and 40% in rural areas by 2025.
5. More than 90% of rural households and 100% of urban households wash hands with soap at critical times by 2025.
6. Implement integrated solid waste management with 100% coverage in urban areas and 60% in rural areas of Sindh by 2025.

Principles

The main principles of draft Sindh Sanitation Policy are as follows:

- The Policy aligns itself with the goals and targets of the SDGs for sanitation, which require sanitation services to be safely managed, have a private improved facility where faecal wastes are safely disposed on site or transported and treated off-site; plus a handwashing facility with soap and water
- The sanitation policy adheres itself to the pursuit of total sanitation as outlined in PATS, within the province, which refers to the complete eradication of all indiscriminate and unhygienic practices including disposal of excreta, foul water and solid waste.

- Safely managed sanitation services is a fundamental right for all persons in Sindh province, and should be ensured through enhanced access to marginalised and low resource areas with equitable distribution of resources. Recognition of inequities and rights based programming will be given key emphasis during the planning, execution and monitoring of sanitation programmes.
- The policy seeks to prioritise the areas that pose the greatest risk to human health namely hygiene awareness and excreta disposal, and then address the environmental health risks that are posed by poor drainage and solid waste disposal.
- Recognising that inadequate and unsafe water supply and sanitation are a major cause of diarrhoea and nutritional deficiency in children, which as a consequence contribute towards child mortality, safe drinking water supply and sanitation should be integrated in health, nutrition and school health programmes
- Increase access to high quality nutrition-sensitive services, including access to water, sanitation facilities, and hygiene
- Integrate key hygiene actions (safe drinking water, handwashing with soap, safe disposal of excreta, and food hygiene) as essential components in all nutrition programmes
- The policy shall promote the community led approaches to strengthen the demand for safely managed improved sanitary conditions that emerges from local communities. The multi-stakeholder partnerships and collaborations comprising of citizens, governments, civil society, non-governmental organisations (NGOs), donors, academia, media, etc. be encouraged to maximise the synergies in designing and implementation of interventions.
- Affordable (in terms of designs as well as availability of water) and cost effective technical solutions with necessary modifications and adaptations in technical standards to be consistent with cultural sensitivities of specific communities will be identified and marketed.
- Sustainability of the services shall be ensured by mobilising and engaging existing structures, where possible like LHWs, UC secretaries, NGOs and private sector in service delivery and reporting of WASH.
- The component sharing model as envisaged in the National Sanitation Policy will be institutionalised gradually in which the community is responsible to construct lane and neighbourhood level sewers (internal development) on self-help basis and the government focuses on trunks, disposal and treatment unit (external development).
- The role of women shall be an integral component of behavioural change communication strategies and project planning, implementing and monitoring through capacity development and social mobilisation of relevant stakeholders.
- An independent monitoring and evaluation system will be established and maintained to track progress under the sanitation agenda and also to operationalise incentives envisaged in this policy.

Pakistan Approaches to Total Sanitation, 2010

Pakistan Approaches to Total Sanitation (PATS) developed under the leadership of Climate Change Division of the Cabinet Secretariat, (former Ministry of Environment) has been successfully rolled out in Pakistan with the support of Provincial Governments, UNICEF and civil society partners. PATS underpins an Integrated Total Sanitation approach that seeks for sanitation demand creation, sustaining the demand through supply side interventions, promoting participatory hygiene, attaining 100% adequate drainage and wastewater treatments, linkages development with duty bearers and knowledge management and accountability. PATS extends an active social mobilisation strategy by building a cadre of human resources who inspire and empower the communities to construct technically sound and viable latrines which are connected to a secure disposal system and achieve total sanitation status, sustainably adopt hygiene practices and continuously use improved sanitation facilities.

PATS calls for humanitarian-development nexus in sanitation programmes and includes sanitation marketing strategies to achieve total sanitation in an urban or rural human settlement. Large scale sanitation programmes following PATS approach have been implemented by sanitation sector partners in the aftermath of 2010 floods, which affected the whole country. Evaluation of these programmes and subsequent sanitation programmes in response to floods in 2011 and 2012 has helped refinement of programme design under PATS, especially in harmonising humanitarian-development interventions. It is estimated that more than 8 million people have achieved 'Open Defecation Free' (ODF) status as a result of at scale programmes under PATS since its launch in March 2011. Another achievement of PATS approach is that all sanitation sector partners have adopted it and sanitation programmes implemented under this approach at scale are being adopted by the government in terms of funding and implementation.

Community Led Total Sanitation

Community Led Total Sanitation (CLTS) methodology is an entry point to achieve "total sanitation" and not total sanitation in itself. CLTS is an effective approach for triggering action to change defecation behaviours at the community level and to create demand for improved sanitation facilities. Sanitation, as a whole is an entry point for greater social change and community mobilisation. The steps identified under CLTS include:

Pre-triggering: selecting community and developing a better-defined sense of community

Triggering: educating the community regarding the consequences of living in a faecally contaminated environment until they come to the realisation that they are eating, washing in, and drinking each other's faeces. Some of the triggering activities include defecation area transect, mapping of defecation areas, calculations of faeces and medical expenses, triggering disgust and ignition. The "ignition" captures the moment when the community becomes mobilised to take collective action to stop the ingestion of each other's faeces and improve their poor sanitation.

Post-triggering: Once communities typically pledge to improve their sanitation by either becoming open-defecation free or by adopting improved sanitation technologies, there is a danger that these pledges do not come to fruition without follow-up work. Follow-up activities include

immediate follow-up and encouragement, community action follow-up i.e. engaging with communities to agree furthering action plans to achieve other sanitation outcomes including external systems, participatory monitoring and indicators setting, verifying and certifying Open Defecation Free (ODF) status, celebrations and the monitoring and sustaining of ODF status

School Led Total Sanitation

A significant component of PATS is School Led Total Sanitation (SLTS). The SLTS approach is used for promotion of good health practices where children largely helped in changing perceptions at community level. The usage of a forum like the teacher-student WASH club proves highly successful in imparting hygiene communication messages at scale. Additional enabling factors such as training programmes for schoolteachers, capacity building and awareness raising of village based development organisations, coordination and support for the district level government education department play significant roles in the programme's success. SLTS is being used as an opening intervention in PATS programme at scale in transition from humanitarian to development as it provides an opportunity to mobilise the disaster affected communities with dignity, pride and self-respect.

Solid Waste Management

Several legal rules and institutional framework deal with solid waste management in the country. These include Pakistan Environmental Protection Act (PEPA) 1997, the National Environmental Quality Standards (NEQS), Hazardous Substances Rules of 1999, Guidelines for Hospital Waste Management 1998, Hospital Waste Management Rules 2005, Hazardous Substances Rules 2003, and several other regulations, rules and standards.

Several legislations, regulations and rules are applicable to Solid Waste Management (SWM). These are summarised in **Table 8**.

Draft Solid Waste Management Guidelines

Draft Solid Waste Management (SWM) Guidelines were developed by the Pakistan Environmental Protection Agency in 2005 in collaboration with UNDP and JICA and provide a useful reference for municipal services.

Table 8 - Summary of legislation and regulations relating to solid waste management

Name of Regulation	Year	Major issues related to SWM
International Legislation		
Basel Convention on the Control of Transboundary movements of hazardous waste and their disposal	1994	o Transboundary movement and management of hazardous and other wastes. o Hazardous and other waste o Control system
Federal Legislation		
The Factories Act	1935	o Regulations on labour in factories o Disposal of waste and effluents has to be arranged
Pakistan Penal Code	1960	o Penal Law o Handling and negligent conduct with respect to poisonous, toxic and hazardous waste is an offence. The code is to be monitored by the provincial government
Constitution	1973	o Basic rights and duties of the Citizens and Government of Pakistan o Acquiring land for public interest
Pakistan Environmental Protection Act PEPA	1997	o Protection, conservation, rehabilitation and improvement of environment, prevention and control of pollution o Defines municipal waste, hazardous waste, hospital waste, industrial waste and agriculture waste, organic and inorganic matters and living organisms, buildings o Prohibits discharge of waste in an amount of concentration that violates the National Environmental Quality Standards (NEQS) o EPAS that are satisfied that the discharge of any waste in violation of the provisions of the Act is likely to occur or occurring are empowered to direct the responsible person to take necessary measures o Penalties for contraventions against the provisions of the Act
Pollution Charge for Industry Rules	1998	o Calculation and Collection of charges
Provincial Sustainable Development Fund Rules	1998	o Rules on constitution and meeting of the board
Environmental tribunal Rules	1999	o Organisation and Procedure Rules
Review of IEE/EIA Regulations	2000	o Regulation on Environmental Impact Assessments o Projects requiring an IEE/EIA o Waste disposal projects require IEE/EIA
National Environment Quality Standards NEQS	2000	Quality Standards for: o Municipal and liquid industrial effluents o Industrial gaseous emissions o Motor vehicle exhaust and noise
NEQS Regulations	2000	o Certification of Environmental Laboratories
NEQS Rules	2001	o Self monitoring and reporting by industrial units o Categories of industrial units o Monitoring report in addition to EIA approval
Environmental Sample Rules	2001	o Procedure of inspection and taking samples
Public Procurement Regulatory Authority Ordinance	2002	o Establishment of Public Procurement Regulatory Authority for regulating public procurement of goods, services and works in the public sector
Hazardous Substance Rules	2003	o Management of Hazardous substances o Waste management plan pertaining to hazardous waste
Hospital Waste Management Rules	2005	o Management of waste generated by healthcare institutions

Name of Regulation	Year	Major issues related to SWM
Provincial and Local Legislation		
Sindh Solid Waste Management Board Act	2014	o For collection and disposal of all solid waste, to arrange for effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters
Sindh Solid Waste Management Policy	2006	o Sindh Solid Waste Management Policy is intended to support and guide the Sindh City District Government and Taluka Municipal Administrations (TMA) to frame their own solid waste management (SWM) strategies, plans and programmes and is the result of stakeholder consultations held at the Taluka and provincial levels
Sindh Hospital Waste Management Rules	2014	o Hospital Waste Management Plan based on internationally or nationally recognized environmental management practices, standards, which shall efficiently and effectively address the hospital waste
Sindh Local Government Act	2014	o Local Councils establishment and scope of services o Solid waste management, treatment and disposal o Industrial and hospital hazardous and toxic waste treatment and disposal
Sindh Environmental Protection Act	2014	o Environment control including control of air, water and soil pollution in accordance with Federal and Provincial laws and standards
Sindh Environmental Quality Standards Rules	2014	o The Sindh Environmental Quality Standards Rules, 2014 provide for Self-Monitoring and Reporting by Industry

Inter-sectoral Nutrition Strategy Sindh

The National Nutrition Survey 2011 indicates that Sindh is the most food deprived province of Pakistan where only 28% households are food secure (21.1% food insecure without hunger, 33.8% food insecure with moderate hunger and 16.8% food insecure with severe hunger). In order to address this serious public health issue, the Government of Sindh has launched an Inter-sectoral Nutrition Strategy for the province.

The Inter-sectoral nutrition strategy for Sindh aims to reduce chronic malnutrition in children aged 0-24 months by 10 percentage points (from an estimated 49.8% to 39.8% by the end of 2016), iron deficiency anaemia in children from 73% to 62% and maternal anaemia from 59% to 49% by the end of 2016 through sustainable, effective and inter-sectoral interventions.

The operational objectives of the strategy are:

(i) Improve nutritional outcomes in the Sindh province with a focus on sustainable, effective inter-sectoral interventions
(ii) Strengthen the provincial capacity for developing, mobilizing and stewarding inter-sectoral intervention developed through public private partnership;
(iii) Integration and mainstreaming of nutrition in agricultural education, agriculture services and community development programmes;
(iv) Promote nutrition health of women and children through linking mother and child health with social protection, and food security interventions to produce long term sustained results;

(v) Promote programmatic complementarities and geographical convergence through coordinating the strategic sectoral plan
(vi) Provide a broad Monitoring and Evaluation Framework for monitoring of nutrition sector strategy by Department of Health and partners

Specific actions pertaining to water and sanitation under the strategy include:

1) Provide safe drinking water and good sanitation facilities through: Legislating "Execution, Operation & Maintenance of water and sanitation policy"; defining Role of District Councils, Municipal Committees, Union Councils and PHED"; and prepare a grand strategy that prioritise schemes in districts that are high risk for malnutrition.

2) Enhance community ownership for follow up maintenance of the new schemes through reviving project implementation teams (PIT) in high risk areas (PIT consists of Community Development Officer, Assistant Community Development Officer and Hygiene Educator).

3) Strengthen capacity of the service providers (Water & Sanitation) to ensure provision of safe water on WHO Standards.

4) Induct environment specialist at each district level for ensuring and monitoring quality of existing and upcoming WASH facilities by following WHO standards.

5) Establish intra sectoral monitoring cell to ensure that water and sanitation schemes meet the minimum WHO standards.

6) Undertake social mobilisation campaign to promote health and hygiene behaviour in the community such as protection of water source, follow-up maintenance of schemes.

7) Participate in integration of WASH related messages in the curriculum of outreach workers from different sectors.

8) Provide technical assistance and support to Education and Literacy department for:
   - inclusion of standardised messages related to environmental hygiene in their curriculum
   - ensuring the availability of WASH facilities in school environment

9) Introduce new WASH schemes in prioritised areas.

10) Rehabilitation, improvement, extension and augmentation of WASH schemes.

11) Participate actively in the forum established for generating evidence to influence policy through research.

12) Participate in the inter-sectoral nutrition coordination committee.

Draft WASH Behaviour Change and Communication Strategy, 2016

A draft Behaviour Change and Communication (BCC) strategy has been developed by LG&HTPD.

Its Vision and Mission are as follows:

Vision

The Sindh BCC Strategy envisions for sustainable and safe hygiene environment by 2025 to enhance the living standards of the people of Sindh.

Mission

The Sindh BCC Strategy will strive for effective implementation relevant government development plans, processes and methods, resulting in improved hygiene in relation to water and sanitation to reduce the burden of water borne and sanitation related diseases.

Principles

The main principles of Sindh BCC strategy are the following:

- The Government owns the responsibility for ensuring safe drinking water, improved sanitation and safe hygiene by recognising these as basic human rights of the people.
- Access to clean drinking water, improved sanitation with appropriate disposal and good hygiene practices are prerequisites for healthy human life especially reductions in morbidity and mortality rate among the children.
- Water allocation and rationing for drinking and domestic purposes will be prioritised over other usages along with promoting judicious use for sanitation and hygiene purposes.
- Inclusion and equity shall be promoted by placing emphasis on eliminating the disparities in the coverage and access to safe drinking water, improved sanitation and hygiene practices for poor and vulnerable groups including women, elderly, disabled and children.
- Social mobilisation especially concerning women engagement will be promoted and enhanced in planning, implementation, monitoring and maintenances of water supply, total sanitation solutions and hygiene practices.
- Capacities and resources of the local government and newly elected councils shall be augmented in effective service delivery for safe drinking water, improved sanitation and environment friendly hygiene.
- Engagement with media and local opinion makers will be maintained and strengthened through dialogues, capacity development and awareness raising sessions.
- The transformation of poor indigenous practices contrary to healthy behaviours shall be sought through evidence based information sharing and community appreciation.

The BCC Strategy has the following Goals and Objectives

Overall Goal

Achieve Sustainable Development Goal targets for water, sanitation and hygiene, by reducing morbidity and mortality caused by faecal-oral contamination due to inadequate sanitation, poor hygiene practices and a lack of access to safe drinking water.

Objectives

Social Mobilisation

1. Facilitate the creation of a sustainable environment that is open defecation and litter free ensuring appropriate liquid disposal and waste management through effective mobilisation of communities and stakeholders.
2. Encourage communities and other stakeholders to construct and use the latrines at the households and important public places while ensuring safe disposal of human excreta.
3. Strengthen immunity against water borne diseases including diarrhoea, stunting, wasting, etc. through promotion of good behavioural practices including hand washing, water treatments, menstrual hygiene and personal cleanliness.
4. Use participatory community driven approaches for local solutions and ownerships under the umbrella of Pakistan Approach to Total Sanitation

Knowledge Management and Research

1. Generate knowledge and evidence regarding consequences and impact of poor sanitation, low quality drinking water and lack of appropriate hygiene practices

Training and Capacity Building

1. Enhance and develop the capacities of all key stakeholders comprising of government institutions, civil society, academia, research organisations, NGOs, media and local councils in understanding the social norms and environmental sustainability.
2. Train local councils and elected representatives about social mobilisation approaches and needs for enhanced resource allocations for WASH.
3. Inform stakeholders and the communities about health burden and economic losses at different levels due to poor water and sanitation services and practices.

Enabling Environment

1. Mobilise support for integration of water, sanitation and hygiene aspects in different development programmes and policies including heath, environment, education, housing, urban development and town planning.

Legislation and Institutional Challenges

The Sindh Local Government Act 2014 delegates planning and management of water supply and sanitation schemes including water rates, etc. to the local government but the newly elected governments and even LG&HTPD are unclear about the distinction between the expected roles from LG&HTPD and PHE&RDD. Even with placement of Local Government in Sindh, there is lack of

clarity about the utilisation and planning of funds for sanitation on the part of these local bodies elected representatives. There is need for revision in the SLGA 2013 to clearly indicate the role of PHE&RDD for rural water supply and sanitation, operation and maintenance, and to direct transfer of personnel and funds as appropriate.

It appears that there is sufficient legislation and policy pronouncement already in place, however, the motivation, coordination, resources, participation of beneficiaries and institutional capacity to effectively implement them appear to be sorely missing[52]. Additionally, there would appear to be overlaps and lack of clarity in responsibilities for interrelated agencies and a lot of the legislation is very prescriptive and 'over-specified' which enforces strict bureaucratic routines and stifles the development of new ways of working.

From the foregoing, it is apparent that there exists a wide range of legislations to regulate, administer and provide guidelines for the functions and authority of institutions directly involved in the water and sanitation sector. However, the lack of an overall framework or strategy within which legislative controls are to be implemented and the absence of inter-linkages, or synergy between the various Acts and Ordinances has had little impact on management of drinking water and sanitation services. There is a pressing need for a comprehensive legislative review that underpins water supply and sanitation issues including community participation and O&M issues, so that harmonised acts for drinking water and sanitation can provide the legal and institutional framework for planning, services, sector coordination, and monitoring and evaluation, in place of the fragmented state of affairs at present.

[52] The Study on Water Supply and Sewerage System in Karachi in the Islamic Republic of Pakistan, 2008. Japan International Cooperation Agency (JICA), Karachi Water & Sewerage Board (KW&SB)

Strategy

Legislations, Regulations, Policies and Strategies			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Finalisation of drafted policies and their implementation	Approval of Draft Drinking Water Policy, Revised Draft Sanitation Policy, and Draft Behaviour Change Communication Strategy and their implementation		
Sindh Local Government Act 2013 provisions for WASH operationalised	Conduct a review of the SLGA and develop Rules of Business for LG&HTPD and PHE&RDD. Seek amendment in SLGA 2013 to clearly indicate role of PHE&RDD in rural water supply and sanitation, O&M, and provide administrative transfer of staff and funds		
Municipal water governed by a legal framework	Enactment and promulgation of the Sindh Municipal Water Act (draft)	City and Town master plans developed and incorporate zone-wise development of water supply, sewerage and drainage, and solid waste management	Industrial wastewater management regulations put into effect in industrial zones and curbs to stop pollution enforced
Sindh Water Commission performs its functions as a regulatory body	Establishment of the Sindh Water Commission	Tariff structure revised Minimum service delivery standards established for municipal services (water supply, sanitation, solid waste management) Ensure that each local government has a master plan on water, sanitation and solid waste management for its area of jurisdiction At least 25% local governments achieve minimum service delivery standards for municipal services (water, sanitation, solid waste management)	At least 50% local governments achieve minimum service delivery standards for municipal services (water supply, sanitation, solid waste management)
Legislative review to harmonise existing legislation, policies and rules	Legislative review of drinking water acts, policies, regulations and development of harmonised new acts, regulations and guidelines,	Periodic review of new legislations, policies and regulations and their implications for WASH	Periodic review of new legislations, policies and regulations and their implications for WASH

	including O&M Introduce legislative change in SLGA 2014 for PHE&RDD to be responsible for O&M of water and sewerage and drainage schemes, and transfer resources and manpower to PHE&RDD for their proper maintenance Legislative review of sanitation, sewerage and drainage acts, policies, regulations and development of harmonised new acts, regulations and guidelines, including O&M		
Sectoral operating procedures (design guidelines) for planning and management developed	Development of Standard Operating Procedures (design guidelines) for water planning, management and O&M for PHE&RDD Development of Standard Operating Procedures (design guidelines) for wastewater and solid waste planning, management and O&M for LG&HTPD		
Operational guidelines for CBOs for water and sanitation developed	Development of guidelines for CBOs for project management and O&M of water supply schemes Development of guidelines for CBOs for project management and O&M for sanitation, sewerage and drainage schemes		
Municipal services duty bearers have necessary managerial and leadership skills for an integrated, safely managed and nutrition-sensitive water supply, sewerage and drainage, and solid waste management programme	Orientation and capacity building programme of 2 big cities, 119 town and 1297 union council officials on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive	At least 50% of 2 big cities, 119 town and 1297 union council officials have participated in a capacity building programme on planning for and implementing water supply, sewerage and drainage, and solid waste management that are integrated, safely managed and nutrition-sensitive	At least 90% of 2 big cities, 119 town and 1297 union council officials have participated in a capacity building programme on planning for and implementing water supply, sewerage and drainage, and solid waste management that are integrated, safely managed and nutrition-sensitive

WATER RESOURCES

Pakistan is considered to be a water-stressed country (rapidly moving to water-deficit) and many of its regions are categorised as arid. Pakistan lies in an arid and semi-arid climate zone.

Pakistan's Water Resources

According to the AQUASTAT database on water resources[53], the status in Pakistan is summarised below:

- Long-term annual average precipitation – 494 mm/year
- Surface water[54] produced internally (2014) – 47.4 km^3/year
- Ground water produced internally (2014) – 55 km^3/year
- Overlap[55] between surface water and ground water (2014) – 47.4 km^3/year
- Internal Renewable Water Resources (IRWR) (2014) – 55 km^3/year
- Total Actual Renewable Water Resources (TARWR) (2014) – 246.8 km^3/year
- Dependency Ratio – 78%
- TARWR per inhabitant in 2014 – 1306 m^3/year
- Fresh water withdrawal as proportion of TARWR withdrawn (MDG Indicator in 2008) – 74.35%

The World Water Report 2013[56] indicated that the total freshwater withdrawal in Pakistan was 183.5 km^3/year, with a Per Capita withdrawal of 993 m^3/person/year. About 5% of freshwater was withdrawn for domestic use, 1% of industrial use and 94% for agricultural use. About 52 m^3/person/year of freshwater is withdrawn for domestic use.

The Indus basin has a large groundwater aquifer covering a gross command area of 16.2 million Hectares (Ha).

In 2005, the total dam capacity was an estimated 23.36 km^3. By 2012, there were three large hydropower dams and 50 smaller dams (no more than 15 m high), while 11 smaller dams were under construction[57].

The designed live storage capacity of the three large hydropower dams in the Indus basin is 22.98 km^3 (Tarbela 11.96 km^3, Raised Mangla 10.15 km^3, which includes recent raising of 3.58 km^3, and Chashma 0.87 km^3). The current live storage capacity of these three large hydropower dams is 17.89 km^3, representing an overall loss of storage of 22%[58]. Pakistan can barely store 30 days of

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[53] Water resource information by country/territory and MDG Water Indicator, FAO-AQUASTAT database, April 2016

[54] 1 Million Acre Foot (MAF) is equivalent to about 1.233 Km^3

[55] Overlap is water shared by both the surface water and groundwater systems

[56] World Water Report 2013 – Data Table 2, Freshwater withdrawal by country and sector (2013 update)

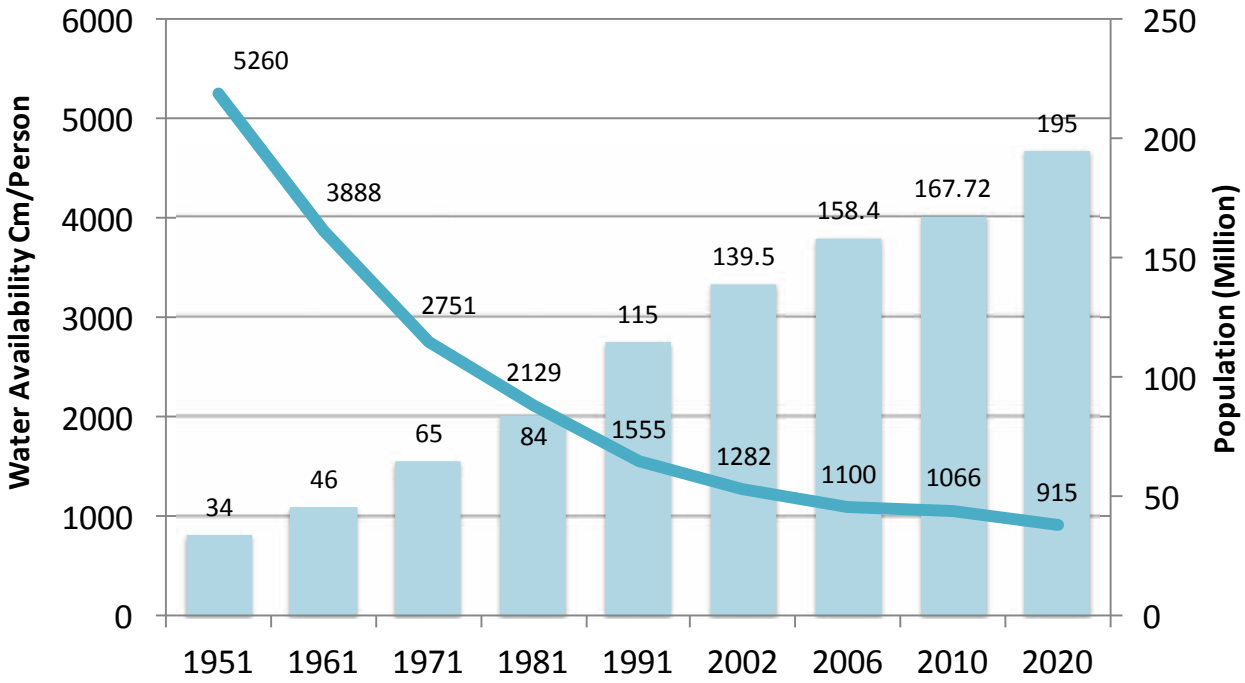
[57] Irrigation in Southern and Eastern Asia in Figures. Aquastat Survey 2011. FAO, Rome, 2012

[58] Country Assistance Strategy, 2005. Pakistan's economy running dry. World Bank, Pakistan Resident Mission, Islamabad.

water in the Indus Basin Irrigation System (IBIS). Each km^3 of storage capacity lost means 1 km^3/year less water that can be supplied with a given level of reliability. There is an urgent need for storage just to replace capacity that has been lost as a result of sedimentation. Given the high silt loads from the young Himalayas, two large reservoirs are silting rapidly.

Per capita water availability has declined rapidly since 1951 and is currently only 1050 cubic meters/capita, which puts Pakistan in the category of a high water-stress country[59] (Fig 4). About 95% of water usage is for agriculture, 1% for industrial use, and 4% for domestic and municipal use[60].

Figure 4 - Water availability (cubic metres) and population growth



(Source: State of the Environment Report (draft) 2005. Government of Pakistan, Ministry of Environment)

[59] State of the Environment Report (draft) 2005. Government of Pakistan, Ministry of Environment

[60] Pakistan Water Sector Strategy. National Water Sector Profile, Vol 5, 2002. Ministry of Water and Power, Government of Pakistan

Freshwater Footprints

Freshwater footprints[61] are reported in terms of water volumes consumed (evaporated or incorporated into a product) or polluted per unit of time. A water footprint has three components: green, blue, and grey. The "blue water" footprint refers to use of surface water and groundwater. The "green water" footprint is the volume of rainwater consumed, which is particularly relevant in agricultural production. The "grey water" footprint is a measure of freshwater pollution and is defined as the volume of freshwater required to assimilate a load of pollutants.

The water footprint of national consumption is defined as the total volume of freshwater that is used to produce the goods and services consumed by the inhabitant of the nation. It consists of two components: the internal and external water footprint of national consumption.

The internal water footprint is defined as the use of domestic water resources to produce goods and services consumed by the nation's population. It is the sum of the water footprint within the nation minus the volume of virtual-water export to other nations related to the export of products produced with domestic water resources. The external water footprint is defined as the volume of water resources used in other nations to produce goods and services consumed by the population in the nation under consideration.

A study on national water footprints found that Pakistan had the following footprints for domestic and industrial sectors:

- Water Footprint of Domestic Water Consumption in millions of m^3/year
  - Blue water footprint – 327
  - Grey water footprint – 2943
- Water Footprint of Consumption of Industrial Products in millions of m^3/year:
  - Blue water footprint – 148.4 (126.9 internal; 21.5 external)
  - Grey water footprint – 2657 (2383 internal; 274 external)

By comparison, United Kingdom has a blue water footprint of 207 and grey water footprint of 242 for domestic water consumption; and an internal blue water footprint of 245.6 and grey water footprint of 117 for consumption of industrial products. This indicates the high degree of freshwater wastage in domestic and industrial sectors in Pakistan.

Climate Change

According to the World Water Development Report 2015[62], three years of repeated floods in 2010, 2011 and 2012 in Pakistan inflicted serious damage on the national economy, halving its potential economic growth. The economy grew on average at a rate of 2.9% per year during this

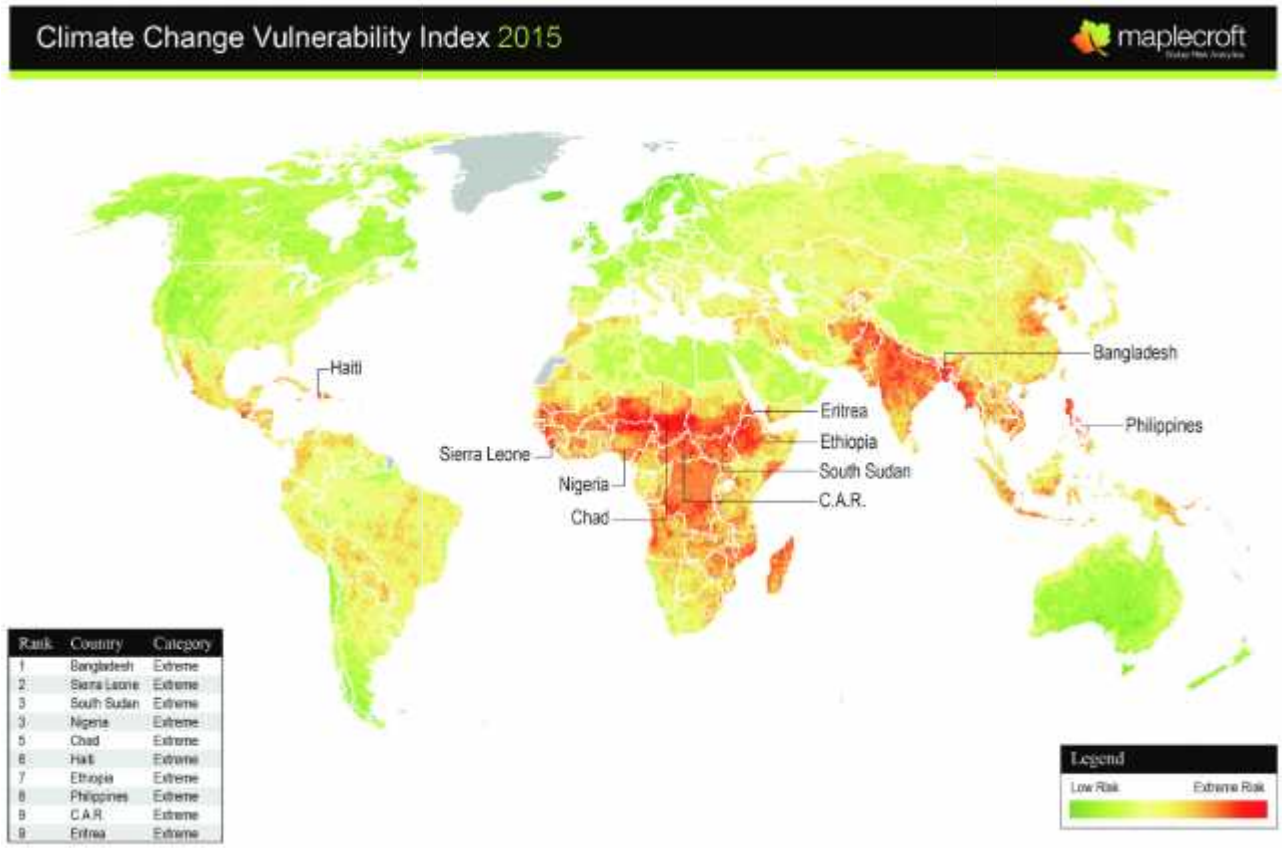
[61] Mekonnen, M. M., and A. Y. Hoekstra. 2011. National Water Footprint Accounts: The Green, Blue and Grey Water Footprint of Production and Consumption. Value of Water Research Report Series No. 50. Delft, Netherlands: UNESCO-IHE Institute for Water Education.

[62] World Water Development Report 2015. Water for a Sustainable World. UNESCO on behalf of UN-Water

period. That is less than half the rate of 6.5% that Pakistan could potentially have achieved if it had not faced economic and human losses associated with flooding. Pakistan lost a total of 3,072 lives and US$16 billion to the 2010-2012 floods. An initial estimate made by the National Disaster Management Authority of the floods' impact shows agriculture sector losses at US$2 billion due to damages to 1.05 million acres of standing crops. Consecutive years of flooding have also pushed up the country's inflation and unemployment rate because the flooding has disrupted supply chains, damaged major crops like sugarcane, rice and cotton, and hampered industrial production[63].

Pakistan lies in the zone that faces one of the highest risks of climate change in the world[64]. **Figure 5** illustrates that most of Pakistan lies in the high-extreme risk category. The negative effect of floods alone is estimated to be USD 6 billion per year. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the Indus Basin is likely to face more frequent extreme events like floods and droughts of more severity and coverage. While climate change is likely to cause more floods, it is also likely to lead to a deepening water scarcity as well since the Indus system depends on glacier melt for about 45% of its flow, which is one of the highest dependency rates in the world.

Figure 5 - Climate Change Vulnerability Index 2015



Rank	Country	Category
1	Bangladesh	Extreme
2	Sierra Leone	Extreme
3	South Sudan	Extreme
3	Nigeria	Extreme
5	Chad	Extreme
6	Haiti	Extreme
7	Ethiopia	Extreme
8	Philippines	Extreme
8	C.A.R.	Extreme
9	Eritrea	Extreme

(Source: Maplecroft, 2015)

[63] Pakistan Economic Survey 2010-11. Special Section 2: Flood Impact Assessment. Islamabad, Ministry of Finance.

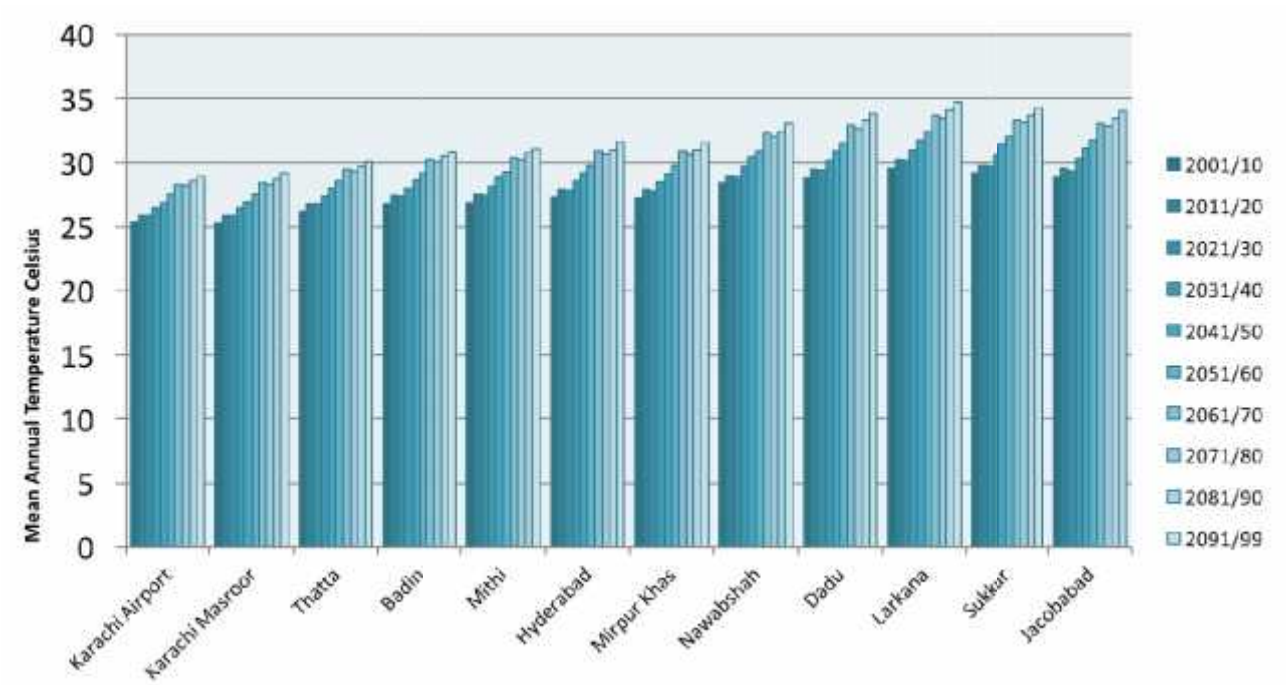
[64] http://reliefweb.int/sites/reliefweb.int/files/resources/Climate_Change_2015_Press_Countries_V01.pdf

Glacial melt is expected to increase river flows and flooding for about 50 years, after which there is an expected 30%-40% decline over the next 50 years[65]. A decline in rainfall may cause further severe water stress in arid and semi-arid areas, while rising mean temperature and depleting soil moisture would have a worsening effect on the country's agriculture and food security. A combination of declining river flows and reduced precipitation is likely to affect coastal ecology and increase desertification.

In the period between 1995-2014, Pakistan was the 8th most affected country according to the Climate Risk Index (CRI). Its annual averages included a death toll of 487.4, 0.32 deaths per 100,000 inhabitants, US$ PPP 3.93 billion in total losses, 0.70% losses per unit GDP, and 143 total number of events in this period[66]. In 2014, Pakistan was rated at 5th position according to the CRI with a death toll of 1,227, 0.6590 deaths per 100,000 inhabitants, US$ PPP 2.220 billion absolute losses, and 0.2511% losses per unit GDP.

Pakistan is in desperate need for more water storage capacity to counter the effects of climate change and food insecurity as it currently only has enough water stored for 30 days to meet its water requirement. Presently, Pakistan has <10% capacity for water storage (12.5 MAF of its total water resources of 145 MAF)[67]. This extra storage capacity would need to come from more dams, revitalised irrigation systems, and reducing irrigation system losses.

Figure 6 - Decadal temperature projections of selected centres



(Source: Pakistan Meteorological Department – 25 Km grid size using PRECIS Regional Climate Model)

[65] Climate Change, Food and Water Security in South Asia: Critical Issues and Cooperative Strategies in an Age of Increased Risk and Uncertainty. Global Water Partnership and International Water Management Institute, 2011

[66] Sönke Kreft, David Eckstein, Lukas Dorsch & Livia Fischer. Global Climate Risk Index 2016. German Watch

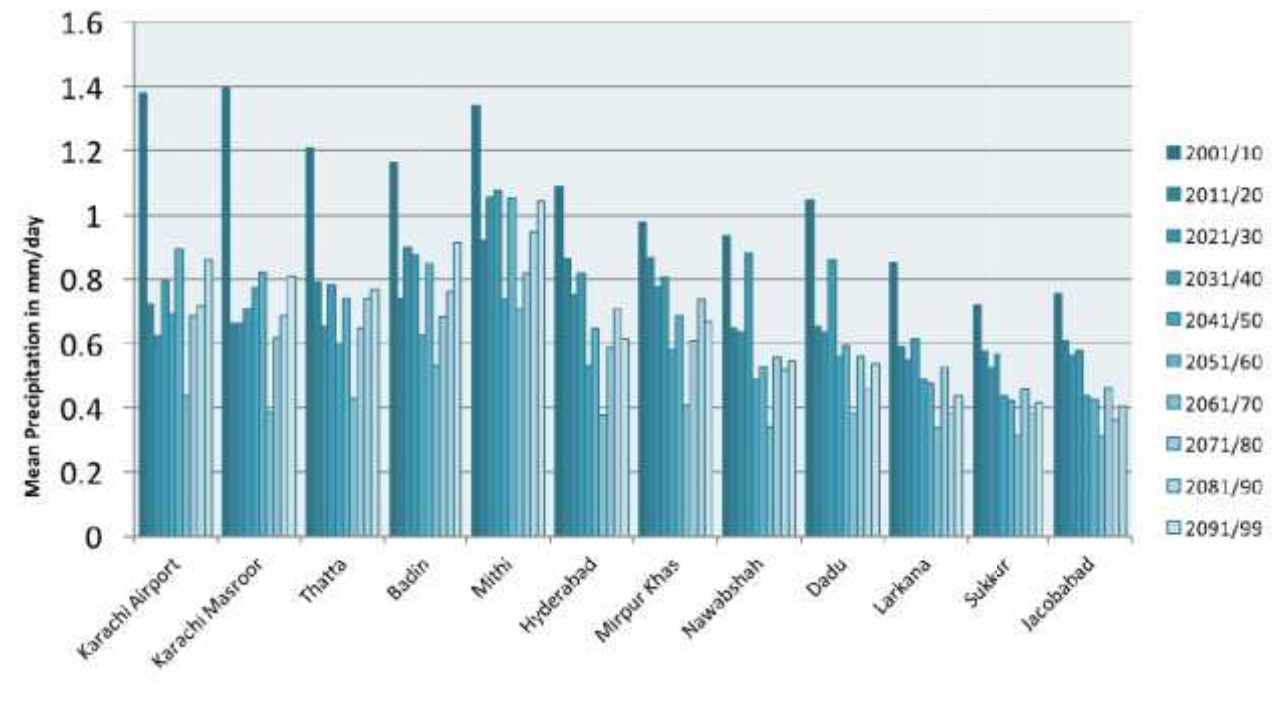
[67] Climate Change, Food and Water Security in South Asia: Critical Issues and Cooperative Strategies in an Age of Increased Risk and Uncertainty. Global Water Partnership and International Water Management Institute, 2011

Decadal temperature trends by the Pakistan Meteorological Department for selected cities/towns in Sindh illustrate (Fig 6) that by 2050 the average temperatures will have risen by 2.5^0 C and in 2100 by about 5^0 C. This is expected to have disastrous effects on water lost through evaporation, and subsequent increased groundwater mining, and reduction in agriculture yield thereby worsening food insecurity.

Decadal projections of precipitation (Fig 7) show that while there may be periods of varying rainfall, there is a general trend for mean rainfall per day to decrease over the next eighty years.

Rainfall patterns too have changed since the 2010 super floods. There has been a latitudinal redistribution of precipitation that has resulted in increased seasonal and annual precipitation and a westward shift (80-100 Km) of Monsoonal rainfall. This means that rainfall over the catchment areas of the eastern rivers has decreased (moved away). Furthermore, the probability of occurrence of heavy rainfall events leading to flash floods/floods would be high over the western rivers instead of the eastern rivers in the future. This implies that the north-west parts of the country are extremely vulnerable to floods. Fig 8 and Fig 9 illustrate the monthly rainfall shift to more precipitation in non-conventional months and drier winter periods.

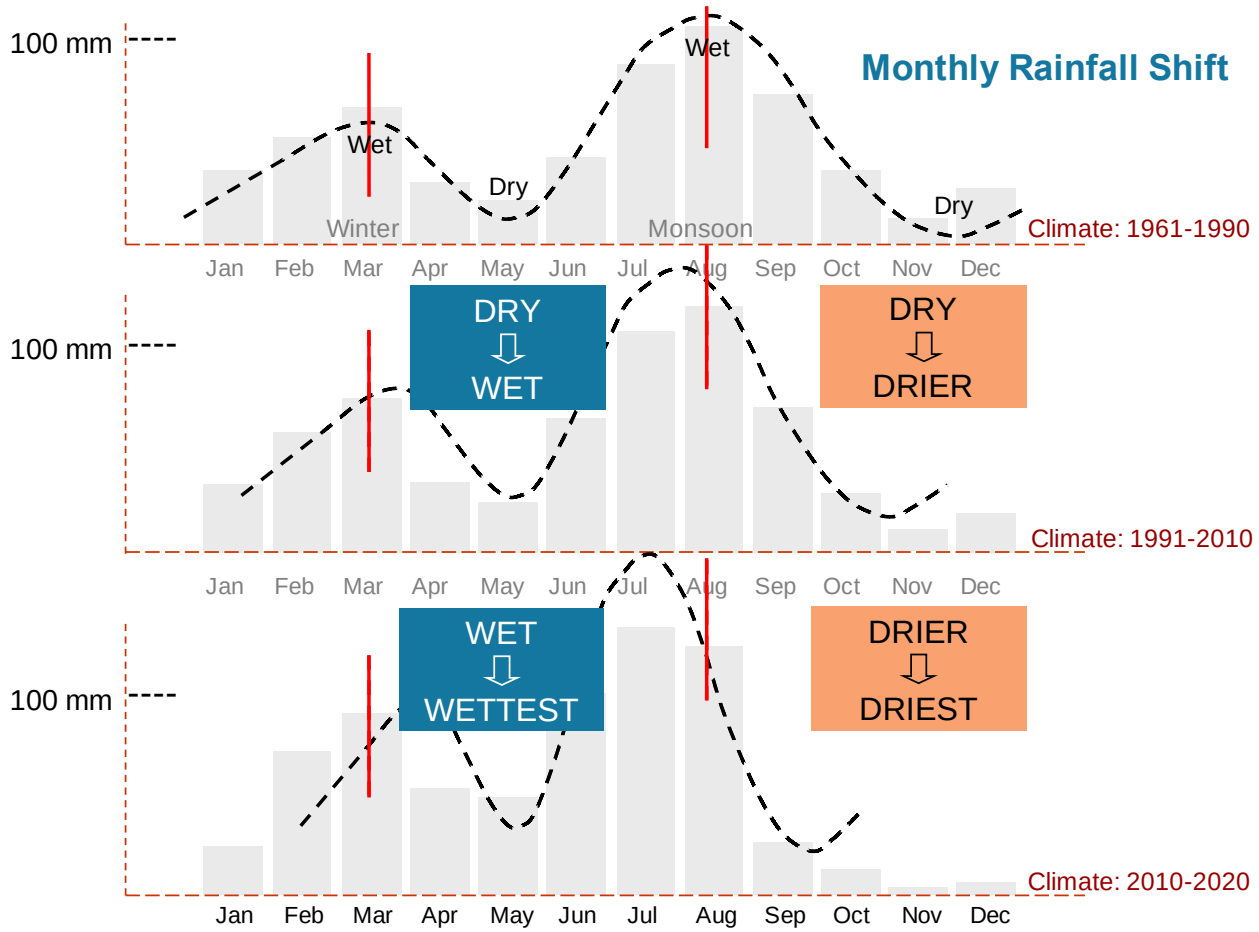
Figure 7 - Decadal precipitation projections for selected centres



(Source: Pakistan Meteorological Department – 25 Km grid size using PRECIS Regional Climate Model)

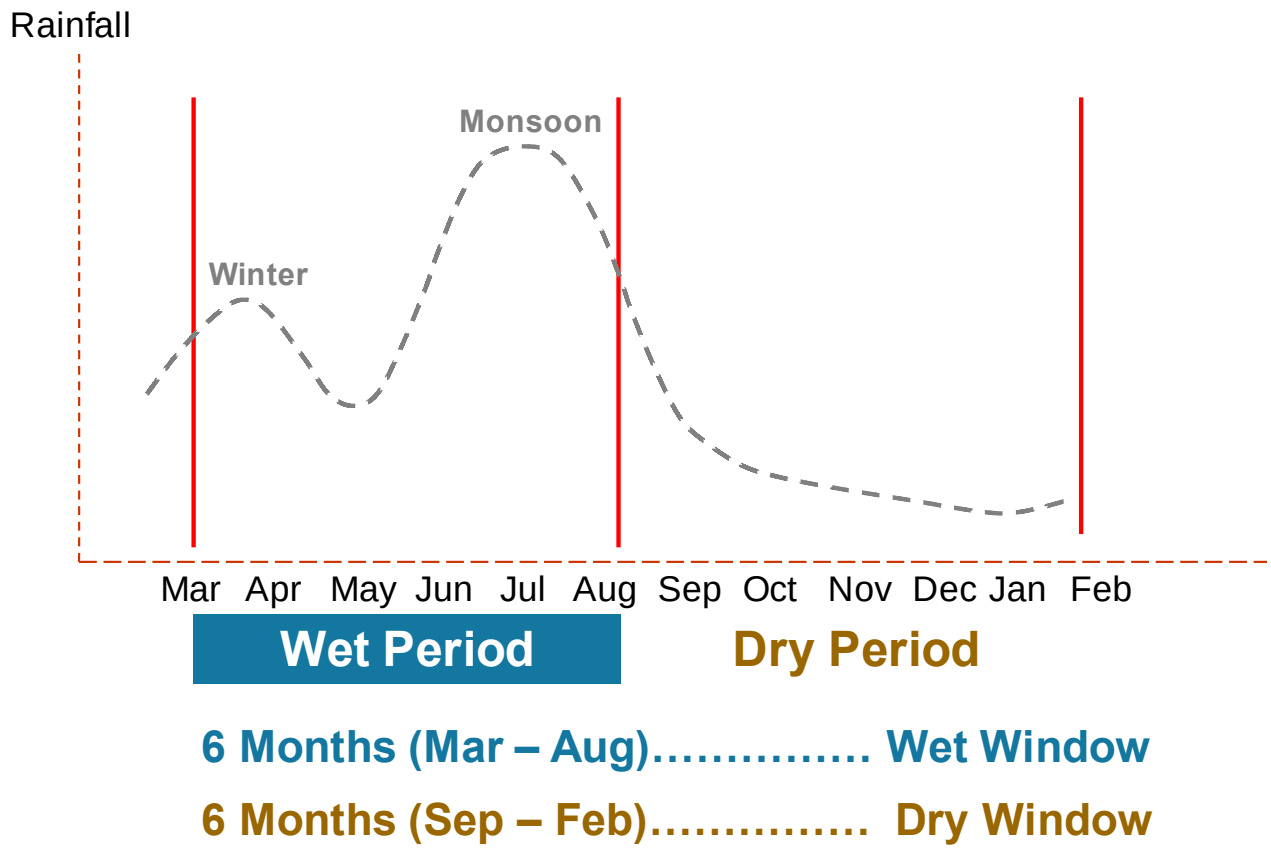
The latitudinal redistribution of Monsoonal rainfall westward, declining decadal projection of mean annual rainfall and rising decadal project of average temperatures have major implications for water resource management and agriculture on one hand, and the safety and sustainability of water and sanitation systems in the light of climatic events like floods on the other. Climate change adaptation of water and sanitation systems would be a critical need in the future.

Figure 8 - Monthly Rainfall Shift



(Source: Pakistan Meteorological Department)

Figure 9 - Projected climate 2020-2030



(Source: Pakistan Meteorological Department)

Vulnerability to Climate Change

Analysis of the recent evidence emerging from flood affected areas regarding the health, water and sanitation repercussions are of serious concern:

- Health facilities and sanitation infrastructure was severely damaged
- Access to safe water and sanitation was severely curtailed thereby increasing the vulnerability of people to infectious and water borne diseases such as diarrhoea, typhoid, intestinal worms and hepatitis. In many cases water pipes were contaminated with sewage water and the use of toilets in most flood affected districts dropped by 50%
- The incidence of cholera, malaria and polio increased over the past one year in Pakistan

A ranking of agro-ecological zones in Pakistan according to their vulnerability[68] to climate change shows the following:

[68] Malik SM, Awan H, Khan N: Mapping vulnerability to climate change and its repercussions on human health in Pakistan. Globalisation and Health 8:31, 2012

- Balochistan is the most vulnerable region with high sensitivity and low adaptive capacity. The major threats posed by climate change in Balochistan include droughts and increase in mean temperature
- Low-intensity Punjab (mostly consisting of South Punjab) is the next most vulnerable region. The region is prone to floods as well as rise in temperature. The region has a high degree of sensitivity and low adaptive capacity
- Cotton/Wheat Sindh is the third most vulnerable region. It is vulnerable to both floods and droughts. The degree of sensitivity is high. However, the coping capacity falls in the 'medium' rank. The rain-fed (Barani) Punjab has a high degree of exposure to climate change due to its greater variability in precipitation, but relatively better adaptive capacity

In a situation where Pakistan is ploughing through a state of development deficiency, building its adaptive capacity to climate change is challenging to say the least. However, the formulation of the new National Climate Change Policy 2012 is an encouraging step. Decadal forecasts of increasing floods and droughts suggest that mitigation planning for 2030 and 2050 needs to begin now.

Water Resource Development in Sindh[69, 70]

The basic lifeline of Sindh province, and indeed Pakistan, is the River Indus. It is one of the twenty-one largest rivers in the World with regard to annual flow. It is 3,180 km long and crosses China, India and Pakistan with a watershed of 1.165 million sq. km before merging into the Arabian Sea near Thatta.

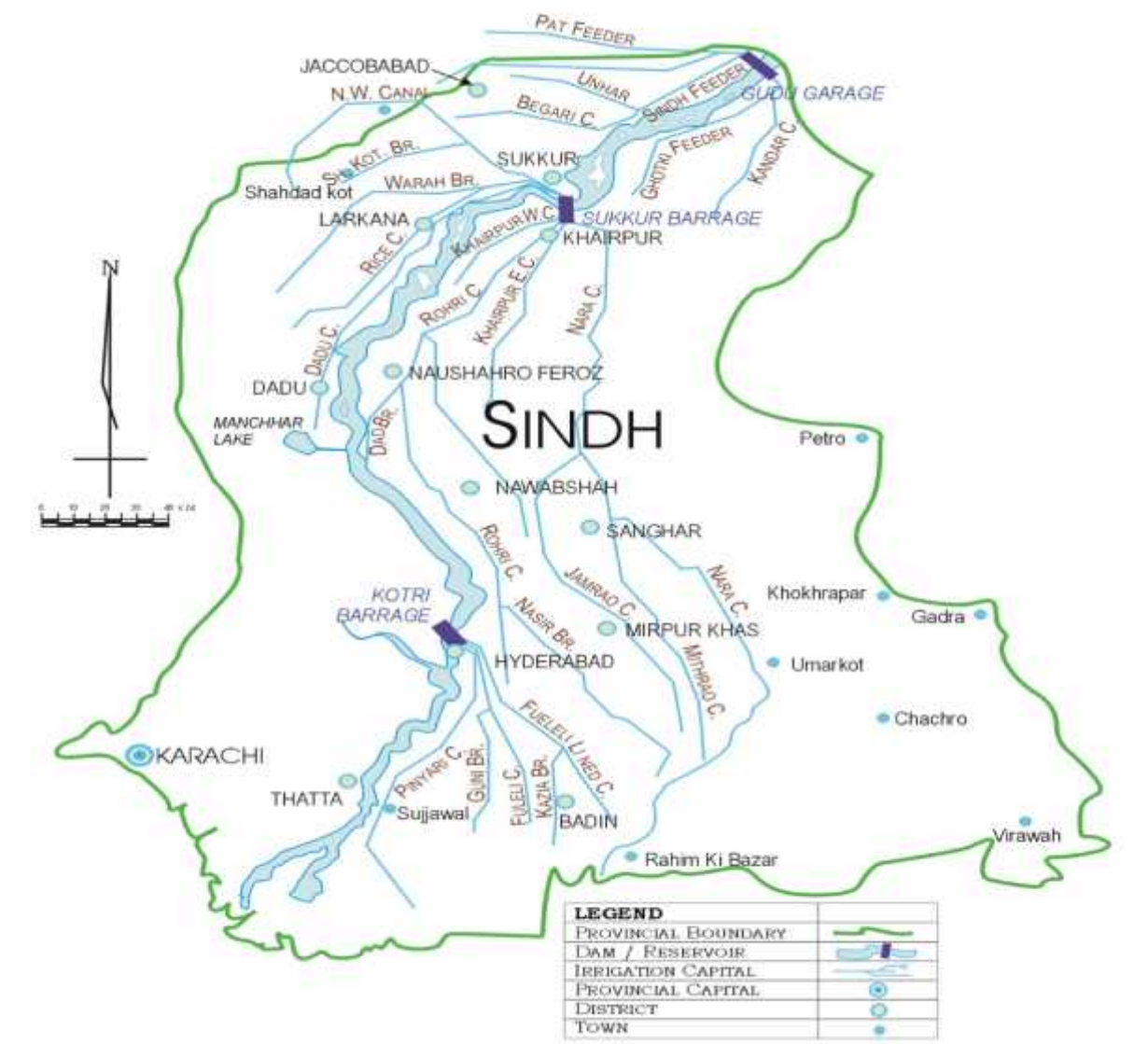
The main flow of surface water is through the irrigation canal system. The water from the River Indus is diverted to the canal system through barrages, while the main canals are further divided into branch canals, distributaries, minor canals and water courses. The canal system in Sindh has three barrages, namely, Guddu Barrage, Sukkur Barrage and Kotri Barrage (**Fig 10**).

The total gross command area (GCA) is 14.391 million acres, with 3 Barrages, 14 main canals, 1,462 branch canals, distributaries and minors, and 42,000 water courses. More than 95% of the irrigation is from canal water. The system runs 13,234 miles in form of main canals, branch canals, distributor canals and minor canals. Approximately 80% of the area is underlain by saline groundwater. Apart from the irrigation system, Sindh has a drainage system which as such is not contiguous and integrated. There are 13 existing surface drainage systems in Sindh, which serve a total area of over 6.2 million acres (2.5 MHA) and have an aggregate length of about 2,981 miles (4,800 km). In addition, there are two sub-surface drainage systems, which serve an area of 0.10 million acres (0.04 MHA).

[69] Nazeer Essani, General Manager, SIDA (Sindh Irrigation & Drainage Authority). Water Sector Development in Sindh: A case of Irrigation Reforms, 2009

[70] Sindh Water Resources Development and Management Investment Programme, 2010. Sindh Irrigation and Power Development and Asian Development Bank

Figure 10 - Sindh Irrigation System



Water Resource Constraints

The climate in Sindh is arid and hot with a minimal rainfall of 140 mm annually. Approximately half of Sindh is non canal command and only rain-fed. Furthermore, there is a shortage and reduced supply of water from River Indus thereby not fulfilling the stipulations under the 1991 Water Accord between the provinces. About 85% of the Indus river flow occurs during June-September for 90-120 days. There are about 6.5 to 8.0 MAF water losses between Sukkur to Kotri Barrage. In addition, there is disposal of saline drainage water and waste into river and fresh water canals and urban waste from Hyderabad and Sukkur. Almost 80% of the irrigated land in Sindh is underlain with saline and brackish underground water not fit for agriculture and less so for drinking. Sea water intrusion has encroached up to 35 km affecting 0.6 MHA of land, which is increasing gradually.

Cropping intensity and the irrigated area have grown faster than surface irrigation supplies. In response, tube wells funded by private farmers have grown rapidly leading to unsustainable

exploitation of groundwater. The irrigation infrastructure, due to high discharges from the Indus, is operating under flows that are higher than the design discharge. This reduces operational efficiency. The whole irrigation system suffers from deferred maintenance, especially distributaries and minors, and drains are neglected. Often, small channels operate without control gates and regulators.

There is no water storage facility in Sindh except the Chotiary reservoir (0.7 MAF) which runs lower than capacity. There are 10 declared wetlands of international importance (Ramsar Sites). However, there is not enough water to feed them through regular supply, seepage or rain, and this poses a major environmental threat. The River Indus below Kotri is dry. Furthermore, the urban water consumer is growing fast- Karachi alone takes 1,200 cusecs and its demand is increasing. By 2025, Sindh requires additional 25 MAF to meet agriculture and non agriculture demand. Sindh also needs water for development of Thar Coal, which is a major challenge.

The Sindh canal command is 5.1 MHA. About 1.3 MHA is cultivable waste that could be brought under irrigation if water were available. About 50% of the total Sindh Canal Command has no drainage facility. As a result, 32% of the irrigated area is saline and 43% waterlogged, with Badin and Thatta being 80% or more. The drainage effluent from Punjab and Balochistan poses a water quality threat to the River Indus from upper riparian and thereby affecting lower riparian Sindh. Furthermore, 2,135 km is flood protective embankment-bund and heavy floods can cause disasters as has been witnessed in recent years. The River Indus provides an uninterrupted supply of water to Karachi Metropolis through 100 miles of transportation. However, there is no major revenue/ recovery. The irrigation system efficiency is reduced to approximately 30%.

Distribution inequities are another major impediment to water resource management in Sindh. Poor, tail end and small farmers, women and peasants are most vulnerable. The rural and urban elites have switched from land to fish farms thereby drawing more water than is allocated. Water theft and tampering is commonplace, while use of Illegal pumping machines and cuts are common as there no checks and control.

Direct Outlets (DOs) form a serious constraint to judicious water distribution. Only the powerful and influential elite can get a DO sanctioned. Approximately 20-30% of irrigated command is served by DOs, especially in the Nara Canal. The DOs constitute a major constraint in distribution equities because from a practical standpoint, DOs do not come under rotation.

Rainwater Harvesting

PHED Karachi has completed Ten Small Dams (Retention Weirs) in rural areas of Karachi and one is still in progress with different pounding capacity to harness rain water to raise ground water for drinking water and agricultural purposes. In the recent rains in Karachi, the maximum number of these dams filled to full capacity.

Strategy

Water Resources			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Improved water resource utilisation through efficient project design and execution	P&DD to issue the following Advisories/Circulars: All future reservoirs – basic design will have outlets for drinking water depending on storage capacity Gravity flow lines are used where feasible Every embankment must have provision for pipe outlet for drinking water There must be water storage provision in design for outlet in times of calamity – all field engineers would need to comply and ensure that a drinking water supply component was part of their projects and ensure that a share for drinking water is allocated It is mandatory to include GIS mapping for every drinking water supply project Every new drinking water supply scheme must have an outlet for distribution to local schools and health facilities - All new PHE&RDD Water Supply schemes must ensure that they provide an extension water pipe to the nearby school with its water tank		
District profiles developed for water resource management and development	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (5 districts in short-term) and	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (10 districts in medium-term) and	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (14 districts in long-term) and

	upgradation Manchar Lake should be preserved RBOD development should be completed on priority basis	upgradation	upgradation Develop an integrated water resources management policy and implementation framework
District level preparedness for safety of water and sanitation systems and disaster risk reduction enhanced	Map out all UCs with risk associated with disasters and safety of water and sanitation systems (5 districts) Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (5 districts in short term) for duty bearers Ensure water quality focus of embankments	Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (10 districts in medium term) for duty bearers Build capacities at town and UC level for planning for safety of water and sanitation systems and disaster risk reduction at district level (60 towns and 500 UCs) Ensure water quality focus of embankments	Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (14 districts in long term) for duty bearers Build capacities at town and UC level planning for safety of water and sanitation systems and disaster risk reduction at district level (59 towns and 797 UCs) Ensure water quality focus of embankments
Sectoral capacity for climate change adaptation and mitigation developed	Sub-sector climate change adaptation and mitigation strategies developed Mapping of towns at risk of effects of climate change	Piloting of climate change adaptation and mitigation in selected towns (to be identified)	Climate change mitigation capacities developed in phased manner in towns located in zones vulnerable to climatic events (to be identified)
Municipal services duty bearers fully conversant with climate change and its mitigation strategies	Need assessment of sub-sector human resources for climate change adaptation and mitigation	Capacity building programme of city, town and union council officials in pilot areas on climate change mitigation strategies	Capacity building programme of city, town and union council officials on climate change mitigation strategies extended to other areas
Rainwater harvesting systems implemented in pilot areas	Rainwater harvesting pilot projects evaluated and plan to extend to other feasible cities developed	In participating pilot areas, rainwater harvesting provides at least 10% of water used for non-domestic municipal services and horticulture	In participating pilot areas, rainwater harvesting provides at least 30% of water used for non-domestic municipal services and horticulture

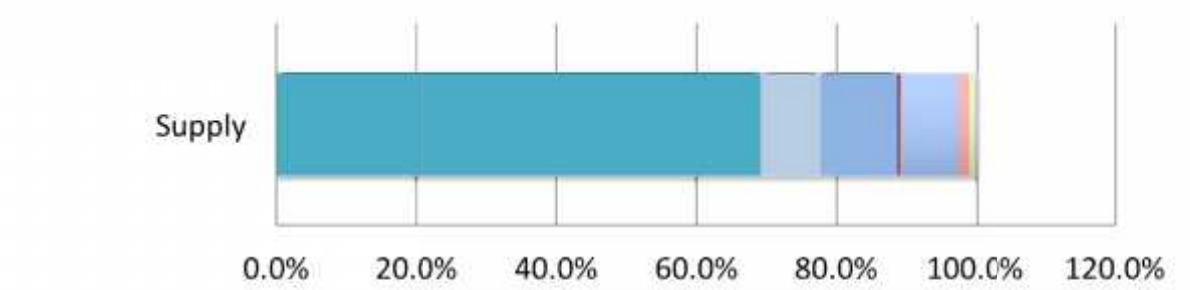
WATER SUPPLY

Urban Water Supply

Coverage

The recent PSLM 2014-15[71] survey shows that tap water (69%) is the prominent source of drinking water supply in households urban areas followed by motor pump (11%) (Fig 11).

Figure 11 - Sources of urban water supply in Sindh (PSLM 2014-15)



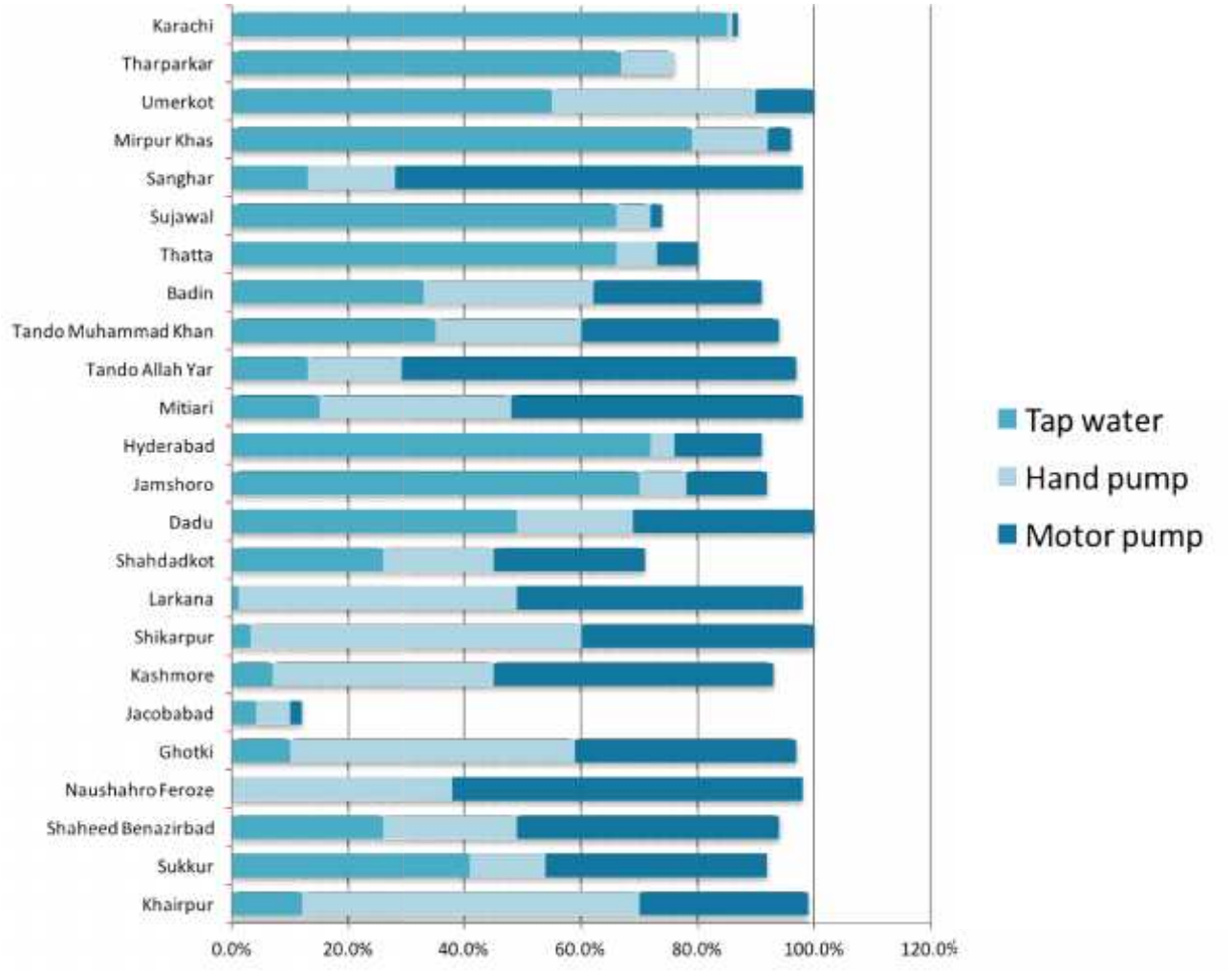
	Supply
Piped water	69.2%
Hand pump	8.4%
Motor pump	11.0%
Close well	0.5%
Open well	0.1%
River/Lake/Pond/Stream	0.1%
Tanker/Truck/Vendor	8.0%
Mineral Water	1.5%
Filtration Plant	0.8%
Others	0.4%

(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 12 shows that Karachi, Mirpur Khas and Hyderabad had the highest percentages of tap water at 85%, 79.0% and 72% households respectively. The lowest rates for tap water were found in Naushahro Feroze (0%), Larkana (1%), Shikarpur (3%) and Jacobabad (4%). High rates of tanker/truck or vendor were found in Jacobabad (84.7%), Shahdadkot (26.9%), Karachi (9.8%) and Thatta (9.7%). The highest use of open well was found in Tharparkar (17.3%).

[71] Pakistan Social and Living Standards Measurement Survey 2014-15. Pakistan Bureau of Statistics

Figure 12 - District wise distribution of improved drinking water source in urban areas (PSLM 2014-15)



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

The Multiple Indicator Cluster Survey (MICS) 2014[72] of Sindh indicates that overall 90.5% of household members use an improved[73] source of drinking water, while 12.8% of household members in households using unimproved drinking water use an appropriate water treatment method. About 90% of urban and 91% of rural household members use an improved drinking water source.

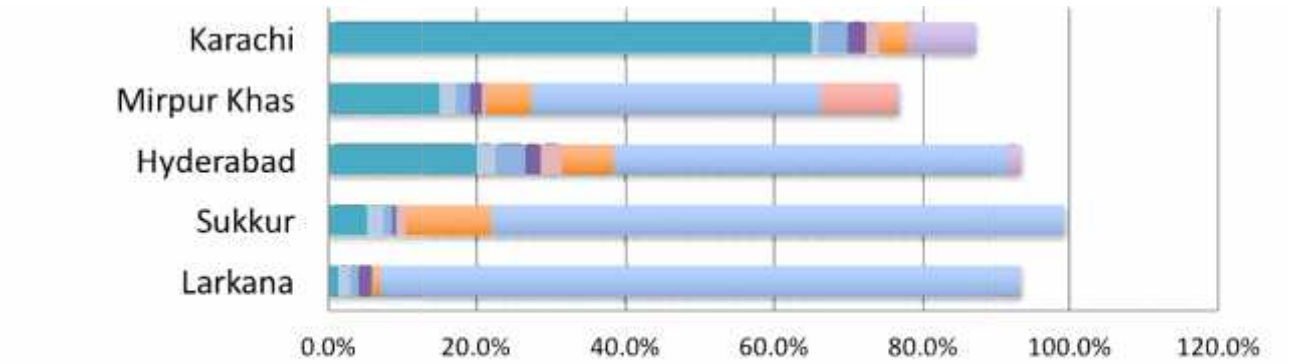
[72] Multiple Indicator Cluster Survey 2014, Key Findings Report. Government of Sindh

[73] Improved sources of drinking water are those using any of the following types of supply: piped water (into dwelling, compound, yard or plot, to neighbor, public tap/standpipe), tube well/borehole, protected well, protected spring, and rainwater collection. Bottled water is considered as an improved water source only if the household is using an improved water source for hand washing and cooking.

Figure 13 shows that piped water into dwelling is found mostly in Karachi division (65.0%), followed by Hyderabad (20.0%) and Mirpur Khas (15.1%) divisions. The rest of Sindh indicates a high use of water from a protected well with highest rates found in Larkana division (86.3%) and Sukkur division (77.3%).

Figure 14 illustrates a similar picture at district level in Karachi, Hyderabad and Mirpur Khas divisions.

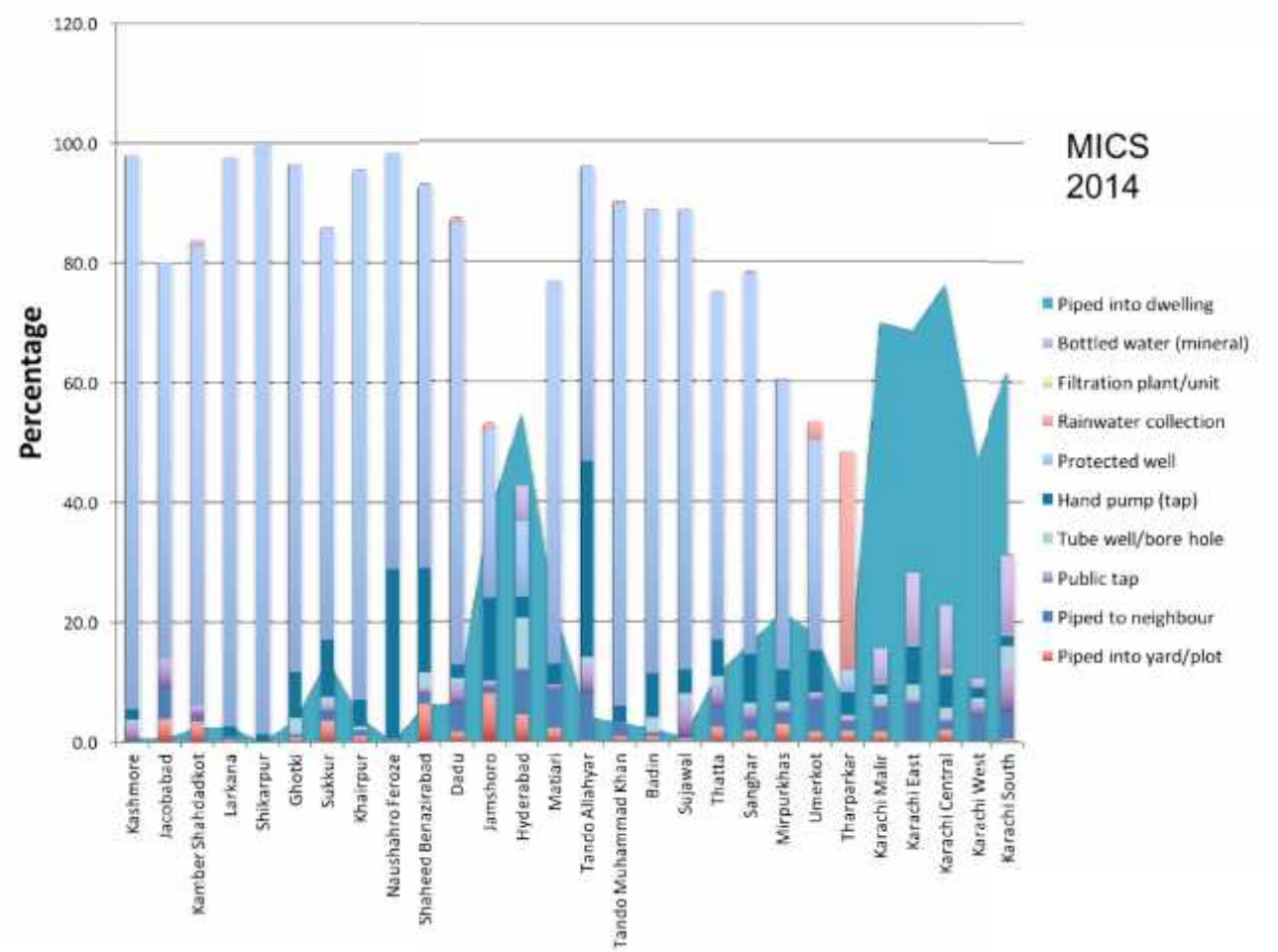
Figure 13 - Overall source of improved water supply by division (MICS 2014)



	Larkana	Sukkur	Hyderabad	Mirpur Khas	Karachi
Piped into dwelling	1.3%	5.2%	20.0%	15.1%	65.0%
Piped into yard/plot	1.5%	2.2%	2.5%	2.1%	0.9%
Piped to neighbour	1.2%	1.1%	4.0%	2.0%	3.8%
Public tap	1.8%	0.5%	2.1%	1.5%	2.5%
Tube well/bore hole	0.1%	1.3%	2.8%	0.5%	1.8%
Hand pump (tap)	0.9%	11.6%	6.9%	6.0%	3.7%
Protected well	86.3%	77.3%	53.6%	38.9%	0.1%
Rainwater collection	0.1%	0.0%	0.3%	10.2%	0.3%
Filtration plant/unit	0.0%	0.0%	0.0%	0.1%	0.0%
Bottled water (mineral)	0.2%	0.1%	1.4%	0.3%	8.9%

(Source: Sindh Multiple Indicator Cluster Survey, 2014)

Figure 14 - Overall source of improved water supply by district (MICS 2014)



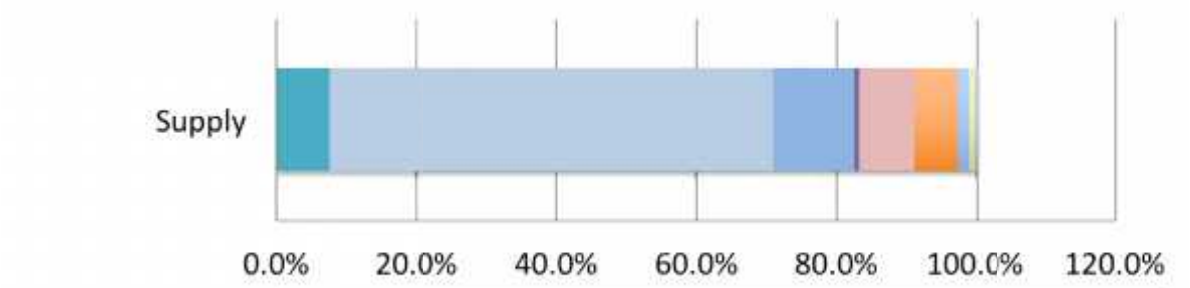
(Source: Sindh Multiple Indicator Cluster Survey, 2014)

Rural Water Supply

The PHE&RDD of the Government of Sindh is the department responsible for providing access to safe drinking water in the rural areas of the province. Presently, data regarding water supply schemes and coverage at district and provincial levels is maintained by LG&TPD and PHE&RDD.

Coverage

Figure 15 - Sources of rural water supply in Sindh (PSLM 2014-15)



	Supply
Piped water	7.5%
Hand pump	63.4%
Motor pump	11.6%
Close well	0.6%
Open well	7.9%
River/Lake/Pond/Stream	6.1%
Tanker/Truck/Vendor	1.6%
Mineral Water	0.0%
Filtration Plant	1.0%
Others	0.3%

(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

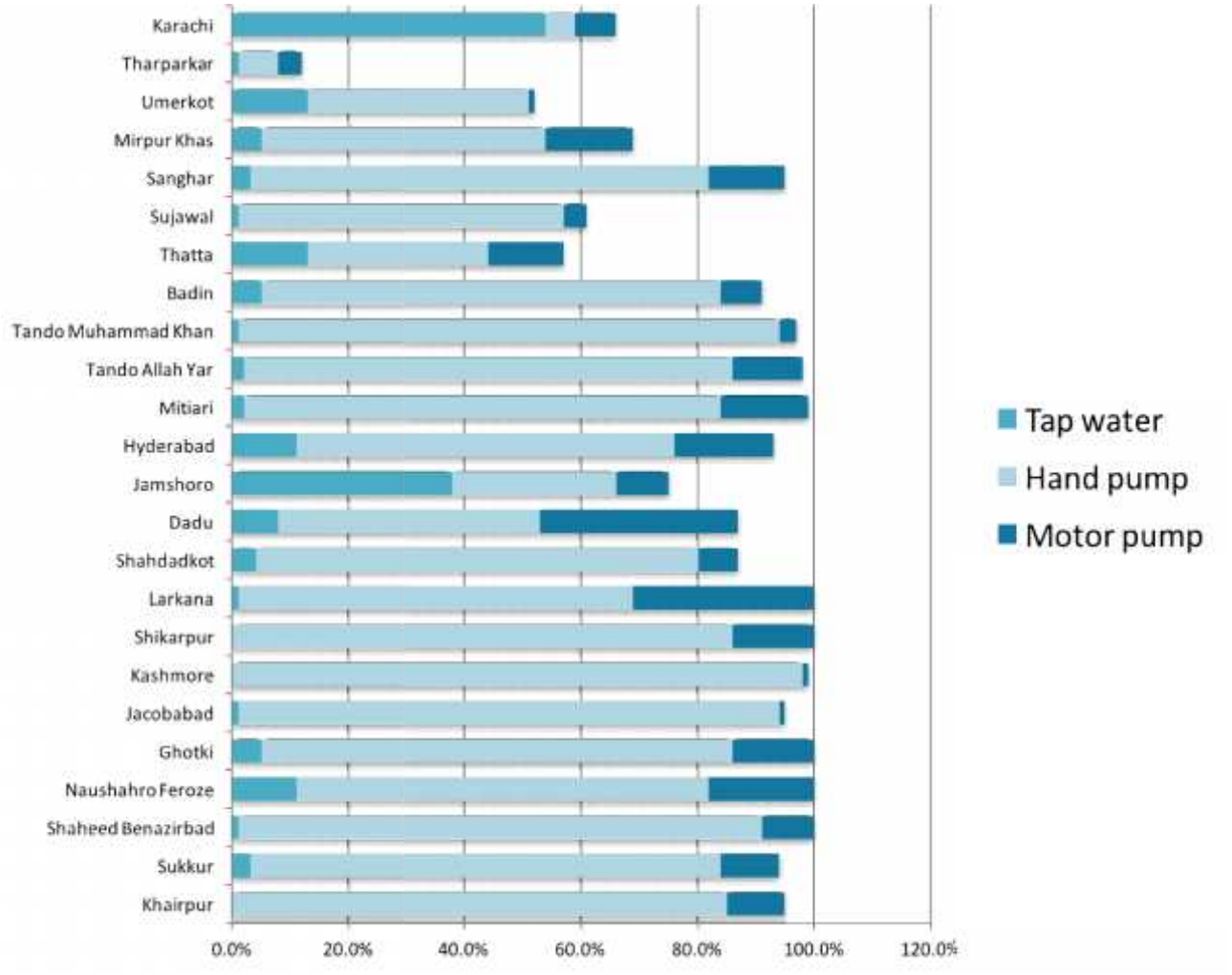
The recent PSLM 2014-15[74] survey shows that hand pump is the prominent source of drinking water supply in rural areas followed by motor pump (Fig 15). However, about 18% of households use 'other' sources of drinking water supply usually from unimproved sources (unprotected well, unprotected spring, tanker-truck, cart with small tank/drum, surface water[75] etc).

Fig 16 shows that Karachi and Jamshoro districts had the highest percentages of tap water at 54% and 38% households respectively. The lowest rates of tap water were found in Kashmore (0%), Khairpur (0.2%) and Shikarpur (0.3%). Kashmore, Jacobabad and Tando Muhammad Khan had high rates of use of hand pumps in 98%, 93% and 93% respectively. The highest rate of use of motor pump was found in Dadu at 34%.

[74] Pakistan Social and Living Standards Measurement Survey 2014-15. Pakistan Bureau of Statistics

[75] River, stream, dam, lake, pond, canal, irrigation scheme

Figure 16 - District wise distribution of improved drinking water source in rural areas (PSLM 2014-14)

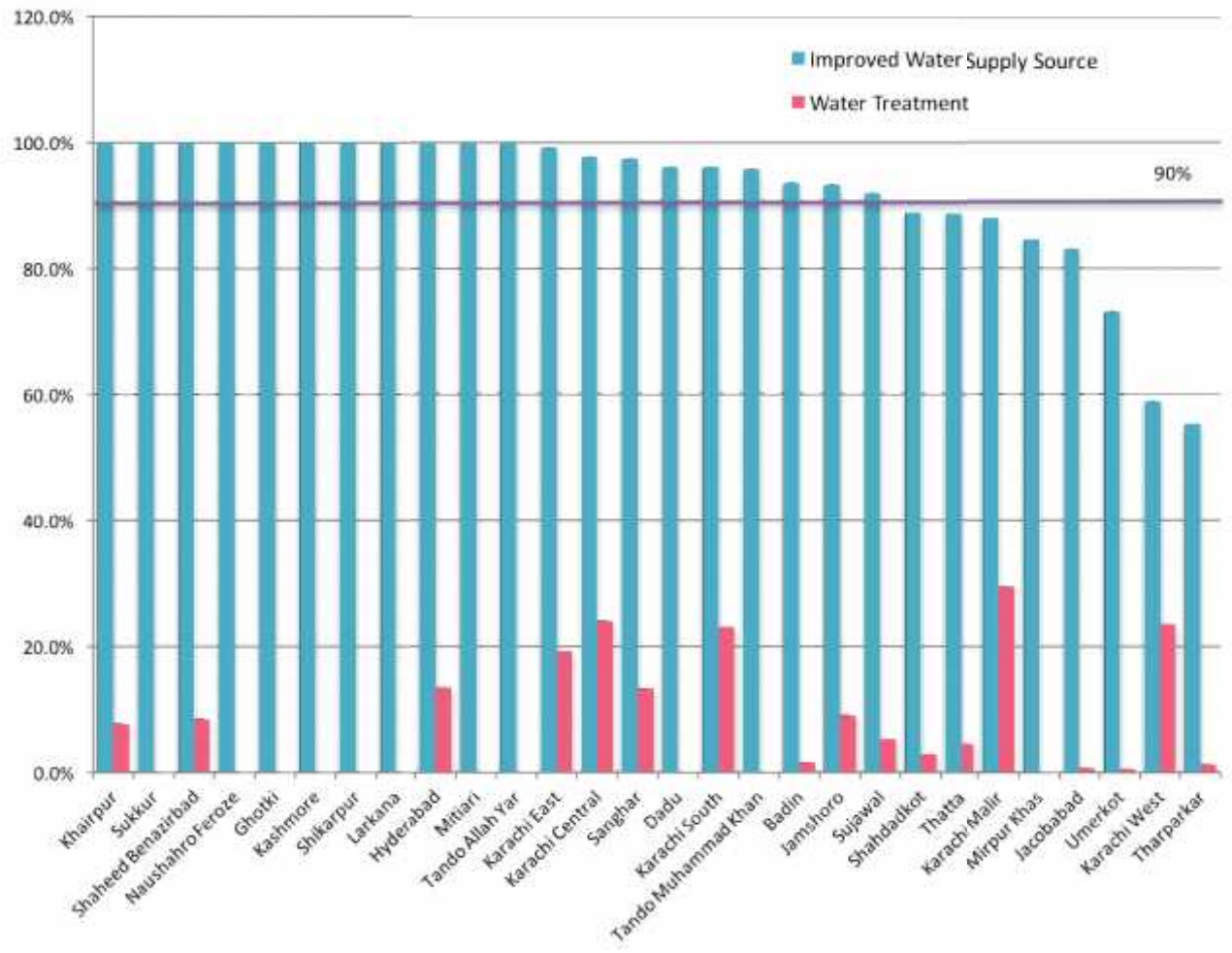


(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

The preliminary results of Sindh MICS 2014 indicate that other than Karachi districts that attain about 20%-30% water treatment, all other districts rate less than 20% for water treatment, even though a large proportion of districts are using improved water for drinking (**Fig 17**).

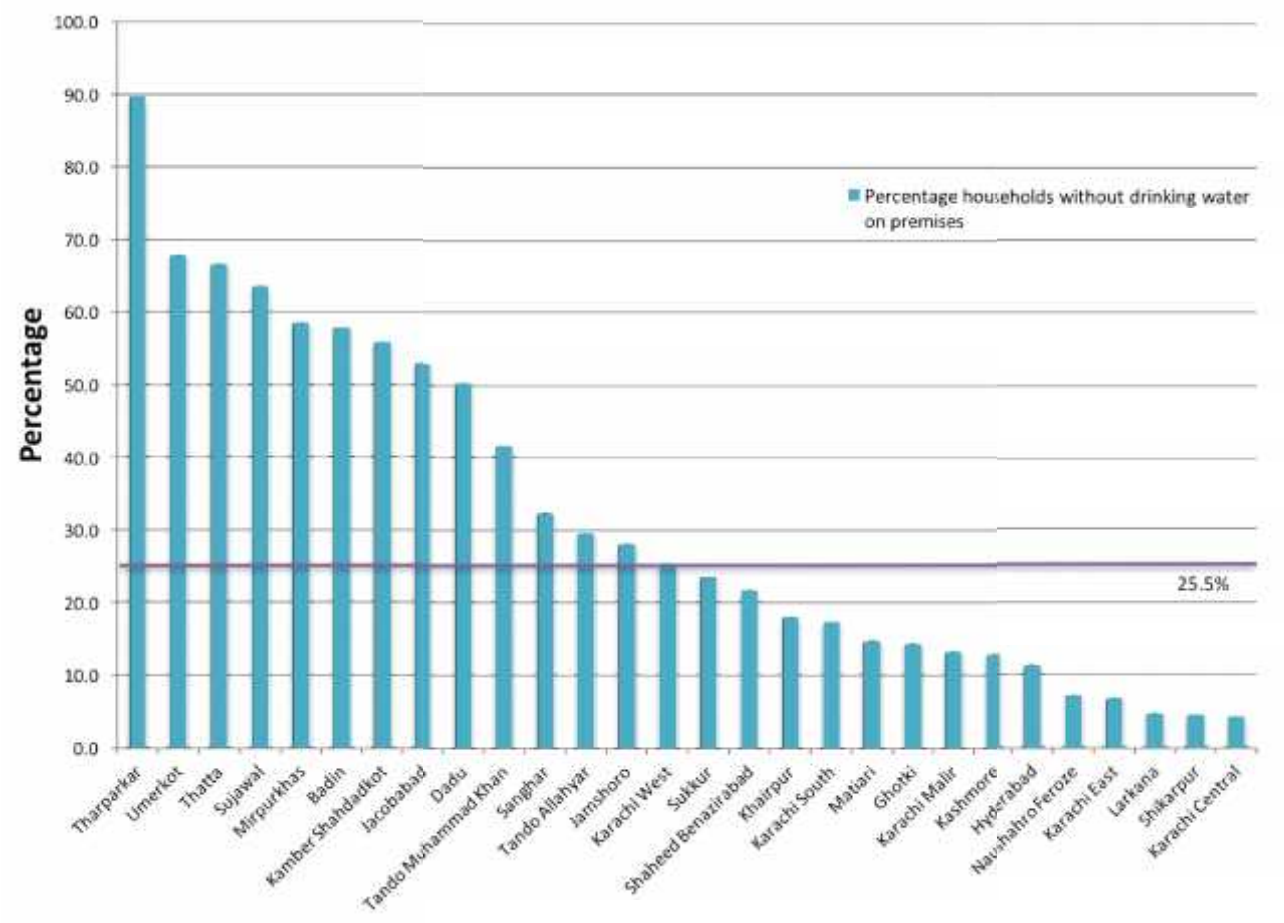
Figure 18 illustrates the proportion of households without drinking water on premises. Tharparkar has the highest percentage of households without drinking water on premises (89.7%) with a provincial average of 25.5%.

Figure 17 - Status of improved water supply and water treatment (MICS 2014)



(Source: Sindh Multiple Indicator Cluster Survey, 2014)

Figure 18 - Percentage households without drinking water on premises (MICS 2014)



(Source: Sindh Multiple Indicator Cluster Survey, 2014)

Water Supply Issues

Work done by the Urban Unit Government of Sindh has identified the following key challenges in drinking water supply[76]:

- Weak institutional arrangements with overlapping of roles and responsibilities
- Weak coordination mechanisms
- High proportion of non-revenue water
- Dysfunctional water supply and sanitation schemes
- Ageing infrastructure
- Water and sanitation schemes driven by political interests – they are not demand driven and not based on need assessment
- Poor water quality from polluted and contaminated sources
- Inadequate waste water treatment facilities
- High dependency on surface water which is depleting

Issues with Karachi Water Supply

Karachi faces a chronic problem of water shortage in supplies to meet the constantly growing demand. There are some major challenges in the area of management of services and the supply deficiencies in both quantity and quality of water.

The water demand amounts to approximately 752 MGD (in 2005); against this demand the capacity of the supply system is 646 MGD, giving rise to a shortfall of 106 MGD in bulk supply[77]. But the amount of water supplied to the consumers by the service remains short by about 35% due to losses in transmission from leakages, friction and large scale unauthorised diversion or thefts. To meet the current shortages adequately and the demand up to 2020 (when the metropolitan population will increase to 27.5 million), the bulk water supply from the Indus and other sources will need to be augmented to double the quantum of the present supply. **Figure 19** illustrates the existing water supply network in Karachi.

About 60% of the households are connected to the supply network. Under the present conditions, water supply is irregular and inequitable. Water is supplied only for a few hours, generally four hours daily and that too at a very low pressure. Inequitable distribution marks the supply system as some areas receive more water, and some too little to meet their needs. There are some areas which are not connected to the system and get water on payment through tankers.

There is also a serious concern about water quality. The existing filtration facilities are not enough to subject all supplies to clarifier process; about 60% of water is filtered and the rest is only

[76] Khalid M Siddiqui, DG UP&SP. State of Urban Water Supply & Sanitation Sector in Sindh. Pakistan Urban Forum Karachi 2014

[77] Adapted from Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi

disinfected through chlorination. Some contamination may also occur in transmission to the end consumers.

Improvements in the system depend on public financing, for the existing tariffs only generate insufficient revenues to cover operational and maintenance costs. Enhancement of tariffs is clearly linked to the economic structure of consumer population besides improvement in service delivery. Efficiency of the delivery system is intricately tied up with the financial viability and related management issues.

Figure 19 - Existing Water Supply Network for Karachi

(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

Table 9 summarises key problems affecting the water supply system in Karachi.

Table 9 - Major problems with the water supply and sanitation system in Karachi

Major Problems	Symptoms	Consequences
Poor conditions of water distribution system	▪ An inflow of 550 MGD: Only 55 % of total water requirement	▪ Water demand to reach 1,400 MGD by 2020, Potential for saving 1/3rd of supplied water.
Lack of autonomy	▪ Intermittent water supply- available 2-4 hours per day ▪ High level of leakage ▪ Low system pressure ▪ Contamination: 30,000 people, mostly children, die each year in the city[78] ▪ Inequitable distribution ▪ 8 million people (40% of city population) have access to Sewerage system	▪ Customers' distrust in KW&SB and the services it provides ▪ Distribution System: 40-45 years ▪ Reluctance to pay for the services ▪ Insufficient revenues ▪ Access levels to water declined: 91 % (2007) to 89% (2013) ▪ Less than 10% of sewage water treated. ▪
Weak financial capacity	▪ High level of receivables ▪ Tanker supplies ▪ Illegal connections ▪ Low tariffs ▪ 6.5 employees per 1000 connections	▪ Insufficient revenues ▪ Low morale of KW&SB staff ▪ JICA recommendations-USD 250m/Year investment for 10 years – which is 0.6 % of City GDP
Absence of measured supplies and volumetric charging system	▪ De-facto bankrupt utility (gap of USD 9 million / month) ▪ Delay in capital replacement ▪ Delay in system expansion ▪ Poor current maintenance ▪ Poor working environments (offices & equipment) ▪ Reliance on Government funding (for capital and operational expenditure) ▪ Collection in past 5 years: declined - 61% to 59 %	▪ Yearly expenditure: US$ 106 million vs US$ 60 million revenue, yearly electricity bill only US$ 66m, ▪ Outstanding arrears estimated at $460M: $179M (retail); $281M (bulk), Non Water Revenue estimated to 60% (or USD240 million in 2015) ▪ Deteriorating services ▪ Deteriorating assets ▪ Low morale of KW&SB staff ▪ Political interference

(Source: Adapted from The Study on Water Supply and Sewerage System in Karachi in the Islamic Republic of Pakistan. Report. Vol II, 2008. Japan International Cooperation Agency (JICA) and Karachi Water & Sewerage Board (KW&SB); and Workshop on Reform Led Investment Plan of KW&SB 2016 Karachi)

[78] WWF 2011 Report

Current Status of Water Supply Schemes[79]

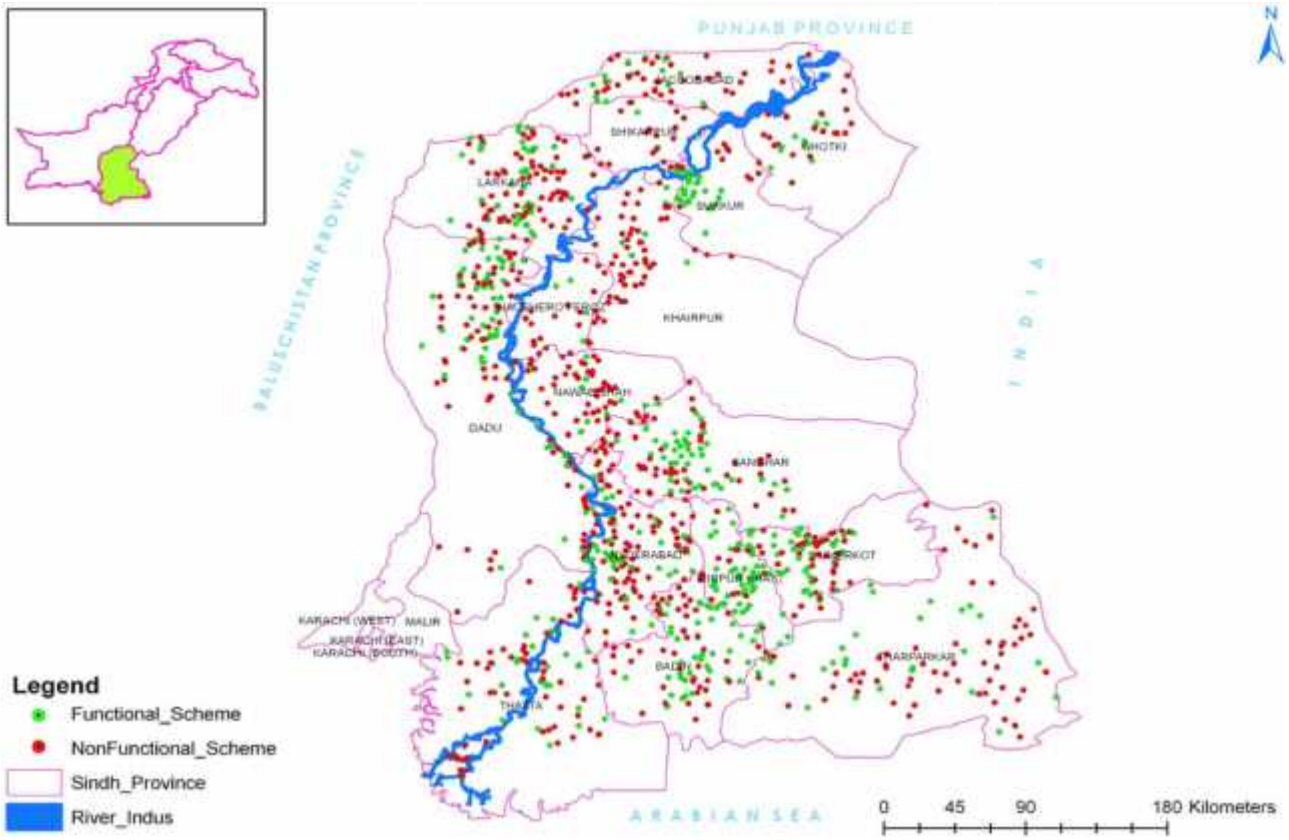
Total Number and Nature of Water Supply Schemes

The Pakistan Council of Research in Water Resources conducted a Technical Assessment Survey of Water Supply Schemes to identify the problems and constraints hindering the supply of safe drinking water to the communities, by the water supply schemes[80]. This involved the identification of the institutional, operational, technological and financial problems of the functional schemes and exploration of the reasons. In addition, the Technical Assessment Survey also investigated and found out reasons regarding non-functional status of the water supply schemes.

Status of water supply schemes in Sindh province

- Total districts surveyed – 22
- Water supply schemes reported by province – 1300
- Total water supply schemes surveyed – 1247 (123 urban and 1124 rural)
- Total number of schemes that were functional – 529

Figure 20 - Location of surveyed water supply schemes



(Source: Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources)

[79] Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources

[80] PCRWR Annual Report 2013–2014. Pakistan Council of Research in Water Resources

The results showed that out of a total of 1247 water supply schemes in the province, 718 (58%) are non-functional (Fig 20). Of these non-functional schemes, 75% are temporarily closed while the remaining (25%) appear to be permanently closed.

Reasons for Non Functional (temporarily closed) Water Supply Schemes

- Lack of funds
- Missing/theft/damage of electrical and mechanical components
- Breakage in transmission/distribution network
- Shortage of water
- Lack of interest
- Community dispute/collection of O&M funds/non-payment of electricity bill
- Shortage of staff/improper design
- Low pressure
- Damage of well
- Rehabilitation of scheme
- Flood affected

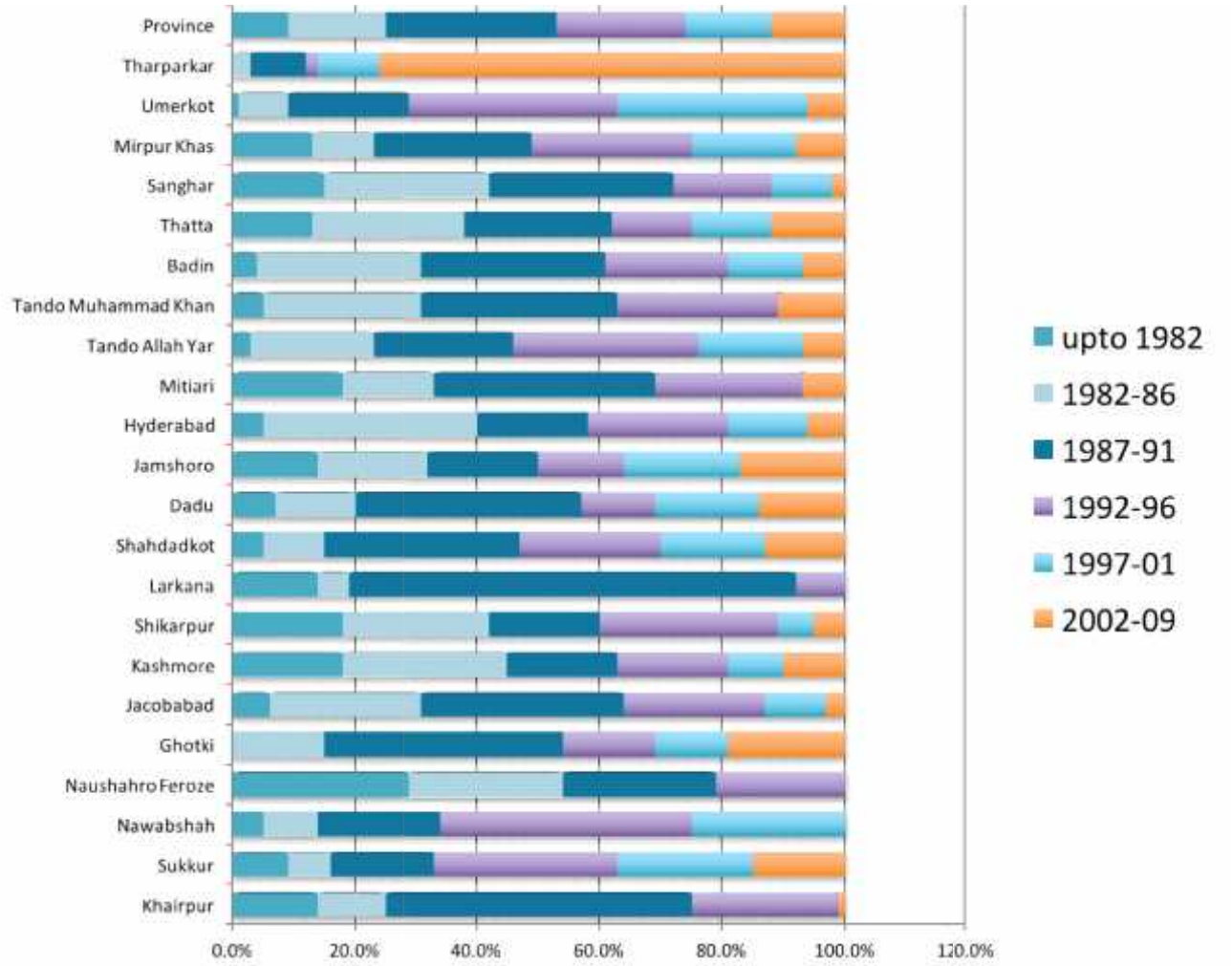
Period of construction of Water Supply Schemes

The Technical Assessment Survey[81] revealed that 107 schemes (9%) are older than 27 years. Nearly 16% of the schemes are 20 to 25 years old, 28% schemes are 15 –20 years old, whereas 47% schemes are 10 – 15 years old (Fig 21). During the 10 years' period (1982 to 1991) that may be considered much older, a higher number of schemes were constructed in all the tehsils.

Most of the schemes have used galvanised iron pipes for the distribution system. The useful life of this material is less than 20 years, and therefore requires rehabilitation of even the functional older water supply schemes.

[81] Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources

Figure 21 - Water Supply Schemes by construction period



(Source: Computed from Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources)

Recent Initiatives for Water Supply by Government of Sindh

Sindh Cities Improvement Programme

Sindh Cities Improvement Investment Programme (SCIP) is an Asian Development Bank (ADB) assisted US$ 400 million infrastructure and service delivery reform programme, which aims to improve water supply, wastewater management, and solid waste management (SWM) services in 20 participating secondary cities through establishment of government-owned, professionally managed Urban Services Corporations; urban sector reforms and investment in water supply, wastewater and solid waste management infrastructure. This has been initiated as the North Sindh Urban Services Corporation (NSUSC). There are plans to establish two other similar corporations – Central Sindh Urban Services Corporation (CSUSC) and Southern Sindh Urban Services Corporation (SSUSC).

Northern Sindh Urban Services Corporation

The North Sindh Urban Services Corporation has been established under the Companies Ordinance 1984 for the secondary cities of the Northern cluster of Sindh Province. This Urban Services Corporation aims to aggregate participating Tehsil Municipal Administration's (TMAs) water supply, waste water and solid waste management operation in a single institution to leverage economies of scale, introduce new skills and management, and increase focus on operations, maintenance and financial management. Presently, NSUSC is being implemented in 7 cities (Sukkur/New Sukkur, Rohri, Khairpur Mirs, Shikarpur, Larkana, Jacobabad and Ghotki). In participating TMAs, the focus of water supply system includes:

- Network mapping and planning
- Source identification, development, improvement, and augmentation
- Raw water transmission, storage, and treatment
- Treatment plant rehabilitation
- Treated water storage, transmission, and distribution
- Distribution network and service connection improvement
- Leak detection and reduction; bulk and individual water metering
- Water quality monitoring
- Ground water testing
- Access current and future water demand

Desalination Plants

The Pakistan Water and Power Development Authority (WAPDA) has completed the task of installing six desalination plants along Manchar lake for providing potable water to the people residing in the areas adjacent to the lake. There are also plans underway to install desalination plants with a capacity to convert several million gallons per day (MGD) of seawater into potable water to supplement the drinking water supply needs of Karachi.

K-IV Drinking Water Project

Greater Karachi Bulk Water Supply Scheme K–IV has been envisioned at a cost of Rs. 25.522 billion with 50 % share of Government of Sindh, to address the water shortage issues of Karachi[82]. Presently, Karachi is drawing 1200 cusecs (650 MGD) approved quota of water from Indus, which is insufficient for the ever-increasing water demand of 24 million people of Karachi. K-IV project is planned for provision of additional 1200 cusecs (650 MGD) in 3 phases from Keenjhar Lake when complete by 2025. Government of Sindh has allocated 485 cusecs (260 MGD) of additional water quota for the first phase of K-IV project, which will be completed by 2018. Additionally, the provincial government has plans to revive the Hub Dam and generate another 100 MGD of drinking water.

Matching Grants from Federal Government

Matching grants from the Federal Government includes expansion of the raw water filtration plant and supply network for supplying clean water to Hyderabad (Hyderabad Package), an urban water supply scheme in Benazirabad, and a water supply and drainage scheme in Tando Jam (Hyderabad Package) (District Hyderabad).

Special Initiatives

The Government of Sindh intends to design 2,500 Ultra Filtration (UF) and Reverse Osmosis (RO) Plants in 4 Phases through Special Initiatives83 till 2018. The Government completed installation of 500 plants under Phase-I all over Sindh, out of which 361 are fully functional. Out of 750 plants under Phase-II, 180 Plants are installed and functional. 750 RO Plants under Phase-III are approved entirely for district Tharparkar, out of which 330 plants are fully functional. In addition, the Sindh Coal Authority also established 8 RO Plants for Tharparkar.

The Government is developing a database on drinking water quality in Karachi, Hyderabad and Kotri.

The Karachi Water and Sewerage Board (KWSB) successfully maintained operation of 11,000 km pipelines, 1,100 million gallons of fluid, 400,000 valves and 250,000 manholes during the second year of the Government (2014-2015).

Thar Coal

As part of the Thar Coal Project under Energy, installation of RO desalination plant 25 villages Tharparkar, upgradation 2 RO plants Mithi and Islamkot, and installation 6 RO desalination plants 6 villages Tharparkar is under way.

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[82] Budget 2015-16. Budget Speech, Minister for Finance, Finance Department, Government of Sindh

[83] Adapted from Sindh Province Assessment of the Quality of Governance 2014-15. Pakistan Institute of Legislative Development and Transparency (PILDAT)

Other Initiatives

A project is under way with the Information, Science and Technology Department for a Barani area water availability study and pilot water supply project in Malir.

The Irrigation Department is upgrading the Kinjhar Lake system for water supply to Karachi.

Construction of drains, sewerage and water supply system has been initiated in different Katchi Abadies in Shaheed Benazirabad, Khairpur, Larkana, Sukkur, Hyderababd, Mirpurkhas, Thatta and Karachi.

Water supply schemes are also being implemented through the Community Development Programme for Sustainable Development Goals in the form of Federal Government grants to Members of Provincial Assembly (MPAs), and through the Social Protection Priority Development Programmes in the form of Federal Government grants to Members of the National Assembly (MNAs).

Strategy

Water Supply			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
URBAN WATER SUPPLY			
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	At least 100% UCs (797) have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 797 UCs
Improved and safely managed water supply coverage enhanced to meet access gap	Develop an SOP for all new and existing water supply schemes to provide improved and safely managed drinking water which is: - Accessible: located on premises - Available: available when needed - Safe: free of faecal and priority chemical contamination - Augmented by improved transmission and distribution networks and increased overhead reservoir capacity Plan and implement safely managed water supply schemes to reduce access gap - By 20% in short term - improved availability from 4 hours to 6 hours daily - piped drinking water that is 'fit for drinking; in at least 25% of areas	Plan and implement safely managed water supply schemes to reduce access gap - By 50% in medium term - improved availability from 6 hours to 8 hours daily - piped drinking water that is 'fit for drinking; in at least 50% of areas Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves	Plan and implement safely managed water supply schemes to reduce access gap - By 100% in long term - improved availability from 8 hours to 12 hours daily - piped drinking water that is 'fit for drinking; in at least 75% of areas Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves

	Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves		
Water supply schemes in 119 towns upgraded	Storage capacity needs of cities and towns determined Upgrade water supply schemes in 30 towns including extra overhead storage capacity	Upgrade water supply schemes in 40 towns including extra overhead storage capacity	Upgrade water supply schemes in 49 towns including extra overhead storage capacity
RURAL WATER SUPPLY			
Dysfunctional and non-functional schemes rehabilitated and maintained (538 schemes fit for repair plus 200 additional schemes)	Rehabilitate 260 dysfunctional and non-functional water supply schemes	Rehabilitate 278 dysfunctional and non-functional water supply schemes	Rehabilitate 200 newly dysfunctional and non-functional water supply schemes
Ageing water supply schemes infrastructure replaced (50 schemes per year)	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Replace infrastructure of ageing water supply schemes (more than 20 years) – 200 schemes
Energy efficient water supply schemes (600)	Map areas that have persistent power shortage Introduce solar energy supported water supply schemes At least 180 water supply schemes converted to solar energy All new water supply schemes are solar energy compliant where feasible	At least 180 water supply schemes converted to solar energy	At least 240 water supply schemes converted to solar energy
Community awareness about water use, safety, maintenance and preservation enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year
Strengthen community development activities of PHE&RDD for social	Recruit 2 social mobilisers per UC and orient in water issues and maintenance	Maintain 2 social mobilisers per UC and orient in water issues and	Maintain 2 social mobilisers per UC and orient in water issues and

mobilisation and O&M (2594 social mobilisers)		maintenance	maintenance

WATER QUALITY

National Water Quality Monitoring Programme

The National Water Quality Monitoring Programme (NWQMP)[84] was initiated by Pakistan Council of Research in Water Resources (PCRWR) in 2002. It was the premier project of the year which generated the first detailed water quality profile of 23 major cities of the country. The NWQMP continued for five years (2002 - 2006). During this phase, 357 water samples from 364 selected water sources were collected, adopting the uniform sampling criteria and analysed for 79 physico - chemical parameters, including trace, ultra-trace elements and bacterial indicators. The analytical findings were compared to World Health Organisation (WHO) guidelines and Pakistan Standards Quality Control Authority (PSQCA) standards for drinking water.

In Sindh Province[85], all the 15 sources monitored in Hyderabad city were found unfit mainly due to bacteriological contamination (93%), excessive levels of iron (47%) and turbidity (93%). Karachi, the largest metropolitan city and capital of Sindh province revealed 93% unsafe water sources due to the presence of bacteriological contamination (86%), Total Dissolved Solids (TDS) and fluoride (4%), sodium, chlorides, sulphate (7%), nitrate (11%) and iron (18%). Only 2 out of a total of 28 were found safe. In Sukkur, 11 out of 12 sources were unfit because of bacteriological contamination (67%) and turbidity (50%), hardness, chlorides, sodium, potassium, arsenic and fluoride (8%), nitrate (25%), sulphate and TDS (17%).

The bacterial contamination level (2002 - 2006) was in the range of 73% - 100% for Hyderabad, 61% - 100% for Karachi and 67% - 83% for Sukkur.

Hyderabad

Water samples were collected from 15 sources covering the main localities of Hyderabad city. No source was found to be supplying safe drinking water to the citizens. The analysis of the water quality data showed that 93% of the water samples were contaminated due to Coliforms and E.coli bacterium and a high level of Turbidity. One sample (7%) was found with a high level of Calcium (Ca), 7 samples (47%) contained excess Fe contents and 13 samples (87%) contained excess Aluminium (Al).

Karachi

Water samples were collected from 28 sources that covered the major part of the metropolis. Only two sources were found to be safe. It was noticed that 86% of the water samples were contaminated with Coliforms and E.coli and 7% of the samples had high Sodium (Na), Chloride (Cl) and Sulphate (SO_4) ions more than allowed under permissible limits. Similarly, 4% of the samples were found with an excessive ionic concentration of Ca, Magnesium (Mg), hardness, Potassium (K), Fluoride (F) and TDS, and 18% were identified having high levels of Iron (Fe). About 64% of the samples had excessive aluminium while 4% of the samples had high Nickel (Ni) contents. 11% of

[84] National Water Quality Monitoring Programme, Water Quality Status in Pakistan, Phase I-V, 2001-2006, Pakistan Council of Research in Water Resources

[85] Water Supply Schemes (7), Tap (41), Hand Pump (7) (Total:55)

the samples were found with high levels of Nitrate (NO_3) and one sample (4%) was found with an excessive level of Fluoride.

Sukkur

From Sukkur, 12 sources covering the entire city were selected for water sampling. The analysis of the water samples showed that only one source was supplying safe drinking water. It was found that 67% of the water samples were microbiologically contaminated and 50% of them were containing a high level of turbidity. High levels of turbidity were observed in tap and water supply distribution systems because the major source of water supplied to the city was drawn from the Indus River containing suspended colloidal material. About 25% of the samples possessed a higher concentration of Ca, and NO_3, while 17% of the samples showed excessive contents of SO_4. The analysis also showed that 80% of the samples possessed high values of hardness, Cl, Na, K, F and Arsenic (As). About 17% of the samples had high TDS and 8.3% of the samples were found with high contents of Al.

Rural Areas

In rural areas of Sindh province water quality monitoring of three districts was completed[86].

In Hyderabad district, 410 water samples from 20% villages of all the union councils were collected and tested. The analytical data compared with Pakistan Standards and Quality Control Authority (PSQCA) standards demonstrated that 23% water samples were contaminated with Total Coliforms, 20% with Turbidity and 48% samples had higher level of TDS. Data analysis and comparison with PSQCA water quality standards showed that 82% water sources were unsafe and only 18% were found to be safe for drinking purpose in rural areas of the district.

In Karachi district, altogether 75 water samples from 20% villages of all the union councils were collected and tested following American Public Health Association (APHA) protocols. The analytical data demonstrated that 76% water samples were contaminated with Total Coliforms and 56% samples had excessive level of TDS. An overall analytical picture showed that 95% water samples were unsafe and remaining 5% were safe for drinking purpose in rural areas of the district.

In Sukkur district, 260 water samples from 20% villages of all the union councils were collected and analysed. The analytical data demonstrated that 16% water samples were contaminated with Total Coliforms and 35% samples had excessive level of TDS. An overall analytical profile of Sukkur district showed that 48% water samples were found unsafe and remaining 52% were safe for drinking purpose in rural areas of the district.

Technical Assessment of Water Supply Schemes

The Pakistan Council of Research in Water Resources conducted a technical assessment of 1247 water supply schemes in Sindh province[87]. The key results are presented in **Figs 22 and 23**.

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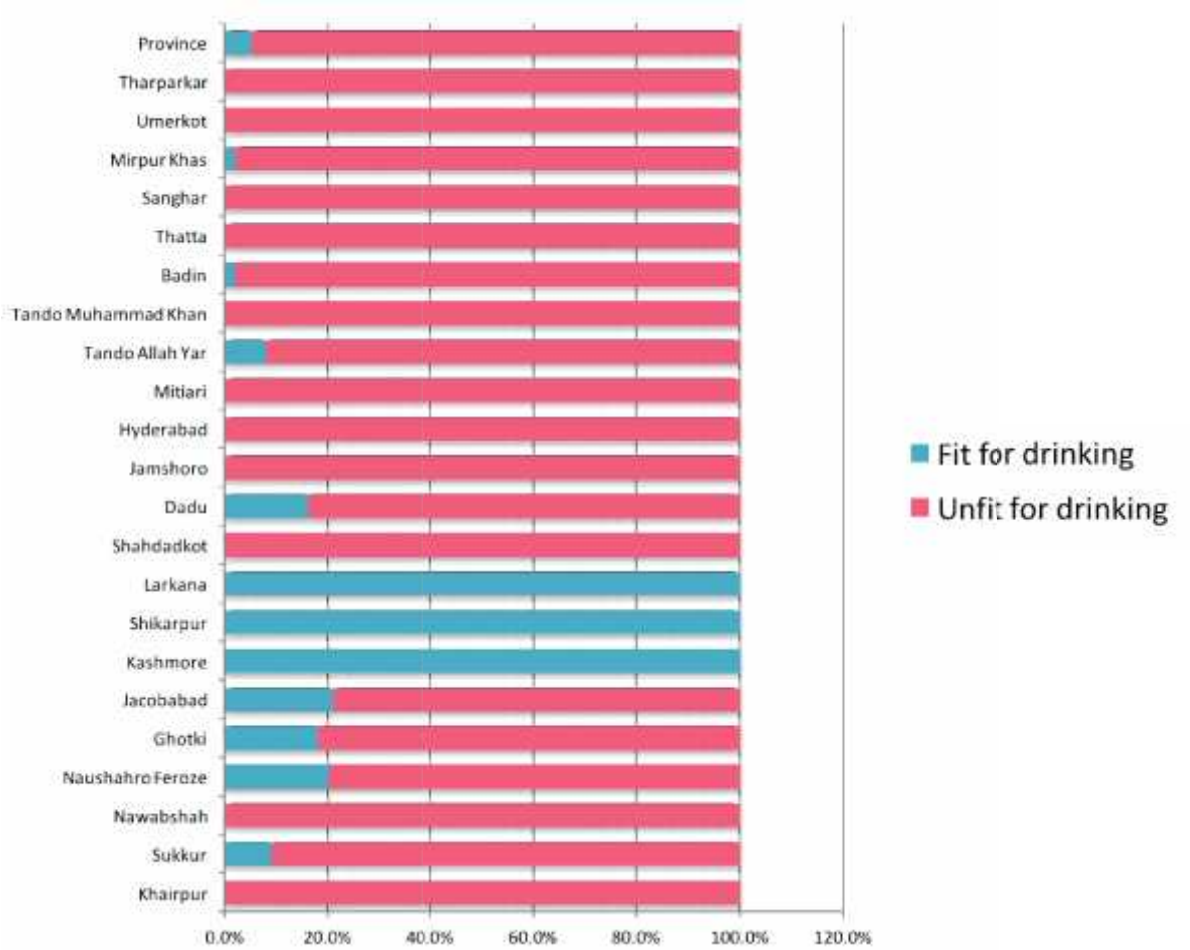
[86] Muhammad Aslam Tahir, Hifza Rasheed and Saiqa Imran. Water Quality Status in Rural Areas of Pakistan, 2010. Pakistan Council of Research in Water Resources

[87] Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources

Figure 22 - Quality of Drinking Water at Source

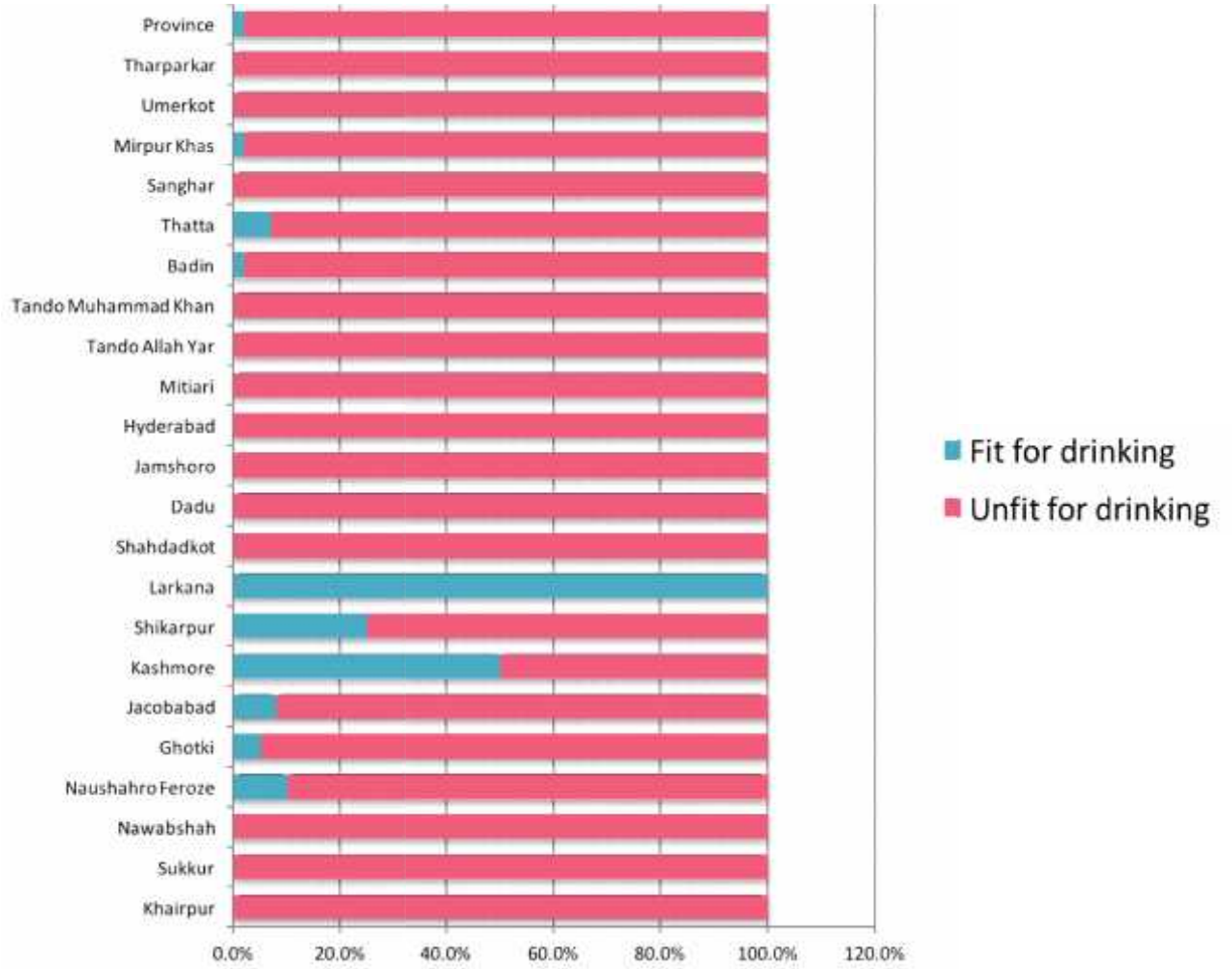


(Source: Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources)

Fig 22 illustrates that only three districts (Larkana, Shikarpur and Kashmore) had a score of 100% 'water fit for drinking' of the samples tested. All other districts were less than 20% except for Jacobabad at 21% and Naushero Feroze at 20%. The analysis of water samples collected from the water sources of the water supply schemes indicates that 95% of the total collected samples are unsafe for drinking purpose. It has been found that water of these sources is unsafe for drinking predominantly because of microbiological contamination, though there is evidence of physical as well as chemical contamination.

Fig 23 illustrates the analysis of water samples collected from the houses of the consumers of the functional water supply schemes and reveals that 98% of the total collected samples are unsafe for drinking purposes. The causes of contamination are not indifferent from that of water at source. Microbiological contamination is again predominant at the consumers' end, which prevails on all the functional water supply schemes, among the districts. In Larkana, 100% of the samples were fit for drinking, followed by Kashmore at 50% and Shikarpur at 25%. All other districts scored less than 10%, with Naushero Feroze at 10%.

Figure 23 - Quality of Drinking Water at Consumer's end



(Source: Technical Assessment Survey Report of Water Supply Schemes, Sindh 2010. Pakistan Council of Research in Water Resources)

Bottled Water Quality

The poor quality of drinking water has forced a large cross-section of citizens to buy bottled water. However, many of the mineral water companies were found selling contaminated water. To monitor and improve the quality of bottled water, the Government of Pakistan through Ministry of Science and Technology has designated the task for quarterly monitoring of bottled/mineral water brands to PCRWR. According to the monitoring report for Sindh[88] for the quarter January to March, 2016, the following findings were noted.

Of a total of 111 brands tested by PCRWR for water quality tests in 15 cities across the country, 89 brands were safe (80%), 22 were unsafe (20%), 19 were chemically unsafe (17%), 3 were

[88] Quarterly Report Bottled Water Quality (January - March, 2016). Pakistan Council of Research in Water Resources, Ministry of Science and Technology

microbiologically unsafe (3%), 64 brands remained consistent in two neighbouring quarters (58%), 47 new brands were introduced (42%), and 36 brands became unavailable (32%).

For Sindh, the following results were found for various brands and the respective cities where they were manufactured.

- Hyderabad – Noble, AFRA, NG Fresh Water, Pak Life
- Jamshoro – Pearl
- Karachi – OSIO, Sunlay, Blu Plus, Al Sahar, Zindagi, Marbella, Simply Pure, Al-Habib, Livon, Aqua Water, Silver, Vinh, ORION, DAM, Aaab-e-Sehat, Aqua Arabia, Al-Masafi
- Hub (Balochistan) – Crystal Maya, Batina Pure

Arsenic

The following brands available in Sindh were found to contain high levels of Arsenic (more than the safe limit of 10 ppm) - NG Fresh Water (85 ppm), Al-Habib (62 ppm), Silver (70 ppm), ORION (68 ppm).

Potassium

Aqua Arabia (22 ppm) exceeded the safe limit of 10 ppm.

The following brands tested safe for both chemical and microbiological quality – Noble, AFRA, Pak Life, Pearl, OSIO, Sunlay, Blu Plus, Al Sahar, Zindagi, Marbella, Simply Pure, Livon, Aqua Water, Vinh, DAM, Aaab-e-Sehat, Al-Masafi, Crystal Maya, Batina Pure

Five brands were found unsafe out of 24 tested (21%).

Bacteriological contamination carries a risk of cholera, diarrhoea, dysentery, hepatitis, and typhoid, while arsenic contamination carries a risk of cancer (lungs, bladder, skin, prostrate, kidney, nose and liver), diabetes kidney disease, hypertension, heart disease, birth defects, black foot diseases. Sodium contamination carries a risk of hypertension.

Table 10 indicates that 3.0% of household members in Sindh drink water contaminated above WHO standards for arsenic, 5.5% for Nitrate, 4.5% for Fluoride, 2.9% for Iron, 8.9% for hard water and 23.6% for TDS. Further, 38.8% of household members drink water contaminated with E.coli, while 66.0% drink water contaminated with coliforms. This indicates a serious water quality issue in Sindh.

Table 10 - Overall status of water quality (MICS 2014)

	Percentage of water quality testing sample households using improved source of drinking water	Percentage of household members with						Number of household members	Bacterial contamination				
		* more than 10 ppb	>10 ppm	>1.5 ppm	> 0.30 ppm	>500 ppm	above >1000 ppm		E.coli		Total Coliform		
		Arsenic	Nitrate	Fluoride	Iron	Hard water	Total Dissolved Solids (TDS)		Percentage of household members with E. coli in household drinking water (>=1 cfu/ml)	Number of household members	Percentage of household members with other coliform risk level equal or above 1 cfu/ml	Number of household members
Total	91.0	3.0	5.5	4.5	2.9	8.9	23.6	12,849	38.8	12,258	66.0	11,757
Division												
Larkana	93.3	0.5	4.6	2.1	0.2	16.5	39.3	1,713	28.5	1,617	51.6	1,592
Sukkur	99.6	10.2	8.7	6.2	5.4	7.2	24.2	2,215	21.2	2,196	58.3	2,144
Hyderabad	94.2	4.7	2.4	3.1	4.9	14.6	36.1	2,969	44.4	2,788	60.1	2,605
Mirpur Khas	78.8	0.0	14.3	19.2	3.8	16.3	41.7	1,238	56.0	1,199	81.2	1,077
Karachi	87.4	0.0	3.8	1.5	1.1	1.2	4.6	4,714	43.0	4,459	74.9	4,339
Area												
Urban	89.8	0.9	4.6	2.1	1.3	4.9	13.2	6,657	42.3	6,340	71.7	6,072
Rural	92.4	5.1	6.4	7.1	4.6	13.0	34.5	6,193	35.0	5,918	60.0	5,685
Wealth index quintile												
Poorest	85.5	3.5	6.4	11.5	3.5	18.0	43.1	2,496	39.5	2,417	59.5	2,254
Second	95.3	4.9	8.0	5.6	4.8	13.9	37.2	2,673	30.8	2,557	55.3	2,494
Middle	87.4	3.4	6.4	2.2	3.2	6.9	20.9	2,694	38.3	2,556	73.0	2,443
Fourth	89.3	1.0	2.6	1.8	2.0	2.0	6.9	2,521	45.6	2,384	73.5	2,353
Richest	97.8	1.7	3.6	1.3	0.7	2.9	8.2	2,465	40.3	2,345	69.0	2,214

(Source: Sindh Multiple Indicator Cluster Survey, 2014)

Water Resources Research Institutes and Laboratories

Some key water institutes conduct research on water resources and quality. These institutes have a vital role in building a water quality profile in Sindh.

Pakistan Council of Research in Water Resources

The following capacity building and training was carried out by PCRWR for Sindh[89].

Capacity Building Training Programmes under the Project Provision of Safe Drinking Water

38th Technician Training Course for Water Supply Agencies of Northern, Areas and Sind was conducted from March 24-28, 2014 at PCRWR Headquarters Islamabad. During the course, lectures were delivered on importance of water, hazards of usage of unsafe water and its related aspects, besides laboratory demonstrations on water quality testing/monitoring and field visits.

Water Quality Testing/Treatment and Operation & Maintenance (O&M) of Water Supply Schemes

Three training programmes of 4-days each were conducted in March 2014, at PCRWR Water Quality Laboratory Karachi, to strengthen the capacity of human resource of PHED, H-WASA, Village Development Associations (VDAs), Community Based Organisations (CBOs) and other implementing partners on Water Quality Testing/Treatment and O&M of water supply schemes. These trainings were organized with financial and technical assistance of UNICEF (Sindh).

Training Programme for the Professionals of Regional Laboratories of PCRWR

The experts of National Water Quality Laboratory (NWQL) visited PCRWR Regional Laboratories (Peshawar, Abbottabad, Karachi, Hyderabad, Sukkur, Badin, Tandojam, Nawabshah, Lahore, Multan, Dera Ghazi Khan, Bahawalpur and Sahiwal) during February to March 2014 and provided onsite training, on water quality analysis, ISO-17025 management and technical requirements, to the professionals of regional laboratories. The objective of this extensive training programme was to prepare the laboratories, to achieve ISO- 17025 Accreditation.

Research and Development

Some of the research and development projects[90] undertaken by PCRWR include the following:

Combating Drought and Desertification in the Thar Desert by Management of Water Resources

The project entails (1) Carrying out a comprehensive survey to document the existing status of water resources management and agriculture activities in the project area; (2) Conducting research for effective utilization of land and water resources by establishing a Research and Dissemination Station in Thar Desert; (3) Developing viable techniques of rainwater harvesting, saline and fresh groundwater utilization and desertification control in the area for agriculture, livestock, and human consumption; and (4) Disseminating efficient techniques for large-scale adaptation for agriculture and socio-economic development. Some of the key achievements of the project include the following:

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[89] Pakistan Council of Research in Water Resources Year Book 2013-14, Ministry of Science and Technology, Government of Pakistan

[90] Pakistan Council of Research in Water Resources Year Book 2013-14, Ministry of Science and Technology, Government of Pakistan

- Catchment area around earthen pond (150 ft x 150 ft x 20 ft) constructed at Khario Nara Field Station was developed by removing obstacles to increase the efficiency of runoff and to harvest maximum rainwater during rainy season.
- Different types of vegetables like bitter gourd, lady finger, lufa gourd, bottle gourd and squash melon have been grown on pitcher irrigation system by using mix water (sweet and tube well water) on an area of 0.25 acre.
- Cluster bean grown on 20 acres.
- Grafting of 700 zizyphus, trees completed during the entire period of the project but due to unfortunate incident of fire occurred on August 4, 2014, 200 trees were burnt. Currently pruning of 50 trees is in process and after that grafting process will remain under progress in future along with applying anti-termite medicines within the roots. The plants were irrigated with ground saline water successfully
- Metrological data (temperature, wind velocity, pan evaporation, rainfall and humidity) was collected regularly.
- Monitoring activities at constructed rainwater harvesting ponds, mini dam and dug wells at community land are in progress.

Pakistan Council for Scientific and Industrial Research

The Pakistan Council for Scientific and Industrial Research (PCSIR) Laboratories Complex in Karachi[91] is undertaking research in disposal of hazardous wastes, recycling of municipal wastewater and industrial effluents, and monitoring of water and air pollution.

Climate Change, Alternate Energy and Water Resources Research Institute Islamabad

The former Water Resources Research Institute (WRRI) established under the National Agricultural Research Centre (NARC) has been renamed the Climate Change, Alternate Energy and Water Resources Institute[92] (CAEWRI). Its mandate includes (1) To optimise the productivity of water use under rain-fed and irrigated environment; (2) To develop sustainable balance between resource utilisation and its replenishment; (3) Climate change impact assessment on water resources and agriculture, its adaptation and mitigation; and (4) Alternate energy resources production/harvesting and management.

[91] http://www.pcsir.gov.pk/Karachi_lab_RD.html

[92] http://www.parc.gov.pk/index.php/en/caewri-home

Drainage and Reclamation Institute of Pakistan

Drainage and Reclamation Institute of Pakistan (DRIP)[93] in Tando Jam was established in 1975, under PCRWR with the mandate to conduct research in drainage and reclamation of waterlogged and salt affected soils, groundwater resources development and management, soil and water management and other related aspects. DRIP has successfully introduced tile drainage technology amongst the progressive farmers, for reclamation of waterlogged and salt affected soils with farmers' participation in capital and responsibility, of the operation and maintenance expenditures. Similarly, the farmers have benefited from skimming well technology, by augmenting irrigation supplies, by pumping freshwater floating over native saline groundwater. Monitoring and evaluation of installed drainage projects has generated scientific data, for planning of future drainage projects. It has state of the art automated lysimeter research station to conduct various water management studies.

The Water Quality Laboratories of Karachi, Hyderabad, Badin and Shaheed Benazir Abad are also equipped with the state of the art facilities and are providing service to the public and private sectors, under the administrative control of DRIP.

Arid Zone Research Institute

The Arid Zone Research Institute (AZRI), Umerkot[94] is working under the administrative control of Director General, Southern Zone Agricultural Research Centre (SARC), Karachi. Its objectives include, to:

- enhance productivity of arid and semi-arid agriculture of Thar and surrounding areas by identifying crop, livestock and socio-economic constraints
- generate baseline data on arid agriculture and develop protocol for maximum utilisation of land and the arid region of Thar and adjoining irrigated belt of lower Sindh
- develop procedures for rain water conservation for production of agricultural crops in arid zone
- conserve and promote the natural vegetation of Thar region for livestock production

Its main areas of research under land and water management include:

- Use of alternative energy sources for pumping water in agriculture (Solar, Wind and Biogas)
- Installation of drip irrigation system for cultivation of grafted ber (Zizyphus spp)
- Rain water harvesting
- Pitcher plantation
- Soil and water conservation though plantation
- Use of wind mill for pumping of ground water

[93] Adapted from http://pcrwr.gov.pk/regionaltandojam.aspx

[94] Adapted from http://www.parc.gov.pk/index.php/en/azri-home

Recent Initiatives for Water Quality in Sindh

Water Testing Laboratories in Districts

Pakistan Council of Research in Water Resources (PCRWR) is implementing a project called "Provision of Safe Drinking Water" in the country[95]. The objectives of this project, which started in 2005, include the following:

- Establish 19 water quality monitoring laboratories in 19 districts in the country to provide dependable water analysis facilities for the provision of safe drinking water
- Conduct Water Quality Monitoring to identify the problems hindering in the supply of safe drinking water
- Install pilot/demonstration water conditioning and filtration plants for larger scale adoption by the federal and local Governments
- Impart training to the technical staff of all water supply schemes of four provinces, Azad Jammu and Kashmir (AJK), Federally Administered Tribal Areas (FATA) and Northern Areas
- Investigate and identify the causes of pollution in water resources and to suggest the remedial measures for water quality improvement

The following activities are planned under this project:

1) Establishment of Water Quality Testing Labs in 18 districts across the country (now upgraded to 19 districts[96])
2) Installation of Demonstration Water Conditioning and Filtration Plant in 24 districts across the country (now upgraded to 25 districts[97])
3) Physical Survey of all Completed Water Supply Schemes (PHED/WASA)
4) Training and Capacity Building of Staff associated with Water Supply Schemes
5) Investigation and Identification of Causes of Pollution and Contamination of Water Supply
6) Regular Monitoring and Surveillance of Water Supply Schemes/Agencies

As part of this project, PCRWR is in the process of establishing water quality testing laboratories in Sukkur and Badin in Sindh.

Science and Technological Research Division

The Federal Government has funded a scheme for 'Demarcation of Groundwater Quality Zones in Indus Plain and Marginal Areas for Sustainable Development and Management of Groundwater (Lower Indus Plain)', which is being undertaken by PCRWR.

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[95] Provision of Safe Drinking Water (Revised PC-I), January 2014. Pakistan Council of Research in Water Resources, Ministry of Science and Technology

[96] Pakistan Council of Research in Water Resources Year Book 2013-14, Ministry of Science and Technology, Government of Pakistan

[97] Pakistan Council of Research in Water Resources Year Book 2013-14, Ministry of Science and Technology, Government of Pakistan

Strategy

Water Quality			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Quarterly water quality testing at water source	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 25% of tube wells (250)	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 50% of tube wells (500)	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 75% of tube wells (750)
Quarterly quality testing of distribution network	At least 25% coverage of distribution system every quarter (250 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	At least 50% coverage of distribution system every quarter (500 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	At least 75% coverage of distribution system every quarter (750 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department
District level water quality testing laboratories established (29 districts)	Establish water testing laboratory facilities in 5 districts	Establish water testing laboratory facilities in 10 districts	Establish water testing laboratory facilities in 14 districts
All ground and overhead reservoirs supplied with chlorination treatment	Conduct study to determine the status of ground and overhead reservoirs in cities and towns Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 30% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 60% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 90% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination
Community awareness about water quality (including adoption of treatment of safe drinking water in the household) enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level

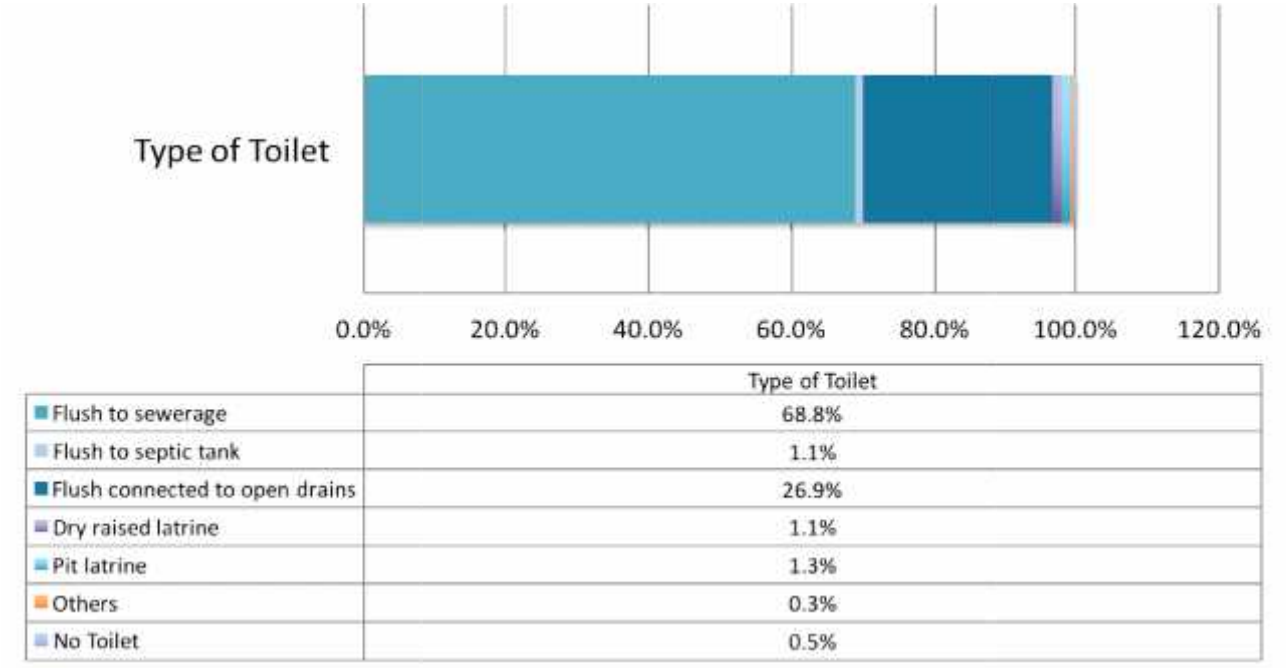
SANITATION

Urban and Rural Sanitation

Coverage

The recent PSLM 2014-15[98] survey shows that flush toilet is the prominent mode of sanitation in 97% of households in urban areas. No toilet was found in less than 1% of households (Fig 24).

Figure 24 - Mode of urban sanitation in Sindh (PSLM 2014-15)



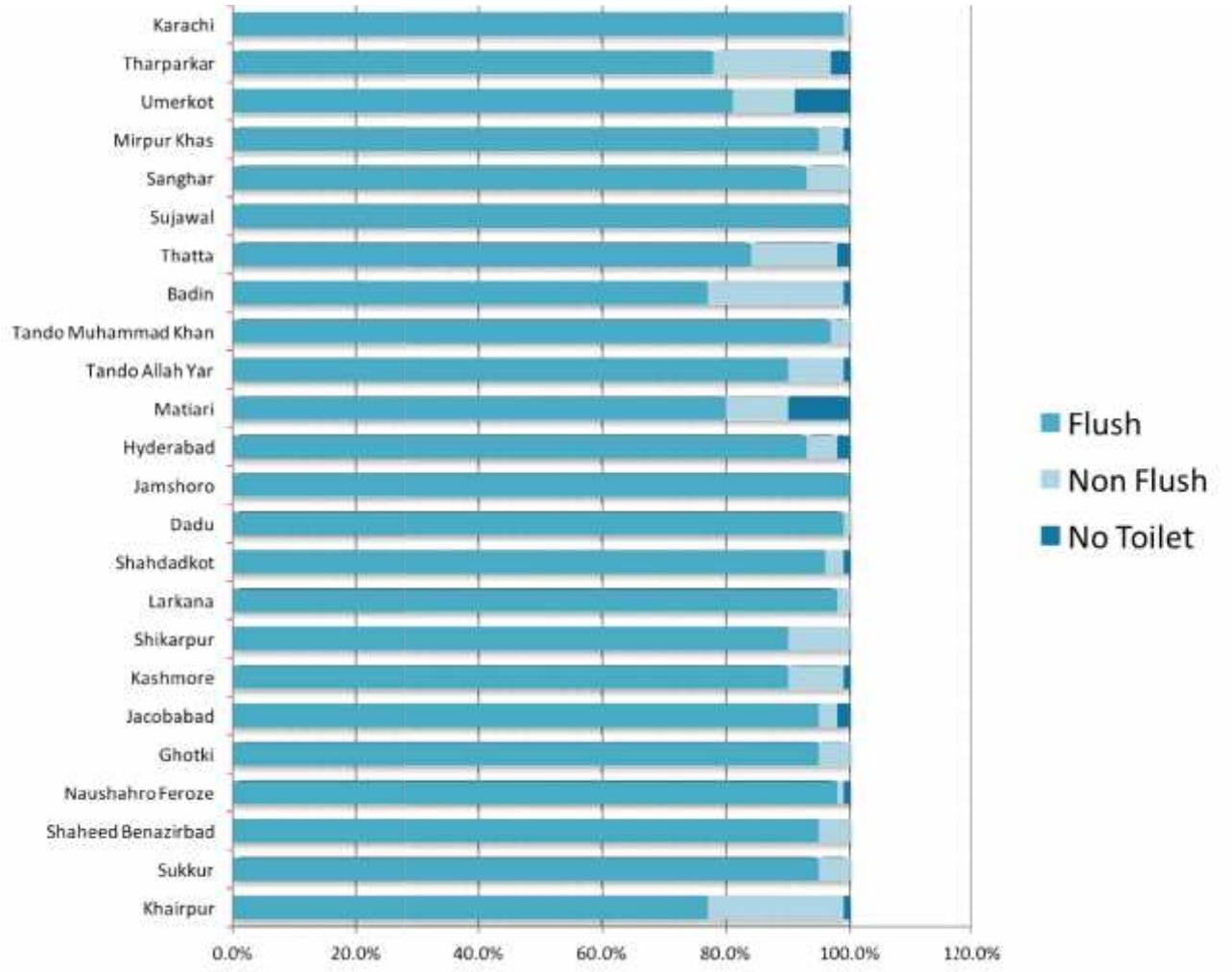
(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 25 shows that in urban areas, Mitiari and Umerkot had the highest percentages of no toilet at 11% and 9% respectively. Jamshoro and Sujawal had the highest flush use at 100%. In over a fourth of households (26.9%), the flush toilet was connected to open drains.

In rural areas however, the rates of no toilet were thirty-one times as high at 15.7% as compared to urban areas (Fig 26). Furthermore, Fig 27 shows that the highest percentages for no toilet were found in Umerkot (50%), Tharparkar (47%), Sujawal (41%), Thatta (28%) and Matiari (26%). In over a fifth of households (21.7%), the flush toilet was connected to open drains.

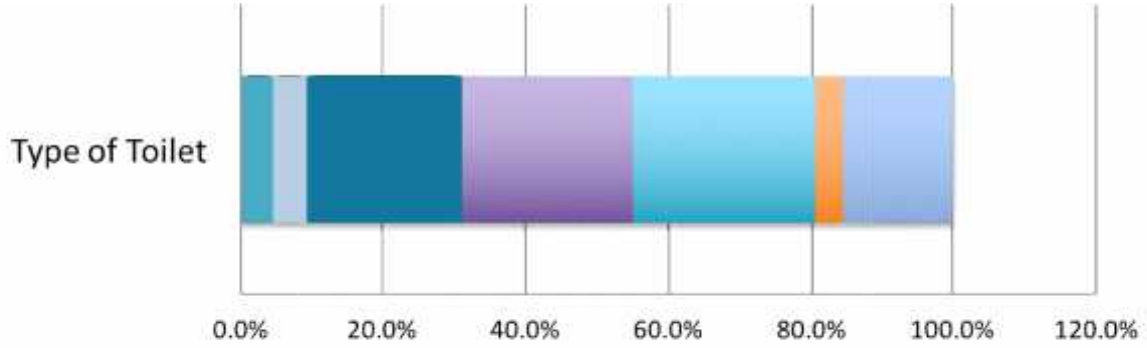
[98] Pakistan Social and Living Standards Measurement Survey 2014-15. Pakistan Bureau of Statistics

Figure 25 - District wise distribution of mode of sanitation in urban areas (PSLM 2014-15)



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

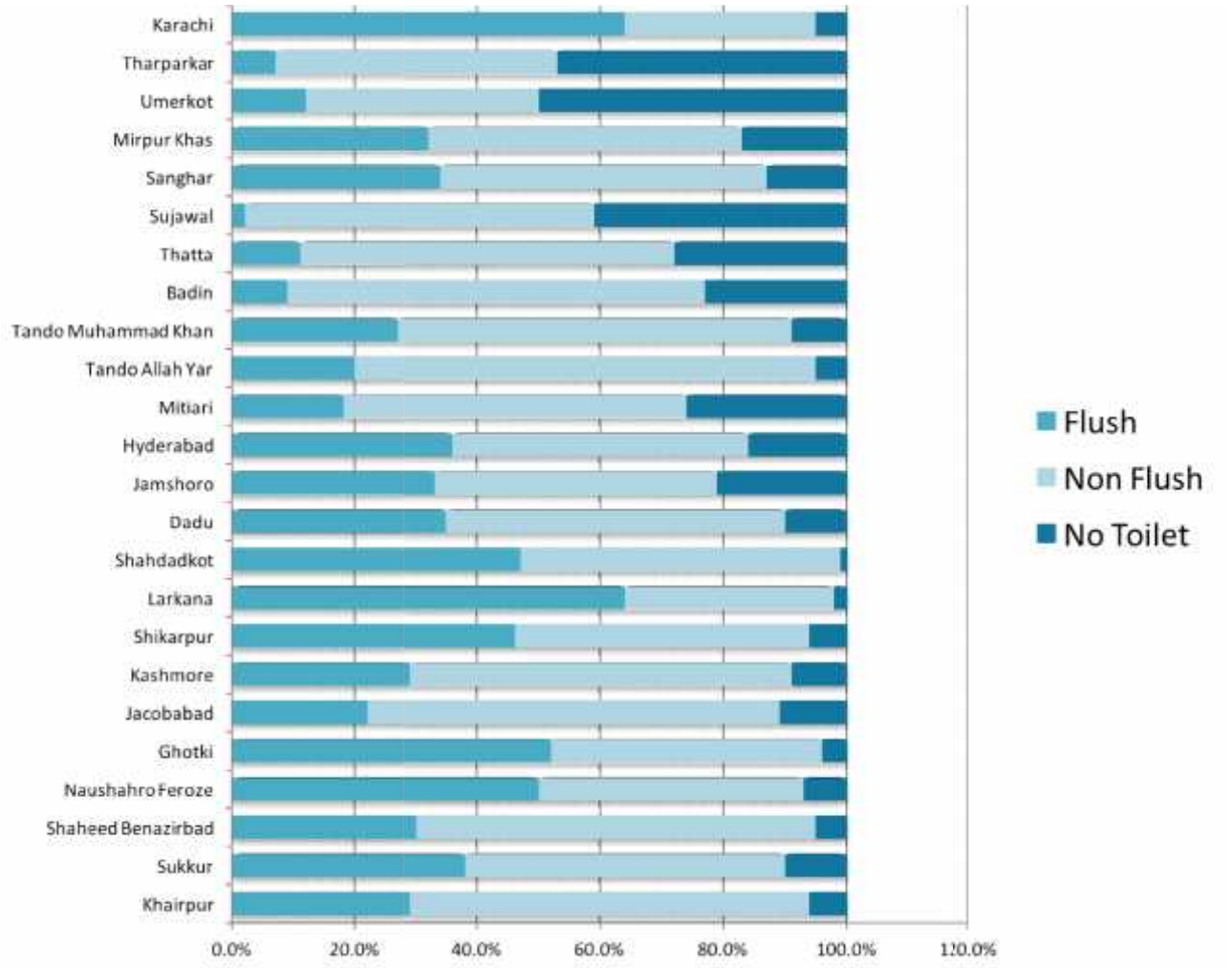
Figure 26 - Mode of rural sanitation in Sindh (PSLM 2014-15)



	Type of Toilet
Flush to sewerage	4.5%
Flush to septic tank	4.9%
Flush connected to open drains	21.7%
Dry raised latrine	23.8%
Pit latrine	25.5%
Others	3.9%
No Toilet	15.7%

(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 27 - District wise distribution of mode of sanitation in rural areas (PSLM 2014-15)



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

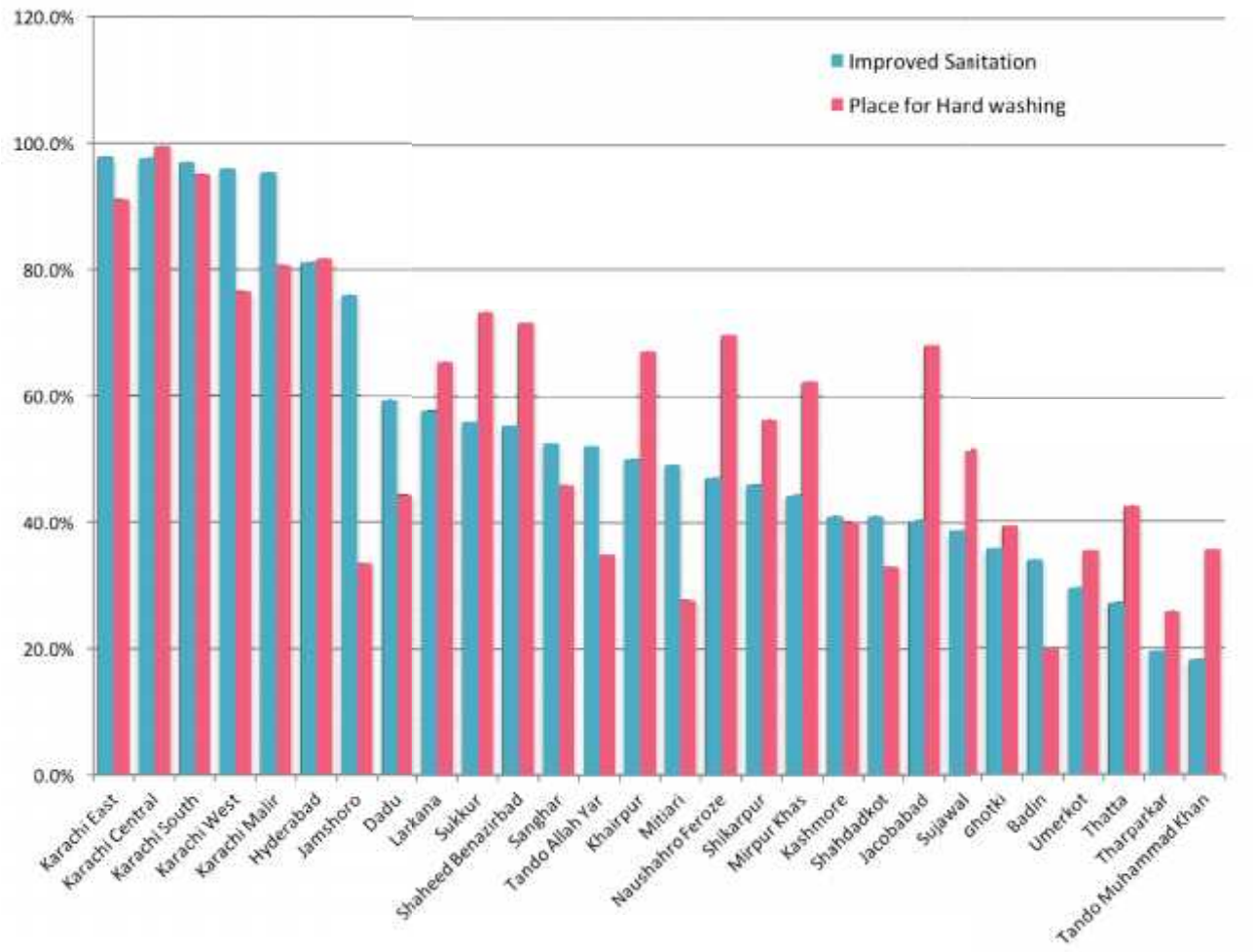
Figure 28 illustrates that on average 54.9% use improved sanitation, while 56.1% have a place for hand washing. There is a general awareness about the need for a place for handwashing since many districts that have low rates for improved sanitation have higher rates for a place for handwashing.

Figure 29 indicates that the poorest and second quintiles have the lowest rates for use of improved sanitation and having a place for hand washing. However, even in the poorest category, 63.1% had soap or other cleansing agent available.

Figure 30 indicates that 90.0% of urban, 22.1% of rural and 97.9% of households in Karachi division use flush/pour flush latrines connected to piped sewer system.

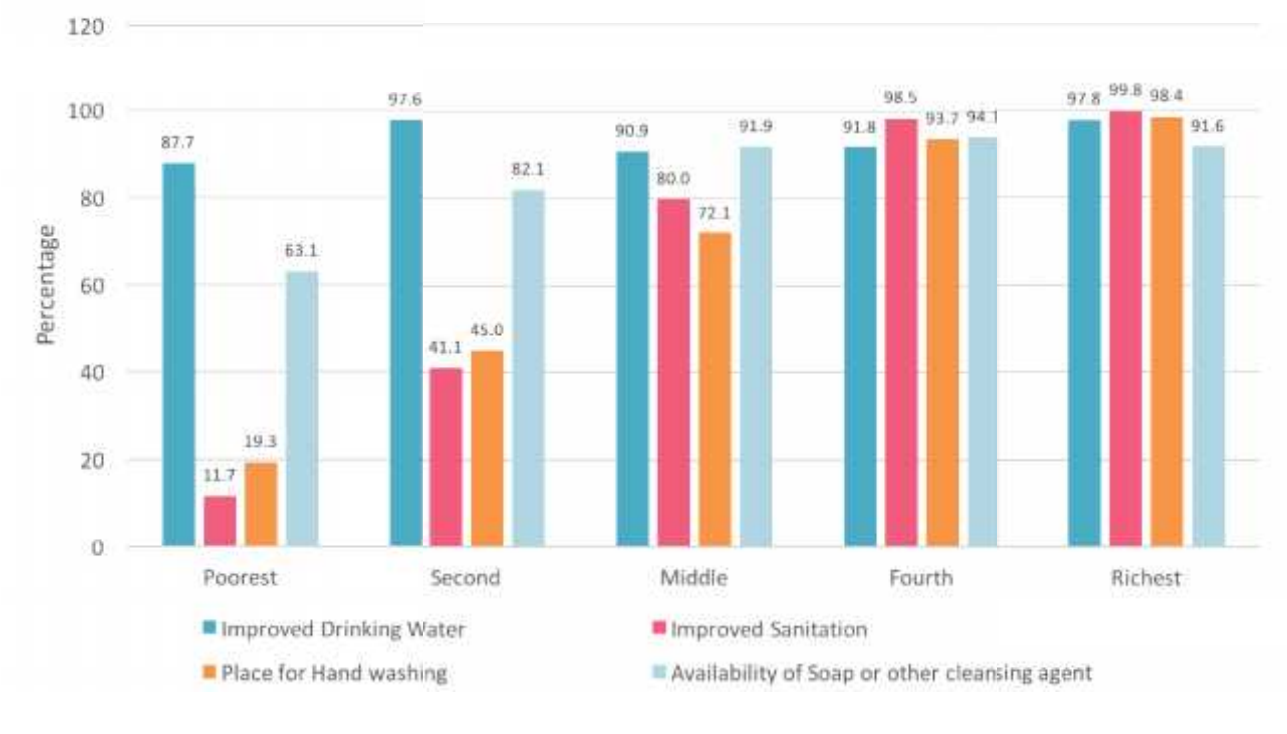
Figure 31 illustrates that 39.9% of household population in rural areas practice open defecation, which is highest in Mirpur Khas division at 49.2%.

Figure 28 - District profile of improved sanitation and place for hand washing



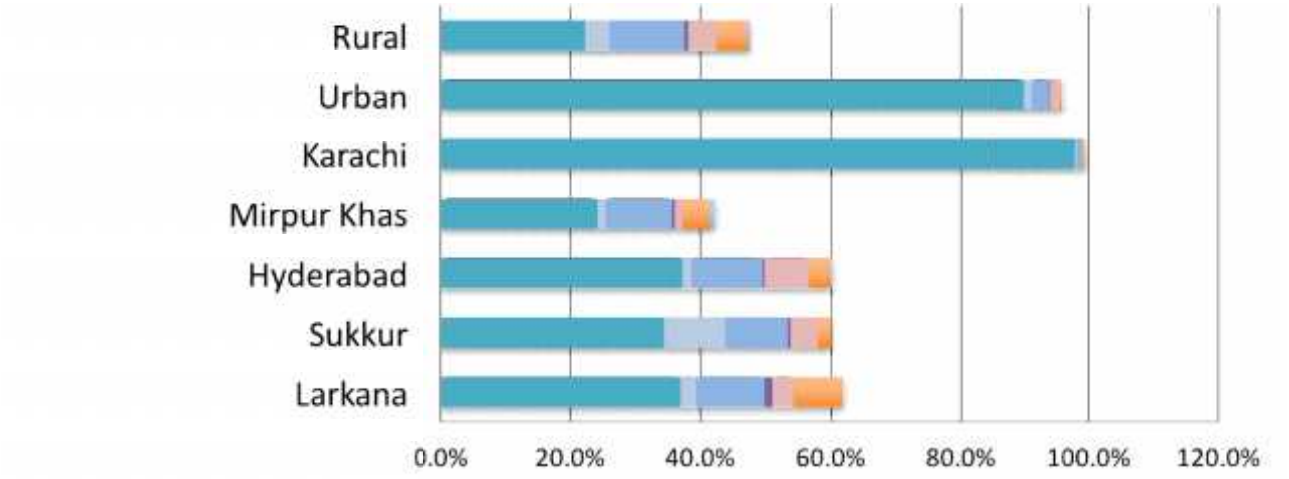
(Source: Sindh Multiple Indicator Cluster Survey 2014)

Figure 29 - Equity profile of water and sanitation



(Source: Sindh Multiple Indicator Cluster Survey 2014)

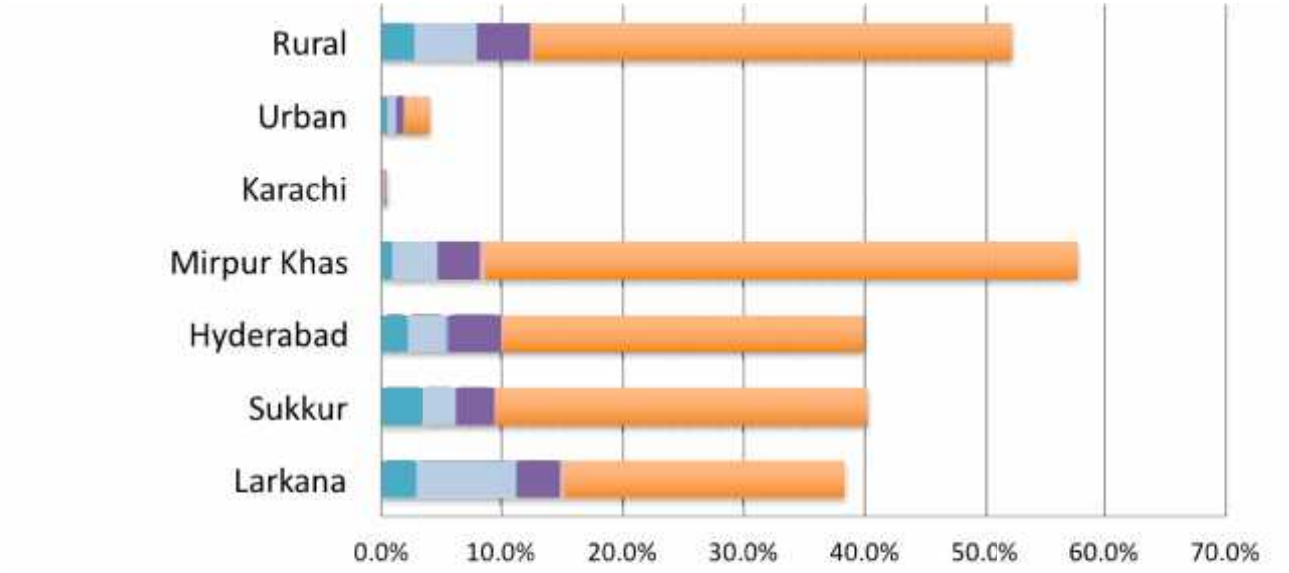
Figure 30 - Overall status of improved sanitation (MICS 2014)



	Larkana	Sukkur	Hyderabad	Mirpur Khas	Karachi	Urban	Rural
Flush/pour flush to piped sewer system	36.9%	34.3%	37.2%	24.1%	97.9%	90.0%	22.1%
Flush/pour flush to septic tank	2.3%	9.3%	1.3%	1.1%	0.3%	1.2%	3.8%
Flush/pour flush to soakage pit latrine	10.6%	9.7%	11.0%	10.3%	0.8%	2.7%	11.5%
Flush/pour flush to unknown place / don't know	1.1%	0.4%	0.3%	0.4%	0.0%	0.1%	0.6%
Ventilated Improved Pit latrine	3.3%	4.1%	6.7%	1.3%	0.1%	1.4%	4.3%
Pit latrine with slab	7.5%	2.1%	3.3%	4.1%	0.3%	0.5%	4.9%
Composting toilet	0.1%	0.0%	0.4%	0.9%	0.0%	0.0%	0.4%

(Source: Sindh Multiple Indicator Cluster Survey 2014)

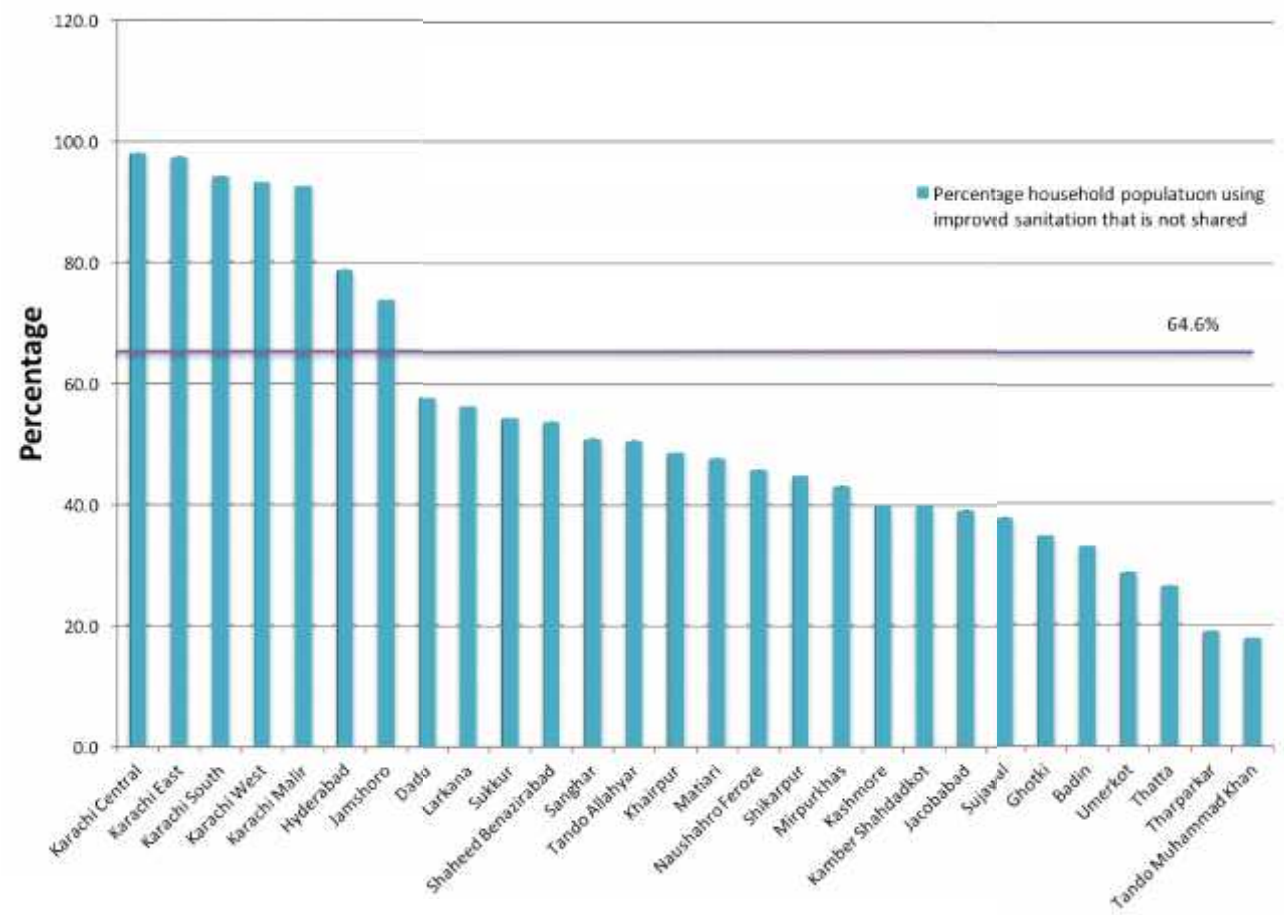
Figure 31 - Overall status of unimproved sanitation (MICS 2014)



	Larkana	Sukkur	Hyderabad	Mirpur Khas	Karachi	Urban	Rural
Flush to somewhere else	2.8%	3.4%	2.1%	0.9%	0.0%	0.5%	2.7%
Pit latrine without slab / open pit	8.3%	2.8%	3.3%	3.8%	0.2%	0.7%	5.2%
Bucket	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%
Other	3.6%	3.2%	4.3%	3.5%	0.1%	0.6%	4.3%
Missing	0.4%	0.1%	0.1%	0.4%	0.0%	0.1%	0.2%
Open defecation	23.1%	30.7%	29.9%	49.2%	0.2%	2.2%	39.9%

(Source: Sindh Multiple Indicator Cluster Survey 2014)

Figure 32 - Percentage household population using improved sanitation that is not shared (MICS 2014)



(Source: Sindh Multiple Indicator Cluster Survey 2014)

Figure 32 shows the percentage of household population using improved sanitation that is not shared, with the highest in Karachi (98.0%) and least in Tando Muhammad Khan (17.7%).

Figure 33 illustrates that there has been a gradual improvement in sanitation systems in the period of 2004-05 to 2013-14. Overall for Sindh, 'No system' has reduced from 54% to 41% and 'underground drains' increased from 31% to 41%. However, 'open drains' have increased from 15% to 17% and there has been no increase of covered drains that have remained at 1%

In urban areas, 'underground drains' have increased from 69% to 72%, and covered drains have decreased from 2% to 1%. In rural areas 'no system' has reduced only marginally from 85% to 84%. At present, only 3% of the urban areas and about four-fifths (84%) of the rural areas have no sanitation system. About one-fourth (24%) of the urban areas have open drains. Overall in Sindh, there is no sanitation system in about two-fifths of households (41%).

Figure 33 - Type of Sanitation system used in Sindh

	04-05 Urban	05-06 Urban	07-08 Urban	11-12 Urban	13-14 Urban	04-05 Rural	05-06 Rural	07-08 Rural	11-12 Rural	13-14 Rural	04-05 Overall	05-06 Overall	07-08 Overall	11-12 Overall	13-14 Overall
No System	10%	7%	6%	3%	3%	85%	83%	85%	83%	84%	54%	43%	45%	42%	41%
Open Drains	19%	23%	26%	27%	24%	13%	15%	14%	15%	11%	15%	19%	20%	21%	17%
Covered Drains	2%	4%	2%	1%	1%	0%	1%	0%	1%	0%	1%	3%	1%	1%	1%
Underground Drains	69%	66%	66%	69%	72%	2%	1%	1%	1%	5%	10%	35%	34%	36%	41%

(Source: Pakistan Social and Living Standards Measurement Survey, 2004-05, 2005-06, 2007-08, 2011-12 and 2013-14)

Sewerage and Drainage Issues

Some of the key sewerage and drainage issues identified in Karachi are also to a large extent germane to urban sanitation in general[99]. These include:

- Absence of comprehensive master plans for cities and towns – there is urgent need for master plans for sewerage implementation in line with the city planning, to implement sewerage facilities based on it and to revise the plan on regular basis taking social and physical changes into account
- Limited budget allocation for sewerage facilities – since the tariff collected in water supply and sewerage sector is very limited, the budget allocated for sewerage sector is limited, too. With the limited budget, it is almost impossible to operate and maintain existing sewerage facilities so as they function as planned and to extend or newly construct sewerage facilities to meet the future requirements

[99] The Study on Water Supply and Sewerage System in Karachi in the Islamic Republic of Pakistan, 2008. Japan International Cooperation Agency (JICA), Karachi Water & Sewerage Board (KW&SB)

- Improper operation and maintenance of sewerage facilities – mainly due to the limited budget and personnel allocated for operation and maintenance of sewerage facilities, existing facilities are not operated properly. Improper maintenance might lead to earlier aging of facilities and non-compliance with the effluent quality standard
- Insufficient sewerage facilities – existing sewerage facilities for sewage collection and its treatment are far from sufficient in quantity to serve the rapidly increasing population. Additional sewage collection systems including branch sewers, trunk sewers and pumping stations need to be constructed to improve the living environment of the citizens. In the same manner, existing sewage treatment plants need to be extended and new plants have to be installed to treat all the generated sewage to improve water qualities of public water bodies, especially of Arabian Sea
- Insufficient information on facilities – sewers, pumping stations and sewage treatment plants consist of civil structures, mechanical and electrical equipment. For efficient and effective operation and maintenance of these facilities, it is necessary to equip their as-built drawings, list and specifications on site. However, site surveys have usually found that there was little information on these items, especially about sewers
- Inefficient record of operation and maintenance works – in the same manner, little information in written form is available on the performance of pumping and treatment facilities such as flow rates, operation hours, water qualities, facility failures and repairs and so forth
- Absence of operation and maintenance manuals – manuals for operation and maintenance of sewerage facilities are not available. It is very difficult to operate and maintain sewerage facilities in a proper way without O&M manuals

Wastewater

Disposal of wastewater is a guide to potential water contamination. About 59% of Sindh's households have disposal of wastewater (sewerage connected with main line, sewerage connected with open drain or septic tank), ranging from 97% in urban and 16% in rural areas[100].

Karachi City Wastewater[101, 102]

Karachi is most industrialised and urbanised city of Pakistan. More than 450 million gallons of wastewater is generated per day by different types of industrial processes and human operations. There are only three wastewater treatment plants in Karachi city working at Haroonabad (TP1), Mahmoodabad (TP2) and Mauripur (TP3), which can treat less than 30% of the total wastewater generated. Sindh Industrial Estate (SITE), Korangi Industrial Area (KIA) and Landhi Industrial Area (LIA) are important industrial sites of Karachi whose wastewater influxes indirectly into the Arabian Sea without any treatment. In addition, untreated industrial effluents and domestic wastewater from other resources is also being discharged into the Arabian Sea. Therefore, more than 70% of the wastewater goes into the Arabian Sea without any treatment.

Major rivers of Punjab discharge their wastewater load into the River Indus, which ultimately discharges its pollution load into the Arabian Sea at Keti Bunder endangering aquatic life and fish. Besides containing other toxicants, this wastewater contains large quantities of heavy/trace metals/metalloids, cyanides, phenols, oils and greases and suspended solids resulting in high values of biological and chemical oxygen demand and low dissolved oxygen threatening aquatic life and as well as fish. It is also suspected that, influx of this untreated wastewater is also making the water quality of the Arabian Sea unfit for recreation purposes at different sea spots like Paradise Point, Hawks Bay, Sand Spit, Keamari, Manora, Clifton and Sea View.

In 2007, according to KW&SB, Karachi was producing about 446 MGD of sewage per day. The three treatment plants have a collective maximum design capacity of 151 MGD of treatment of effluents. However, only about 90 MGD of total sewage is treated, while 356 MGD wastewater remains untreated. Out of this 356 MGD, about 196 MGD drains into Lyari river, 98 MGD wastewater finds its way into Malir river, which ultimately discharges into the sea, whereas 22 MGD percolates into the ground and becomes part of ground water. There is still 139 MGD of sewage water that remains unaccounted.

More recent data from KW&SB shows that of 472 MGD of sewage generated daily in Karachi, only about 50 MGD is treated, leaving 422 MGD untreated (**Table 11**).

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[100] Pakistan Social and Living Standards Measurement Survey, 2013-14

[101] Mahmood Hussain. Competitive Performance Evaluation of Waste Water Treatment Plants of Karachi and Impact of Untreated Waste Water on Some Edible Fishes of Arabian Sea (Thesis, 2007). Department of Chemistry, University of Karachi

[102] Rashid Ali Panhwer. Wastewater Problem and its Complications for "Karachi". Journalist Blog 2011, Associated Press of Pakistan

Table 11 - Status of Sewerage System in Karachi

Sewerage System		
Sewage generated in city (70% of water supplied)		472 MGD
Optimum Design Capacity of Sewerage Treatment Plants		150 MGD
Quantity of Sewage Treated		50 MGD
Shortfall in Sewage Treatment Capacity		322 MGD
Untreated Sewage		422 MGD
Inventory of Sewerage System		
Sewerage Treatment Plants		3
Major Sewerage Pumping Stations		6
Sewerage Lift Pumping Stations		32
Sewer Cleaning Machines – Suction Machines		23
Sewer Cleaning Machines – Jetting Machines		23
Total Length of Sewers		5670 km
Number of Manholes		250,000
Sewage Treatment Plants	**Optimum Design Capacity (MGD)**	**Actual Treatment (MGD)**
Sewage Treatment Plant – TP1	51.00 MGD	20 MGD
Sewage Treatment Plant – TP2 Mehmoodabad	46.50 MGD	0 MGD
Sewage Treatment Plant – TP3 Mauripur	54.00 MGD	35 MGD
Total	151.50 MGD	55 MGD

(Source: KW&SB, 2016)

Key issues with Sewerage and Wastewater disposal in Karachi City

The existing sewerage system serves a large part of the city. There are some areas including katchi abadis and other informal settlements which are not sewered and lack proper disposal system. The sewered areas of central and southern Karachi are connected to existing treatment plants, while other sewered areas discharge wastewater without treatment directly into nullahs, rivers or the sea[103].

System performance is marred by glaring deficiencies. The collection network has a low coverage and lacks major interceptors and sufficient treatment capacity. Most sewage flows into the nullahs and rivers which run as open sewers through the urban area, causing highly obnoxious, insanity conditions with serious health risks and unpleasant environment for the residents of adjoining neighbourhoods.

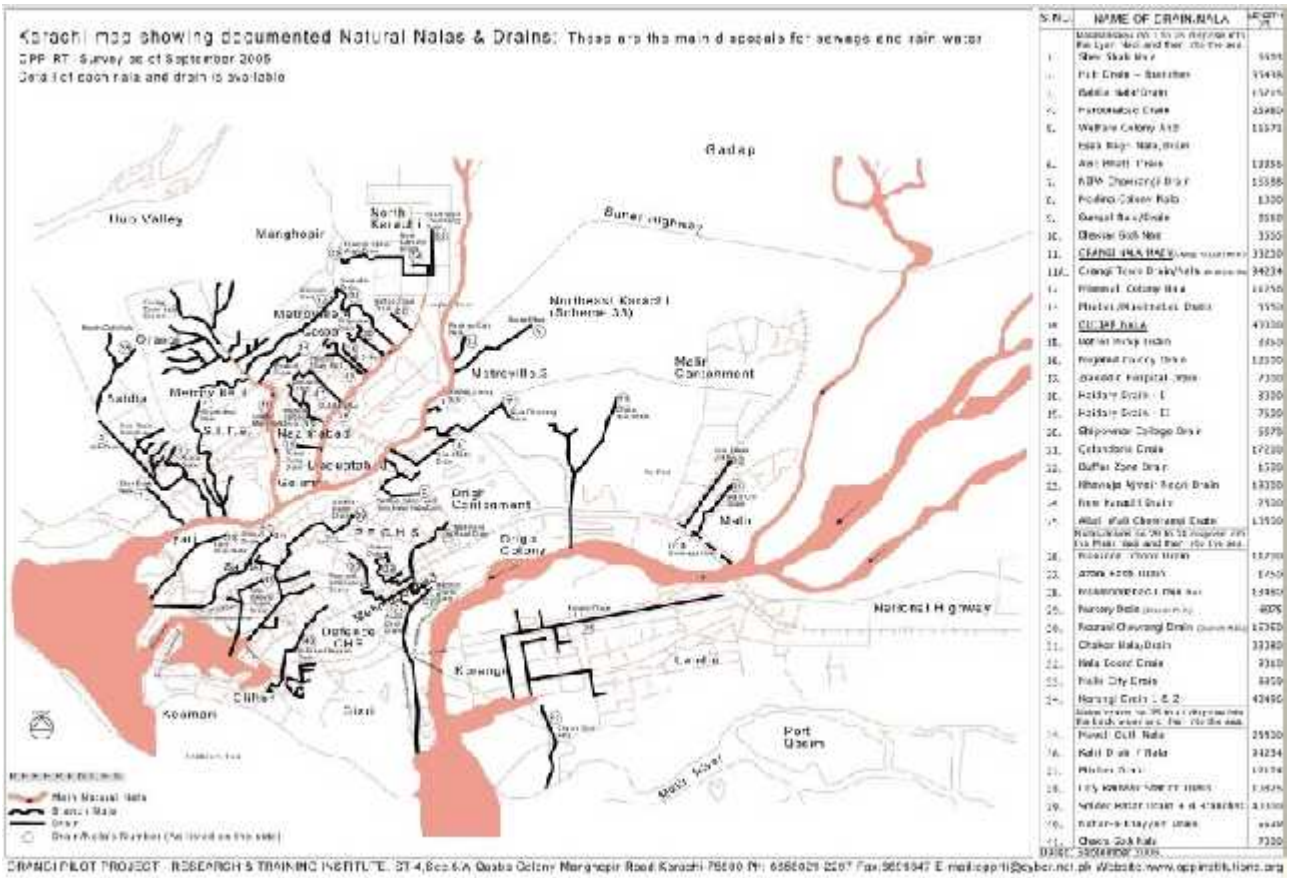
There are other problems in the system that are caused by poor maintenance such as low number of manholes and frequent effluent overflow onto the streets. Further, most of the network, laid 25-35 years ago, needs replacement and upgrading to carry the present sewage load which has increased much above its capacity. In addition to network improvements, major capital investments are required for building the wastewater treatment capacity and improving sanitary condition by eliminating untreated sewage (Fig 34 and 35).

Figure 34 - Location of Wastewater Treatment Plants in Karachi

(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

[103] Adapted from Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi

Figure 35 - Karachi Natural Nullahs and Drains



(Source: Orangi Pilot Project, Research and Training Institute, Karachi)

Sea Pollution

Due to improper handling of waste and insufficient/negligible treatment facilities available with respective organisations, marine/sea pollution is continuously increasing. The major sources of sea pollution are as follows[104]:

- Disposal of untreated waste water generated from industrial areas located in Karachi
- Disposal of untreated waste water generated from Fertilizers discharging into river and canals
- Disposal of untreated waste water generated from different districts adjacent to River Indus
- Disposal of untreated waste water generated from KW&SB
- Disposal of untreated waste water generated from Defence Housing Authority Karachi
- Disposal of untreated waste water generated from Karachi Port Trust
- Disposal of untreated waste water generated from Cantonment Boards
- Disposal of untreated waste water generated from Right Bank Outfall Drain (RBOD) I & II
- Disposal of untreated waste water generated from Sugar mills in Sindh

[104] Provincial Assembly Sitting on 16th February 2016. http://www.pas.gov.pk/index.php/business/stn/en/31/927 accessed on 27 April 2016

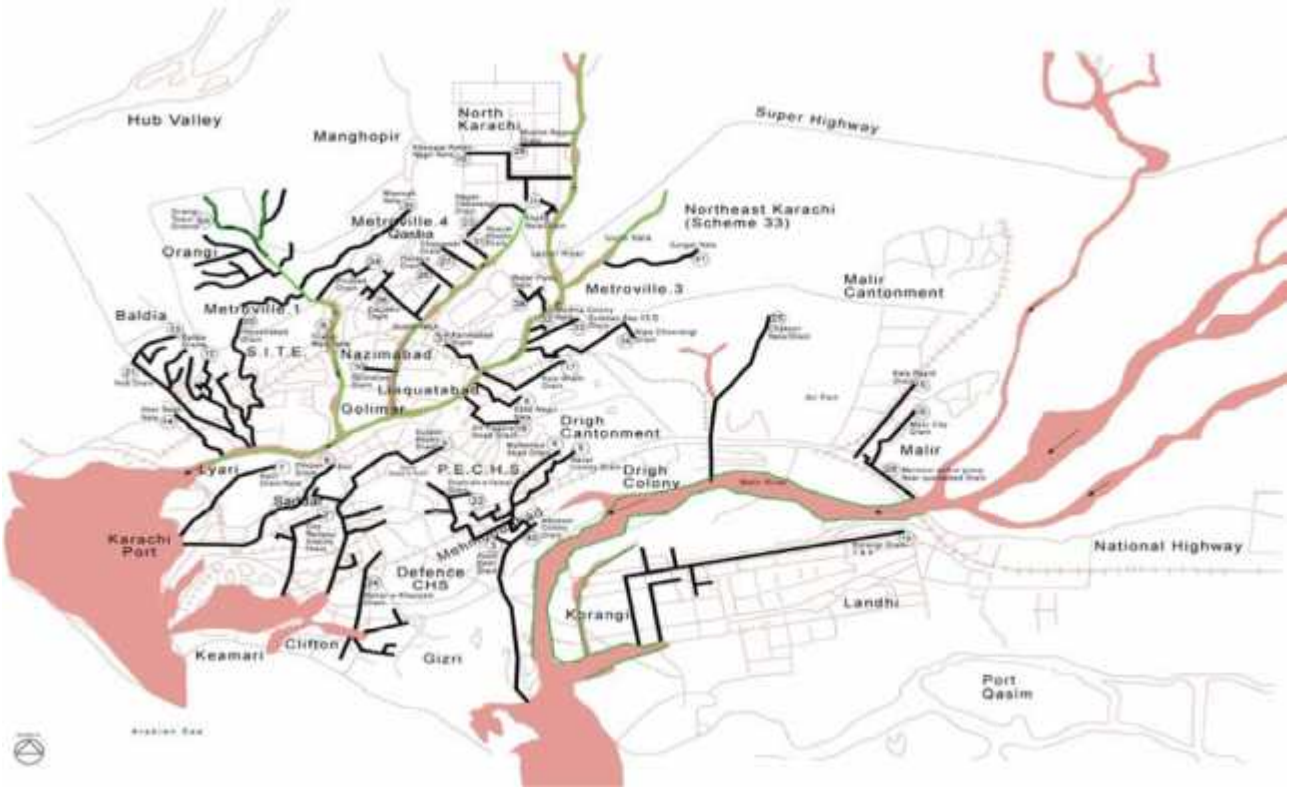
Storm Water Drainage

Karachi has an annual average monsoon rainfall varying 125-250 mm whereas winter rainfall is about 25 mm. There are two main non-perennial rivers, the Malir and Lyari rivers, crossing the thickly populated city areas before falling into Arabian Sea.

The natural drainage system of Karachi consists of the Lyari and Malir rivers, and their tributaries or nullahs (Fig 36)[105]. Because of urban development and excessive occupation at the banks of the Lyari River and its tributary nullahs of Gujro and Orangi, the natural drainage has been destroyed and almost completely obliterated. As a result, the runoff of storm water is prevented from going into the natural channels, thus overflowing into the streets and parts of the residential areas. The areas worst affected are North Nazimabad, Liaquatabad, and SITE.

In the inner city, the low-lying areas of Saddar, Chundrigar Road, Bunder Road and Lyari become heavily inundated during the rainy spells mainly due to inadequate storm water drainage system. Extensive flooding occurs in parts of the Gulshan-e-Iqbal along the University Road, Societies Union area along Shahrah-e-Faisal and Tipu Sultan Road. katachi abadis of Mehmoodabad and Manzoor Colony located on the Malir River bank are also worst affected by excessive flooding and stagnant water.

Figure 36 - Storm Water Drainage System Karachi



(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

[105] Adapted from Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi

Heavy rains were recorded in August,2006 resulting in high intensity uncontrolled gushing flows overtopping medians and other infrastructure features of road transportation network. Shahra-e-Faisal was among such hard hit areas wherefrom catchments of Shahra-e-Qaideen and adjoining areas of Hill Park and Shaheed-e-Millat resulted in the massive blockade of vehicular traffic which lasted well over 5 hours in complete choking conditions. The ripple effect was felt from Gulshan-e-Iqbal to areas of Korangi, Landhi and inner city areas such as Saddar. This situation occurs/results from the following reasons:

- Due to irregular and illegal land utilisation practices in the past, most of the natural drainage, nullahs and low lying areas which were left as open areas were converted into developed lands notwithstanding the requirements of providing alternate and man-made disposal channels and thus disturbing the natural flow conditions and consequently resulting in uncontrolled storm drainage pattern especially during a high intensity storm/rainfall.

- It is a general observation that due to lack of an organised solid waste disposal system in the city, a substantial percentage of solid waste is regularly disposed in the open storm drainage channels especially from adjoining localities which obviously results in complete choking or partially interrupted flow conditions in the event of storm. This practice is universally seen along the major drainage channels/nullahs such as Gujro and Orangi where the occupants of the katchi abadis due to the unavailability of any local waste collection and disposal systems invariably indulge in such practices. Almost all the residents of North Nazimabad areas will acknowledge similar practices in the localized drains mainly being used as dumpsters rather than an interconnecting interceptor drainage system. The resulting reduced and narrow channel width does not provide the adequate hydraulic radius and the flow capacities and in most cases results in localized ponding scenarios with overflows topping the streets and connecting roads.

- It is also observed that the existing interceptor drains along roads sides are also not fully functional mainly due to change in local topography and the slopes conditions. The storm sewers need major survey in terms of existing storm sewer network layout, interconnectivity, slopes, inverts and conveyance assessments.

- It is observed that all major intra-city drains overflow with storm water flowing at full capacities overtopping road medians and resulting in uncontrolled flow conditions affecting residential and commercial activities in the respective areas.

Recent Initiatives for Sanitation in Sindh

Sindh Cities Improvement Project

Under SCIP, the NSUSC is being implemented in 7 cities (Sukkur/New Sukkur, Rohri, Khairpur Mirs, Shikarpur, Larkana, Jacobabad and Ghotki). The focus on improving sanitation includes the following:

- Preparation of strategic sanitation plans
- System mapping and planning
- Leak detection and reduction; drainage and sewerage network improvements
- Rebuilding of pumping stations
- Provision of equipment
- Rehabilitation and expansion of stabilisation ponds
- Rehabilitation and construction of wastewater treatment plant

Some salient plans in progress or completed include the following:

Sukkur/New Sukkur

- Rehabilitation of 03 water treatment plants (WTP) and waste water facilities at Sukkur, Khairpur and Shikarpur Cities "Contract No. 2499-Pak/ICB/C03". Work in progress 33%
- Construction of extension of WTP at Numaish Gah of 18 MGD together with Force main to Adam Shah Reservoir including meters pressure measuring devices
- Replacement of old water mains and supply and laying of all new mains/transmission lines including district meters as part of Master Plan, supply and install appropriate leakage detection and NRW Equipment to reduce physical leakage from water supply networks
- Laying of new ring/trunk mains, including bulk meters and refurbishment of an elevated tank (OHR), and additional HSR
- Construction of water treatment plant at Sukkur Airport Road of 6 MGD together with desilting and capacity enhancement of storage lagoons and alternative supply of treated water from Numaish Gah via Adam Shah service reservoir
- 4 Additional DNI Zones – replacement of distribution network, household connections, installation of domestic and commercial meters and associated investment in transmission lines. Designed to provide 3,000 customers with 24/7 potable water supply at Sukkur
- Construction of new raw water intake on the River Indus at Sukkur
- Establishment of NRW reduction and pressure management zones with required resources at Sukkur, New Sukkur.
- Supply of sewer/drain cleaning equipment, 4 Jetting machines, 4 sucking machines for New Sukkur
- New Sukkur (1 Jetting + 1 Sucking Machine)
- Supervisory Control and Data Acquisition (SCADA) system for water supply and waste water facilities at Sukkur, New Sukkur

Rohri

- Improvement of sewerage system and waste water treatment system at in Karo Naro and improvement of Umar Kash Wah and New Yard Loco Shed (area) Sewerage Disposal Station at Rohri

- Supply of sewer/drain cleaning equipment, 4 Jetting machines, 4 sucking machines for New Sukkur, Rohri, Shikarpur and Ghotki

Khairpur Mirs

- Improvement of sewerage system Khairpur City (completed in-2010)
- Rehabilitation of 03 water treatment plants and waste water facilities - work in progress 33%
- Procurement of diesel generator sets for the disposal of wastewater (06 Shikarpur and 05 Khairpur) - Project Completed
- Rehabilitation of wastewater treatment plant at existing stabilisation Ponds at Jamali Goth, Khairpur
- Diverting wastewater of all disposal stations from Mir Wah canal to safe discharge point by providing additional force-main for disposal stations at Khairpur
- SCADA system for water supply and waste water facilities at Khairpur, Rohri, Sukkur, New Sukkur, Ghotki, Shikarpur and Jacobabad

Shikarpur

- Replacement of blocked sewers with covered drains
- Rehabilitation of 03 water treatment plants and waste water facilities - work in progress 33%
- Procurement of diesel generator sets for the disposal of wastewater (06 Shikarpur and 05 Khairpur) - project completed

Larkana

- Sanitation, drainage, sewerage strategy and prioritised works (completed-in 2012)
- Rehabilitation and Improvement of sewerage and drainage system of Larkana (based on detailed design of sewerage project consultancy of Federal Government) including 13 transformers for 13 disposal stations where new submersible pumps have been installed

Jacobabad

- Small capital works/projects for operational improvement of water supply and sewerage system of Jacobabad and Ghotki
- SCADA system for water supply and waste water facilities at Khairpur, Rohri, Sukkur, New Sukkur, Ghotki, Shikarpur and Jacobabad

Ghotki

- Small capital works/projects for operational improvement of water supply and sewerage system of Jacobabad and Ghotki
- Supply of sewer/drain cleaning equipment, 4 Jetting machines, 4 sucking machines for New Sukkur, Rohri, Shikarpur and Ghotki
- SCADA system for water supply and waste water facilities at Khairpur, Rohri, Sukkur, New Sukkur, Ghotki, Shikarpur and Jacobabad

Karachi Sewerage (S-III) Project

Karachi Sewerage Project S-III is a mega project for treated sewerage disposal for Karachi[106] having a cost of Rs. 7.982 billion out of which Federal Government has to contribute Rs. 3.991 billion. The

[106] Greater Karachi Sewerage Plan S III 2007-11 PC-1. Government of Sindh

project is conceived to enhance the capacity of sewerage treatment of 500 MGD. The total sewerage generated in the city is 465 MGD. Rs. 1 billion has been allocated in the ADP 2015-16. This project will have immense environmental and health related benefits, in keeping with the vision of a clean, green Sindh[107]. The project has a cost sharing mechanism between Government of Pakistan, Government of Sindh and Karachi Ports Trust.

Saaf Suthro Sindh Programme

The Saaf Suthro Sindh (SSS) Programme is an initiative of the LG&TPD, Government of Sindh, which has been conceived as an additional component of the Sindh Inter-sectoral Nutrition Support Programme (NSP).

The common objective of the SSS programme and the NSP is to improve the nutritional status of the rural communities through sanitation interventions. The SSS programme is also aligned with the Federal Government Vision 2025 and aims to achieve an open defecation free Sindh by 2025. The SSS will be implemented through the Directorate of Sanitation based in the LG&TPD which will be responsible for all sanitation related interventions in the province and also maintain integrated coordination with the Nutrition Programme for the desired results of SSS. The SSS is the first phase for achieving the 2025 objectives and will target 50% villages in 13 districts of Sindh. These districts include:

1) Jacobabad, 2) Kashmore, 3) Kambar-Shahdadkot, 4) Larkana, 5) Tharparker, 6) Badin, 7) Sanghar 8) Tando Muhammad Khan 9) Umarkot 10) Shikarpur 11) Dadu 12) Thatta; and 13) Sujawal

The SSS builds upon PATS by selecting the CLTS and Sanitation Marketing approaches as the instruments of change. The SSS model is an advanced model with additional components that have been included based on learnings from best practices. These include linkages with duty bearers, participatory health and hygiene, and development of end of pipe treatment. Behaviour change and sustainability beyond the life of the project are also an integral part of the SSS project with some linkages with schools. At the provincial level, a Directorate of Sanitation will be established at LG&TPD for implementing the programme activities while working closely with NGOs – called Implementation Partners (IPs).

Sindh Municipal Services Delivery Programme

The US Government through USAID in Pakistan has earmarked a grant of US$ 66.0 million for the development of municipal infrastructure in six selected towns in 2010 flood affected districts of the province. Under the Sindh Municipal Services Delivery Programme (SMSDP) emphasis was given to smaller towns, falling outside the purview of SCIP. Accordingly, Jacobabad, Qambar, Shahdadkot, Mehar, Khairpur Nathan Shah and Johi were selected for the USAID assisted development work under the programme. In the first phase, the construction works on Jacobabad Water Supply System are currently underway while work on Waste Water and Solid Waste Systems in Jacobabad have also been initiated.

[107] Budget 2015-16. Budget Speech, Minister for Finance, Finance Department, Government of Sindh

Municipal Services Programme, Jacobabad

The main components of the SMSDP project in Jacobabad are improvement of water supply, up-gradation and rehabilitation of sanitation system, and development of solid waste collection and disposal infrastructure.

The project aims to achieve the following:

- Improved water intake – by constructing 3 new lagoons, new pump and generator rooms and 600 mm water main (running 22 km)
- Water filter plant – with Additional Clarifier and 4 Rapid Sand Filter Beds, new generator room, Alum dosing system and sodium hypochlorite disinfection
- Water distribution – with a new water transmission loop, an additional 6 overhead reservoirs, additional pumping machinery and SCADA
- Improved sewerage system – through up-gradation of pumping capacity, construction of tertiary drains, construction of new wastewater treatment plant/oxidation ponds, and provision of drain cleaning/de-silting machinery for O&M of the sewerage network
- Implementation of a solid waste management plan – with proper collection, transportation and waste management system, door-to-door collection, and machinery for collection and transportation to a landfill site

Other Initiatives

A new drainage system for Thatta City has been initiated under Special Initiatives.

Consultancy Services for establishment of four Combined Effluent Treatment Plant (CETP) for the Industrial Areas of Karachi including laying of interceptor sewers have been initiated by the Industries and Commerce Department.

Construction of drains, sewerage and water supply system has been initiated in different Katchi Abadies in Shaheed benazirabad, Khairpur, Larkana, Sukkur, Hyderababd, Mirpurkhas, Thatta and Karachi.

Drainage schemes are also being implemented through the Community Development Programme for Sustainable Development Goals in the form of Federal Government grants to Members of Provincial Assembly (MPAs), and through the Social Protection Priority Development Programmes in the form of Federal Government grants to Members of the National Assembly (MNAs).

UN Maternal and Child Stunting Reduction Programme

UNICEF has selected four implementing organisation (Plan International, HANDS, SAFWCO and NRSP) to implement WASH interventions under 'PATS Plus Approach' in order to achieve the 'Open Defecation Free' status of the rural communities in six Taluks of Districts Nausharo Feroze, Ghotki and Khairpur. WASH infrastructure with disaster risk reduction will be provided to the communities as part of incentives so that communities are mobilised to construct toilets at their

household level. WASH in Schools (WinS) component will be addressed under 'Three Star Approach' to improve the learning environment for school children and teachers – particularly girls. WinS interventions will also ensure that school children have access to WASH facilities in their learning environment and group handwashing will be promoted through the provision of handwashing stations so that daily group handwashing becomes the regular feature for their activities.

Rural Sanitation Scale-up Strategy

The strategy to scale up rural sanitation e.g. under the 'UN Maternal and Child Stunting Reduction Programme' includes:

- Extensive series of activities undertaken to improve the living conditions of people and to achieve 100% ODF at Taluka level.
- Under the cascading model, social mobilisation activities will be one of the key components to achieve this goal/objective through Social Mobilisers, Community Resource Persons and Lady Health Workers.
- Overall project will be implemented by combining hardware and software components that are necessary to create a healthy environment and to develop or support safe water, sanitation and hygiene practices. It focuses on development of life-skills, a healthy and safe environment for the targeted population.
- The implementation strategy is guided by human rights based approaches particularly ensuring 'Equity' agenda and 'Gender Mainstreaming' embedded within WASH interventions exclusively. In addition, 'Disaster Risk Reduction' approaches will be adopted to 'build resilience' of rural communities during the emergency situations – particularly floods in Sindh.

As a result of project interventions in targeted areas, the initiative aims to achieve the following:

- **Water Supply**: people (including women and children) will have access to safe drinking water through the provision of small water supply systems (raised hand pumps with DRR) – water quality monitoring and testing will be given due consideration and project interventions will ensure to build the capacity of service providers, WASH Committees as well as communities – much focus will also be given on 'community led water safety and security' planning so that people have access to safe drinking water.

- **Rural Sanitation under PATS Plus Approach**: By the end of the project, all project areas will be declared/certified as 100% Open Defecation Free – under sanitation, a series of interventions will be undertaken like adaptation of cascading model for extensive social mobilisation and triggering communities to construct toilets through social mobilisers, community resource persons and LHWs, formation of WASH Committees, identification of local masons and entrepreneurs and 'Behaviour Change Communication' campaigns at community level targeting the key segments. Standardised capacity building planning and trainings shall be delivered by implementing partners to all local activists (including social organisers, community resource persons, WASH Committees, local masons and entrepreneurs). These trainings will ensure to roll out cascading model and achieve the quality results.

- **Health and Hygiene**: Health and hygiene related key messages and sessions will be delivered to the community so that key social norms are created particularly, handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options.

- **WASH in Schools**: School children in target areas will have access to WASH facilities in their schools. WASH clubs will be institutionalised after providing improved WASH facilities in schools which would help in mobilising households to move up the sanitation ladder and adopt improved practices e.g. treatment of water by boiling before use at household level, construction of latrines and consuming a balanced diet. Children at school are direct recipients of improved WASH services at school which help in improving enrolment and retention rates, especially among girls at the age of puberty. In addition, under 'Three Star Approach', group handwashing will be promoted through the provision of handwashing stations so that daily group handwashing becomes the regular feature for their activities. This activity will be organised as part of the routine of institutionalized WASH clubs. Evidence from previous programmes of UNICEF has shown the link between group hand washing at school by children and promotion of hand washing practices at household level by them after school. This activity will follow the three star approach guidelines which will help in engaging children and school authorities to help their school graduate from one star to two and then three stars using a prescribed methodology. School children would directly benefit from this activity but promotion of hand washing with soap at household level by them will also benefit the target group and help in community mobilization efforts through other activities. Menstruation Hygiene Management will be addressed as a cross cutting theme and will be the key component of WinS interventions.

- **WASH in Health Facilities**: Catchment populations in target areas will have access to WASH facilities in health centres. Improved WASH facilities would be provided in healthcare facilities/and CMAM sites, adopting construction manuals and standards, for reducing vulnerability of WASH related infections in pregnant/lactating women and children visiting the healthcare facilities. Improved WASH activities at healthcare facilities will also help in improving health seeking behaviour, reporting cases of diarrhoea and promoting good practices e.g. use of latrines with more dignity and privacy, especially important for women. WASH facilities are a pre-requisite to inculcate improved behaviour in healthcare facilities.

Orangi Pilot Project

In the urban areas, the Orangi Pilot Project–Research and Training Institute (OPP-RTI) has demonstrated strategies for community participation, engagement with local governments, and engagement with utilities. It also conducts documentation and analysis of the sector. Direct assistance to communities in Orangi town in north-western Karachi and the demonstration effect of OPP-RTI's work benefited over 108,000 households (more than 865,000 people) in nearly 7,600 lanes, representing almost 90% of the entire settlement of Orangi. Collectively, communities invested nearly US$1.7 million of their own money in their community's sewerage system[108].

[108] Pakistan Water Supply and Sanitation Sector. Volume III Executive Summaries, April 2013. International Bank for Reconstruction and Development/The World Bank

Strategy

Sanitation (Sewerage and Drainage)			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
URBAN SANITATION			
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	At least 100% UCs (608) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 608 UCs
Improved and safely managed sanitation services coverage enhanced to reduce access gap in urban areas and rural areas, especially in those that are also nutrition-sensitive	Develop an SOP for all new sanitation schemes to meet criteria for 'safely managed' which include: - not shared with other households - excreta are safely disposed in situ or transported and treated off-site - guidelines for integration in interventions in nutrition-sensitive areas Plan and implement safely managed sanitation schemes to reduce access gap - By 20% in short term - reduce proportion of households connected to open drains from 27% to 24% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Plan and implement safely managed sanitation schemes to reduce access gap - By 50% in medium term - reduce proportion of households connected to open drains from 24% to 20% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Plan and implement safely managed sanitation schemes to reduce access gap - By 100% in long term - reduce proportion of households connected to open drains from 20% to 15% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component

Wastewater treatment plants established in 119 towns (12 per year)	Establish wastewater treatment plants in 36 towns	Establish wastewater treatment plants in 36 towns	Establish wastewater treatment plants in 47 towns
Water supply and sanitation schemes linked with wastewater treatment	At least 25% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	At least 50% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	At least 75% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes
Monitor contamination levels of industrial effluent	LG&HTPD, PHE&RDD, Irrigation department, PCSIR and Sindh Environment Protection Agency map major industrial wastewater flows and conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Hazard and risk GIS mapping of contaminated rivers and water bodies done Conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced
Increased proportion of treated industrial wastewater	Set up Combined Effluent Treatment Plant (CETP) for cluster of industries where feasible Identify industries with high volume of untreated effluent and prioritise for enforcement of regulations	At least 5% of industrial wastewater treated	At least 10% of industrial wastewater treated
Optimal sewage flow capacity maintained	Sewage flows determined for all cities and towns, and six monthly de-silting and cleaning of 30% drains and sewers with safe sludge disposal in towns and zones in cities	Six monthly de-silting and cleaning of 60% drains and sewers with safe sludge disposal in towns and zones in cities	Six monthly de-silting and cleaning of 90% drains and sewers with safe sludge disposal in towns and zones in cities
Optimal status of sewer maintenance equipment (sucking machine, jetting machine, sucking/jetting machine)	Status of equipment availability and functionality determined for each town and city zone At least 30% of towns and city zones equipped with sewer maintenance equipment	At least 60% of towns and city zones equipped with sewer maintenance equipment	At least 90% of towns and city zones equipped with sewer maintenance equipment
Adequate and functional collector and branch	Status of collector and branch sewers in each city	Phased replacement of 25% non-functional	Phased replacement of 50% non-functional

sewers	and town determined Phased replacement or laying of new lines instituted	collector and branch sewers or laying of new lines instituted	collector and branch sewers or laying of new lines instituted
Optimal functionality of pumping stations	Status of pumping stations in each city and town determined Phased rehabilitation plan instituted for at least 30% dysfunctional pumping stations	Phased rehabilitation plan instituted for at least 60% dysfunctional pumping stations	Phased rehabilitation plan instituted for at least 90% dysfunctional pumping stations
Systematic management of Operation and Maintenance of sewerage and drainage systems	Develop O&M manual for sewerage and drainage including sewer desilting safety measures Train LG&HTPD and PHE&RDD staff in use of O&M manual	Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual	Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual
RURAL SANITATION			
Implement rural sanitation scale-up strategy in nutrition and WASH programmes	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (13 priority districts)	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (13 ongoing + 6 other districts)	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (19 ongoing + 10 other districts)
Community awareness and social mobilisation regarding sanitation, nutrition and hygiene enhanced in all UCs through effective implementation of BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)
2 Community Resource Persons (preferably one male and one female) deployed for BCC for each	Deploy and orient 2594 Community Resource Persons in 1297 UCs	Maintain 2594 Community Resource Persons in 1297 UCs	Maintain 2594 Community Resource Persons in 1297 UCs

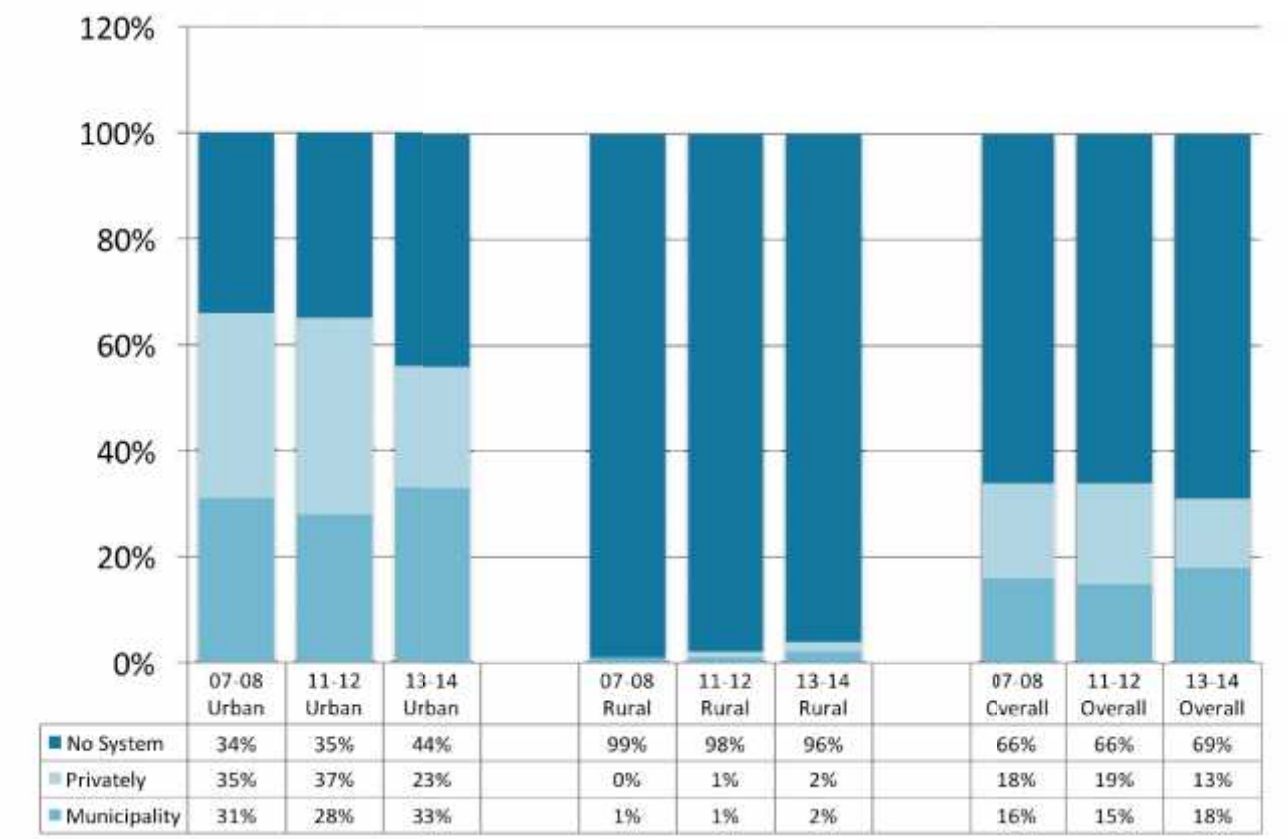
UC (2594 Community Resource Persons)			
Safe sanitation practices promoted in high open defecation zones, nutrition-sensitive and polio priority areas	Develop provincial and district level road maps on PATS/ODF for identified villages in 13 priority districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 13 priority districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 13 priority districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 13 priority districts	Develop provincial and district level road maps on PATS/ODF for identified villages in 6 additional districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 6 additional districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 6 additional districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 6 additional districts	Develop provincial and district level road maps on PATS/ODF for identified villages in 10 additional districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 10 additional districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 10 additional districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 10 additional districts

SOLID WASTE

The Ministry of Environment undertook a study during 1996 on "Data Collection for Preparation of National Study on Privatisation of Solid Waste Management in Eight Selected Cities of Pakistan". The study revealed that the rate of waste generation on average from all type of municipal controlled areas varies from 0.283 kg/capita/day to 0.613 kg/capita/day or from 1.896 kg/house/day to 4.29 kg/house/day in all selected cities. The projected population of the country for the year 2014 was 197.77 million on the basis of current annual growth rate of 2.6% resulting in an estimated projection of solid waste of 71,018 tons per day/ 25.921 million tons per year.

The study[109] estimated that the Solid Waste Generation Rate (kg/C/Day) for Karachi was 0.613 kg/C/Day, while for Hyderabad, it was 0.563 kg/C/Day. Using the current estimated population of Karachi of 24 million[110], at least 14,712 tons per day or 5.37 million tons per year. Using an arbitrary mean Solid Waste Generation Rate of 0.330 kg/C/Day (average of urban and rural rates), the total solid waste generated per day in Sindh for a population of 44.807 million is about 14,786 tons per day, and about 5.397 million tons per year. Clearly, most of the solid waste is generated in Karachi.

Figure 37 - Status of Garbage Collection in Sindh



	07-08 Urban	11-12 Urban	13-14 Urban	07-08 Rural	11-12 Rural	13-14 Rural	07-08 Overall	11-12 Overall	13-14 Overall
No System	34%	35%	44%	99%	98%	96%	66%	66%	69%
Privately	35%	37%	23%	0%	1%	2%	18%	19%	13%
Municipality	31%	28%	33%	1%	1%	2%	16%	15%	18%

(Source: Pakistan Social and Living Standards Measurement Survey, 2007-08, 2011-12 and 2013-14)

[109] (Draft) Guideline for Solid Waste Management June 2005. Pakistan Environment Protection Agency

[110] http://worldpopulationreview.com/world-cities/karachi-population/ accessed on 27 April 2016

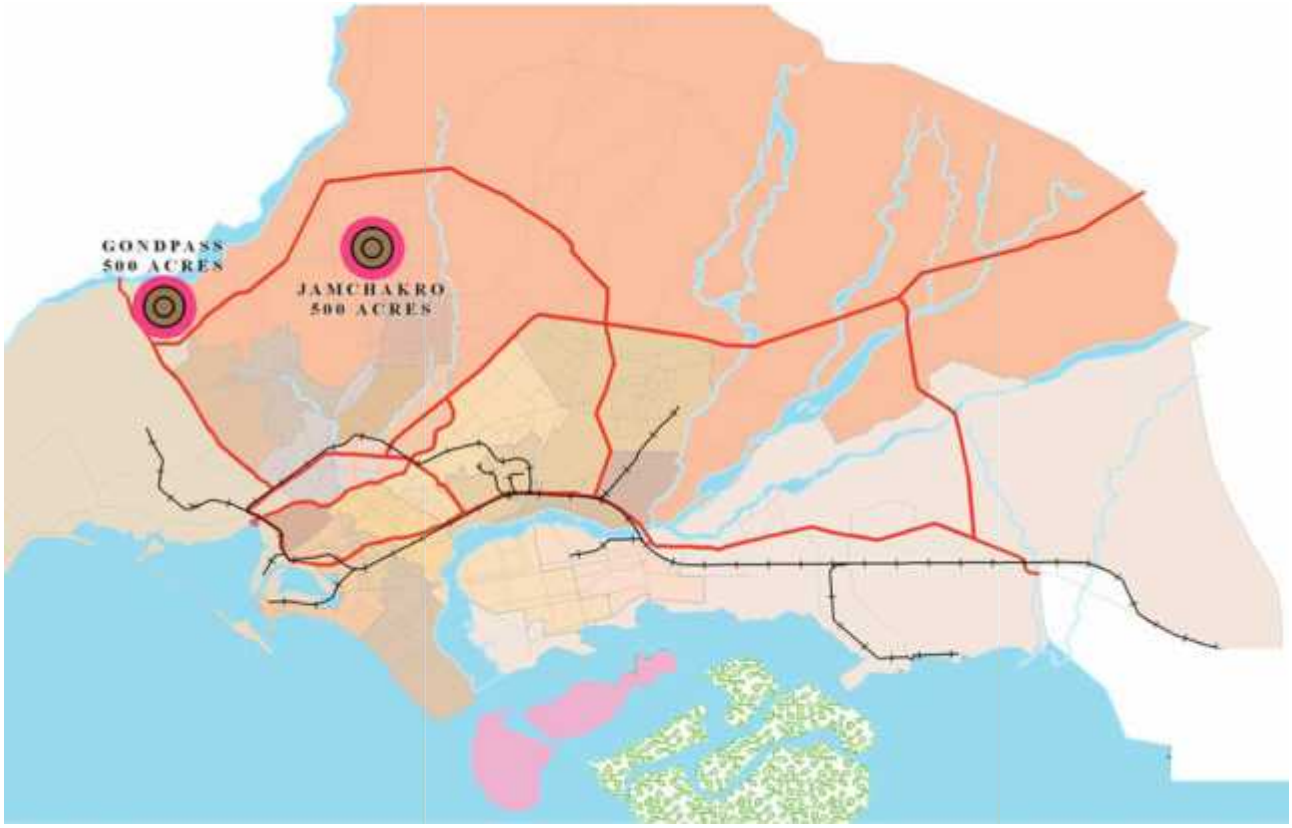
Only 31% of Sindh has proper disposal of waste solids (collected by any municipal institution, disposed of by solid waste management department or a private company vehicle collected from home) (Fig 37). This ranges from 56% in urban to 4% in rural areas[111].

Karachi City Solid Waste

The performance of solid waste management system has always been a major cause of concern, as this municipal service was traditionally wanting in such basic aspects as primary collection of garbage and safe transfer to the landfill sites.

Approximately 9,000 tons of solid waste were being generated each day in 2005[112]. Households, trade and industrial establishments, construction activity and a variety of institutions contribute in waste generation. The amount of solid wastes is expected to substantially increase with the rapid growth of population and economic activity. By the year 2020, the solid waste generation may approach 16,000 to 18,000 tons each day. The quality of civic life is closely related and affected by the sanitary conditions in the residential neighbourhoods and other areas, where efficient collection of garbage is the key to clean and healthy environment.

Figure 38 - Existing Landfill Sites in Karachi



(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

[111] Pakistan Social and Living Standards Measurement Survey, 2013-14

[112] Adapted from Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi

it is estimated that of the total household solid waste generated daily within the City District Karachi, around 4,500 tons is lifted and of this, not more than 2,000 tons makes it to one of the two designated city "landfill" sites - actually open dumping sites. The remainder is either recovered for recycling (an estimated 1,500 tons per day) or is disposed of by burning or by illegal dumping into open drains or onto roadsides or open land (an estimated 1,400 tons)[113]. It is estimated that some 55,000 families depend on the informal solid waste recycling industry for their livelihood and with more than 1,000 operating units that the industry is worth some Rs 1.2 Billion per annum.

It is important to effectively organise primary collection of garbage i.e. from the households (within the Union Councils) and locations of origin/generations such as markets, industrial areas, hospitals and recreational places. The city conspicuously lacks garbage transfer stations which need to be developed for better handling of the garbage and transfer to sanitary landfills (**Fig 38**).

Poor planning, inappropriate technology and poor management are obviously the main areas of concern needing serious efforts on the part of the local government and other agencies towards efficient management and modern technological development of this sector.

Hospital Waste

Various studies have reported the waste generation in urban centres of Pakistan, however, there is paucity of data on the situation in Sindh. In Pakistan, however, all hospital waste including hazardous waste is considered to be a part of municipal solid waste.

There is little data on the true estimate of hospital waste being generated in Karachi City. There are no discrete criteria for the categorisation of hospital / clinical / healthcare unit / biohazard waste. Furthermore, the segregation practice is not discretely observed. It is commonly observed that segregation practices are limited or restricted to the boundaries of the source only and are mostly applied where there are source segregation practices at source. Outside the point of generation of source in more than 95% cases the waste is a commingled waste i.e. mixed with municipal solid waste (MSW). Therefore, in order to estimate the realistic quantities of hospital waste being generated in Karachi, comprehensive studies should be undertaken to characterise the type, composition and quantities of hospital waste generated.

Only 140 health care units (HCUs) in Karachi City dispose of their waste through incineration plants run by City District Government (CDG)[114]. The remaining HCUs dispose of their waste along with the municipal waste. This poses a health hazard. The reasons of health hazards are:

- Non-registration of HCUs either with Health Department, Government of Sindh or with City Government and
- Non-presence of Environment Protection Agency of Sindh at grass root level

[113] Solid waste management the most important element constituting the environmental health. UKessays, March 2015

[114] Solid waste management the most important element constituting the environmental health. UKessays, March 2015

The CDG installed two incineration plants at Mewa Shah in 1996. Each has a capacity of 1000 kg/hour. Incineration takes place at 800 ^{0}C in 10 minutes. At present 140 hospitals/clinics are incinerating their waste through these incinerators.

A study[115] was undertaken to evaluate the current practices of segregation approaches, storage arrangements, collection and disposal systems in eight teaching hospitals of Karachi. Out of the eight hospitals visited, two (25%) were segregating sharps, pathological waste, chemical, infectious, pharmaceutical and pressurised containers at source. For handling potentially dangerous waste, two (25%) hospitals provided essential protective gears to its waste handlers. Only one (12.5%) hospital arranged training sessions for its waste handling staff regularly. Five (62.5%) hospitals had storage areas but mostly they were not protected from access of scavengers. Five (62.5%) hospitals disposed of their hazardous waste by burning in incinerators, two (25%) disposed of by municipal landfills and one (12.5%) was burning waste in open air without any specific treatment. No record of waste was generally maintained. Only two (25%) hospitals had well documented guidelines for waste management and a proper waste management team.

A similar study was conducted at Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU) Hospital Larkana.to assess the hospital waste management system at different medical wards and to determine the total daily waste generation rates[116]. The study found that the average generation rate of hospital and infectious waste was about 1.072 and 0.453 kg/bed/day respectively. It also observed that the existing hospital waste management system was lower than prescribed standards. The poor waste management system in the hospital was mainly due to ineffective segregation, collection, storage and dumping of waste. In addition, lack of training and protective equipment for sanitary staff, scarcity of funds and inadequate policy of waste treatment were also the main causes of inappropriate waste management.

The Government of Sindh has developed its Hospital Waste Management Rules 2014. However, its wide scale adoption remains a challenge. In 2015, on the directives of Minister Environment, notices for personal hearings under Section 21 (1) of Sindh Environmental Protection Act 2014 were issued to 30 hospitals in the province for non-compliance of the directives requiring them to submit a comprehensive Hospital Waste Management Plan[117].

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[115] Shahida Rasheed, Saira Iqbal, Lubna A. Baig, Kehkashan Muft. Hospital Waste Management in the Teaching Hospitals of Karachi. JPMA 55:192;2005

[116] Kishan Chand Mukwana, Kamran Ahmed Samo, Abdul Qayoom Jakhrani. Assessment of Hospital Waste Management System and Generation Rates at SMBBMU Hospital Larkana. Quaid-e-Awam University Research Journal of Engineering, Science & Technology, Volume 13, No. 2, Jul-Dec. 2014

[117] Notices issued to 30 hospitals upon failure to submit waste management plan. Health Watch. http://healthwatch.pk/2015/12/1971 accessed on 27 April 2016

Slaughter Waste

According to Livestock Census 2006, 49% of total cattle population of Pakistan resides in Punjab, 23% in Sindh, 20% in Khyber Pakhtunkhwa and 8% in Balochistan[118]. There is a growing demand for both domestic consumption and meat exports. In 2003, the demand for beef in Pakistan was 1.21 million tons, while the supply was 1.05 million tons with a gap of 0.16 million tons. Similarly, for mutton, the demand was 0.80 million tons, while the supply was 0.70 million tons with a gap of 0.10 million tons. By 2020, the demand for beef and mutton would have risen to 3.74 and 2.50 million tons respectively, but the gap would also have increased to 2.31 and 1.47 million tons respectively[119].

There is paucity of data on slaughter waste. However, there is data available on livestock slaughtered which gives an idea of the scale of disposal required (Fig 39). About 80%-87% of goats, sheep, buffaloes and cattle slaughtered in Sindh take place in Karachi (over 2.4 million livestock are slaughtered annually in Karachi). There are 85 recognised slaughterhouses in Sindh. Current practices suggest that slaughter waste is mixed with and disposed in municipal solid waste. The number of recognised slaughterhouses by Government of Sindh are shown by district in Fig 40.

Figure 39 - Livestock slaughtered in Sindh 2011-12

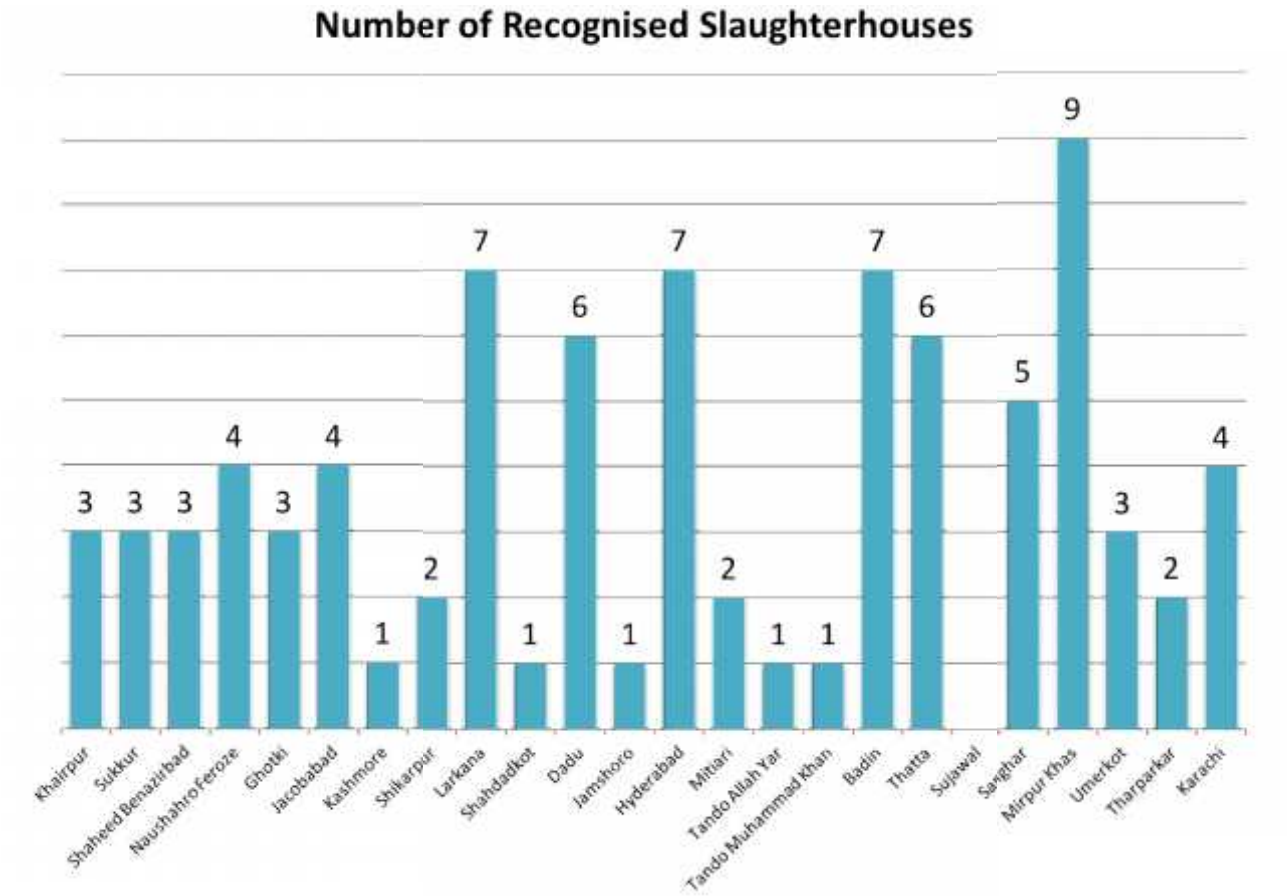
	Sindh	Karachi	Rest of Sindh
Goats	1158031	956932	201099
Sheep	791388	631212	160176
Buffaloes	431811	376621	55190
Cattle	536159	457221	78938

(Source: Directorate of Animal Husbandry Sindh, Hyderabad – in Development Statistics of Sindh 2013, Sindh Bureau of Statistics)

[118] Pakistan Livestock Census 2006.Agricultural Census Organization, Statistics Division, Government of Pakistan

[119] Pre-feasibility Study Modern Slaughter House (Abattoir) For Cattle only. Sindh Board of Investment, Government of Sindh, 2010

Figure 40 - Number of recognised slaughterhouses by district 2011-12



(Source: Directorate of Animal Husbandry Sindh, Hyderabad – in Development Statistics of Sindh 2013, Sindh Bureau of Statistics)

Overview of solid waste management practices

Table 12 illustrates the practices in selected secondary cities as part of data obtained for the Sindh Environment Management Programme. It shows less than satisfactory solid waste management, outmoded collection and disposal methods, lack of adequate equipment and infrastructure and low operating efficiency.

Table 12 - Overview of solid waste management in selected secondary cities

	Mirpur Khas	Umerkot	Johi	Larkana	Shikarpur	Sukkur
Urban population (2006)	231,276	55,615	29,296	38,996	164,727	240,776
Collection vehicles						
Tractor trolleys	6	4	2	8	5	7
Dumper trucks				2		5
Container carriers						1
Mechanical loaders	2			2	1	1
Donkey carts	9	1		20	10	11
Hand carts	70	21	10	40	24	150
Primary-secondary transfer	Open heaps	Open heaps	Open heaps	Open heaps	Open heaps	Open heaps
Disposal methods	Open dumping	Open dumping	Open dumping	Open dumping	Open dumping	Open dumping
Hospital wastes	Collected with municipal wastes	Burnt at site	Negligible (on site in disposal)	Open dumping	Collected with municipal wastes	Collected with municipal wastes
Dead animals	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes	Collected with municipal wastes
Annual expenditure (Rs)	16,686,000	9,224,700	3,185,000	3,070,000	13,517,000	29,732,000
Collection cost/ton (Rs)	952	1487	550	766	823	1037
Cost per inhabitant per year (Rs)	72	166	51	79	82	123
Collection efficiency (%)	48	80	73	62.5	65	72
Staff per 1000 population	1.5	2.59	1.06	0.97	0.92	1.79
Contracts awarded to private sector			1	1		

(Source: Urban Municipal Services Sindh Secondary Cities Urban Sector Assessment Prepared under ADB PPTA 4534 – Sindh Basic Urban Services Project, 2007)

Recent Initiatives for Solid Waste in Sindh

Sindh Cities Improvement Project

Under SCIP, the NSUSC is being implemented in 7 cities (Sukkur/New Sukkur, Rohri, Khairpur Mirs, Shikarpur, Larkana, Jacobabad and Ghotki). This includes investments in primary and secondary storage and collection, waste reduction, recycling / reuse and recovery (including incineration where appropriate), treatment, and final sanitary disposal. The Solid Waste Management (SWM) also includes:

- Construction of landfill facilities
- Procurement of specialised solid waste collection and disposal equipment
- Provision of improved communal bins for waste storage

Some salient plans in progress or completed include the following:

Sukkur/New Sukkur

- Skip platforms for solid waste collection (project completed in 2011)
- Additional SWM secondary collection equipment and skips and system, and replacement of old TMA system including new solid waste management secondary collection equipment (including road mechanical sweepers and small skid loaders for all T1 and T2 Towns. 3.5 cm Skips (68 Nos), Side Loading Trucks (13 Nos), Skid Loader (2 Nos))

Rohri

- Site investigation for SWM landfill sites (in progress since July 2011- due to land issues)
- Skip platforms for solid waste collection (project completed in 2011)

Khairpur Mirs

- Site investigation for SWM landfill sites (in progress since July 2011- due to land issues)
- Skip platforms for solid waste collection (project completed in 2011)
- Construction of three sanitary landfill sites, disposal works, landfill equipment landfill in Rohri, Sukkur, Khairpur and Shikarpur
- Additional SWM secondary collection equipment and skips and system, and replacement of old TMA system including new solid waste management secondary collection equipment (including road mechanical sweepers and small skid loaders for all T1 and T2 Towns

Shikarpur

- Site investigation for SWM landfill sites (in progress since July 2011- due to land issues)
- Skip platforms for solid waste collection (project completed in 2011)
- Construction of three sanitary landfill sites, disposal works, landfill equipment landfill in Rohri, Sukkur, Khairpur and Shikarpur
- Additional SWM secondary collection equipment and skips and system, and replacement of old TMA system including new solid waste management secondary collection equipment (including road mechanical sweepers and small skid loaders for all T1 and T2 Towns

Larkana

- Skip platforms for solid waste collection (project completed in 2011)

- Construction of three sanitary landfill sites, disposal works, landfill equipment landfill in Rohri, Sukkur, Khairpur and Shikarpur
- Additional SWM secondary collection equipment and skips and system, and replacement of old TMA system including new solid waste management secondary collection equipment (including road mechanical sweepers and small skid loaders for all T1 and T2 Towns

Ghotki

- Construction of three sanitary landfill sites, disposal works, landfill equipment landfill in Rohri, Sukkur, Khairpur and Shikarpur
- Additional SWM secondary collection equipment and skips and system, and replacement of old TMA system including new solid waste management secondary collection equipment (including road mechanical sweepers and small skid loaders for all T1 and T2 Towns

Sindh Solid Waste Management

Government of Sindh has established the Sindh Solid Waste Management Board to support local councils in managing municipal solid waste, medical hazardous waste and industrial hazardous waste in all cities of the province[120].

Sindh Government has assigned very high priority to this sector as it has a direct impact on the health of the people and environment of cities. In its Phase I, Integrated Solid Waste Management Projects are being started in 06 districts of Karachi, Hyderabad, Shaheed Benazirabad and Larkana districts. These projects are being undertaken on fast track basis and will be on ground from October 2015 onwards. In Phase II, 10 districts of Sindh will be taken up and in Phase III all remaining districts will be completed.

Sindh Solid Waste Management Board is introducing Integrated Municipal Solid Waste Management Projects whereby the present method of manual sweeping and collection and transportation of garbage will be replaced by a modern, scientific and environment friendly system of mechanical sweepers, door to door collection of garbage, complete ban on burning of garbage, and transportation of waste from community dustbins to Garbage Transfer Stations and then to Sanitary Engineered Landfill sites.

These initiatives include the following under Services, General Administration and Coordination Department:

- Establishment of six garbage transfer stations with Material Recovery (MR) and Refused Derived Fuel (RDF) facility in Karachi
- Development of new sanitary engineered landfill site in Karachi
- Development of sanitary engineered existing 2 landfill sites and their scientific improvement in Karachi
- Integrated solid waste Management Project Nawabshah Municipal Committee, Shaheed Benazirabad District. (Phase I) (Front end Collection System and two Garbage Transfer Stations)

[120] Budget 2015-16. Budget Speech, Minister for Finance, Finance Department, Government of Sindh

- Integrated Municipal Solid Waste Management Project Nawabshah Municipal Committee, Shaheed Benazirabad District (Phase-II) – landfill site and material recovery facility
- Integrated Municipal Solid Waste Management Project Municipal Corporation, Larkana (Phase-I)
- Integrated Municipal Solid Waste Management Project Municipal Corporation, Larkana (Phase-II) – landfill site and material recovery facility

Strategy

Solid Waste			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities Conduct waste characterisation studies (including hospital waste) for mega cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs Conduct waste characterisation studies (including hospital waste) for intermediate cities	At least 100% UCs (608) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 608 UCs
Integrated solid waste management implemented in 29 districts (5 in short term, 10 in medium term, and 13 in long term)	Develop integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana)	Develop integrated solid waste management in 10 districts	Develop integrated solid waste management in 14 districts
Town and UC level profiles developed for wastewater and solid waste in 119 towns and 1297 UCs	Conduct a study on wastewater and solid waste in 119 towns to develop town level profiles (including infrastructure, equipment and staffing)	Conduct a study on wastewater and solid waste in 1297 UCs to develop UC level profiles (including infrastructure, equipment and staffing) Periodic updating of town and UC level profiles	Periodic updating of town and UC level profiles
Solid waste collection and disposal	At least 70% of solid waste generated is collected and disposed of per day At least 30 town councils providing door to door collection service Village based solid waste management piloted in selected villages	At least 80% of solid waste generated is collected and disposed of per day At least 60 town councils providing door to door collection service Village based solid waste management scaled up to 10% villages in Sindh	At least 90% of solid waste generated is collected and disposed of per day At least 100 town councils providing door to door collection service Village based solid waste management scaled up to 30% villages in Sindh
Effective solid waste management	Develop a minimum standards list of staffing,	Upgrade the hardware and equipment for solid waste	Upgrade the hardware and equipment for solid waste

	hardware and equipment for solid waste management and upgrade in 30 town councils (10 per year)	management in 30 town councils (10 per year)	management in 40 town councils (10 per year)
Efficient Solid waste disposal and recycling	At least 30% town councils have established transfer stations to reduce disposal time Recycle at least 10% of solid waste by systematic separation Sanitary landfill options identified for towns where feasible	At least 60% town councils have established transfer stations to reduce disposal time Recycle at least 15% of solid waste by systematic separation At least 20 towns served by sanitary landfill sites	At least 90% town councils have established transfer stations to reduce disposal time Recycle at least 20% of solid waste by systematic separation At least 40 towns served by sanitary landfill sites
Waste to Energy	Formalise contracts with companies for waste to energy options	At least each mega city has a WTE option in place	At least each intermediate city has a WTE in place
Safe hospital high risk waste disposal	Health department establishes hospital waste management committees in each hospital in line with the Environmental and Medical Waste Management Guidelines Health department in collaboration with LG&HTPD orients each hospital waste management committee on Environmental and Medical Waste Management Guidelines, municipal solid waste and high risk waste and their separate disposal Each mega city and intermediate city has a centralised and functional high risk hospital waste disposal facility At least 50% of hospital high risk waste disposed of safely	Each town has a centralised and functional high risk hospital waste disposal facility At least 60% of hospital high risk waste disposed of safely	At least 90% of hospital high risk waste disposed of safely
Safe and hygienic Slaughterhouses	Update status of all slaughterhouses (recognised and unrecognised) in each district and prioritise those for rehabilitation, solid	Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised	Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised

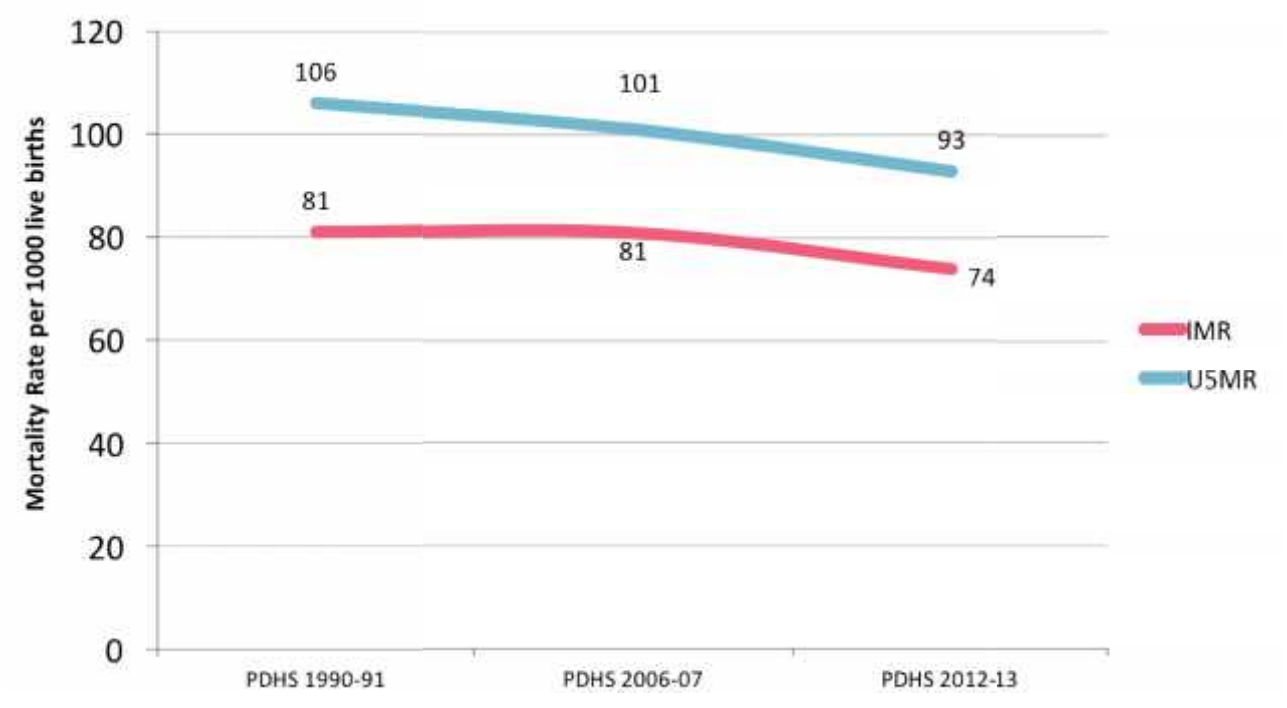
	waste and wastewater management Develop slaughterhouse safety and hygiene practice guidelines and orient 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 30% of municipal services dispose of slaughterhouse solid waste safely	slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 60% of municipal services dispose of slaughterhouse solid waste safely	slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 90% of municipal services dispose of slaughterhouse solid waste safely
Efficient and effective management of Industrial Solid Waste	Determine the current status of industrial solid waste production and disposal	Develop strategies and actions for efficient and effective management of industrial solid waste	

HEALTH, HYGIENE AND NUTRITION

Child Mortality

The Infant Mortality Rate (IMR) and Under 5 Mortality Rate (U5MR) remain high in Sindh. The Sindh MICS 2014 found an IMR of 82 per 1000 live births and U5MR of 104 per 1000 live births. In recent years, the people of Sindh have experienced major emergencies as a result of two successive years (2010 and 2011) of record breaking rains and floods. Children may have been disproportionately affected. Decadal trends show that while there have been improvements in child mortality rates, they are still way above previous Millennium Development Goals (MDG) targets (Fig 41).

Figure 41 - Decadal trends of Infant and Under 5 Mortality Rates in Sindh



(Source: Pakistan Demographic and Health Surveys 1990-91, 2006-07, and 2012-13)

Evidence suggests that pneumonia, diarrhoea and malaria cause about 50% of all deaths in children in Pakistan. Diarrhoea alone accounts for almost 19%-23% of all child deaths[121]. In Pakistan, 53,000 children die every year from diarrhoea[122]. WHO and UNICEF estimate that in Pakistan, the rates of child mortality due to diarrhoea are in the range of 100 - <500 per 100,000

[121] Jai Das and Zulfiqar Bhutta. Scale-up plan for essential medicines for child health – Diarrhoea, Pneumonia and Malaria. Aga Khan University, 2012

[122] Pakistan Demographic and Health Survey 2012-13

children[123]. PSLM 2014-15 found that overall 6% of children under five had diarrhoea in the past 30 days preceding the survey, with urban at 8% and rural at 5%. The prevalence of diarrhoea was highest in Naushahro Feroze (12%), Hyderabad (10%) and Sanghar (10%), and lowest in Kashmore, Shahdadkot and Dadu (each at 2%). About 96% of children under five years with diarrhoea received treatment from a practitioner.

Sindh MICS 2014 found 69.2% of children under 5 years who had diarrhoea in the last 2 weeks sought advice or treatment from a health facility or provider; 11.6% of children under 5 years with diarrhoea in the last 2 weeks received oral rehydration solution (ORS) and zinc; and 41% of children under 5 years with diarrhoea in the last 2 weeks received ORT (ORS packet, pre-packaged ORS fluid, recommended homemade fluid or increased fluids) and continued feeding during the episode of diarrhoea.

PDHS 2012-13 found that of children under 5 years, 21.9% in urban and 23.9% in rural Sindh suffered from diarrhoea in the two weeks preceding the survey. The survey also found that overall in Pakistan, children aged 6-11 months (35.3%) were the most vulnerable and were three times more likely to have had diarrhoea than children aged 48-59 months (12%). In Pakistan[124], 10.8% of all deaths in children under 5 years of age and 17.7% of all child deaths were due to diarrhoea. In Sindh, 10.1% of all deaths in children under 5 years of age were due to diarrhoea, and this was the fifth most important cause after birth asphyxia (21.5%), sepsis (16.1%), pneumonia (13.7%) and prematurity (10.3%).

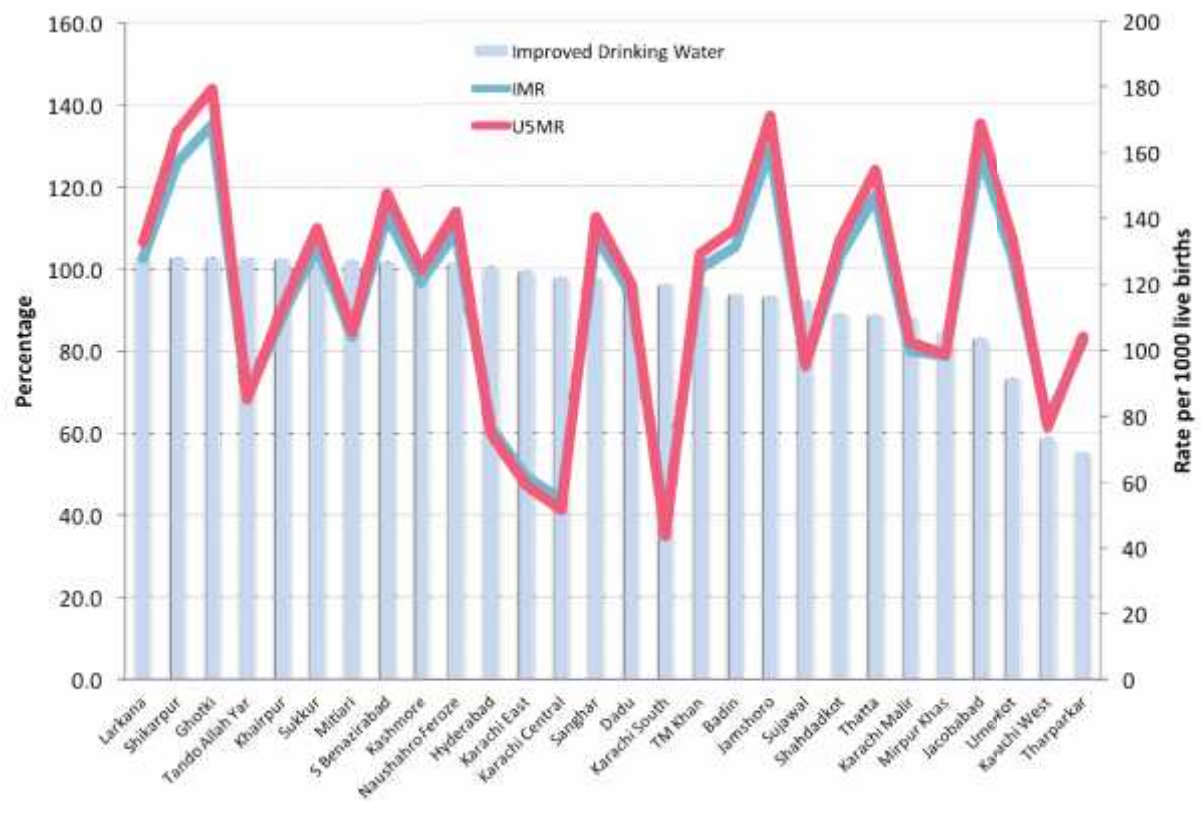
Figure 42 illustrates that as the rates of improved sanitation decrease, the rates of IMR and U5MR increase. This trend however is visible when IMR and U5MR rates are compared to improved drinking water suggesting that low rates of improved sanitation are a risk factor for child mortality (**Fig 43**).

[123] Liu L, Johnson HL, Cousens S, et al. Child Health Epidemiology Reference Group of WHO and UNICEF. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 2012;379(9832)
[124] Pakistan Demographic and Health Survey 2006-07

Figure 42 - Child mortality rates and improved sanitation

(Source: Sindh Multiple Indicator Cluster Survey 2014)

Figure 43 - Childhood mortality rates and improved drinking water



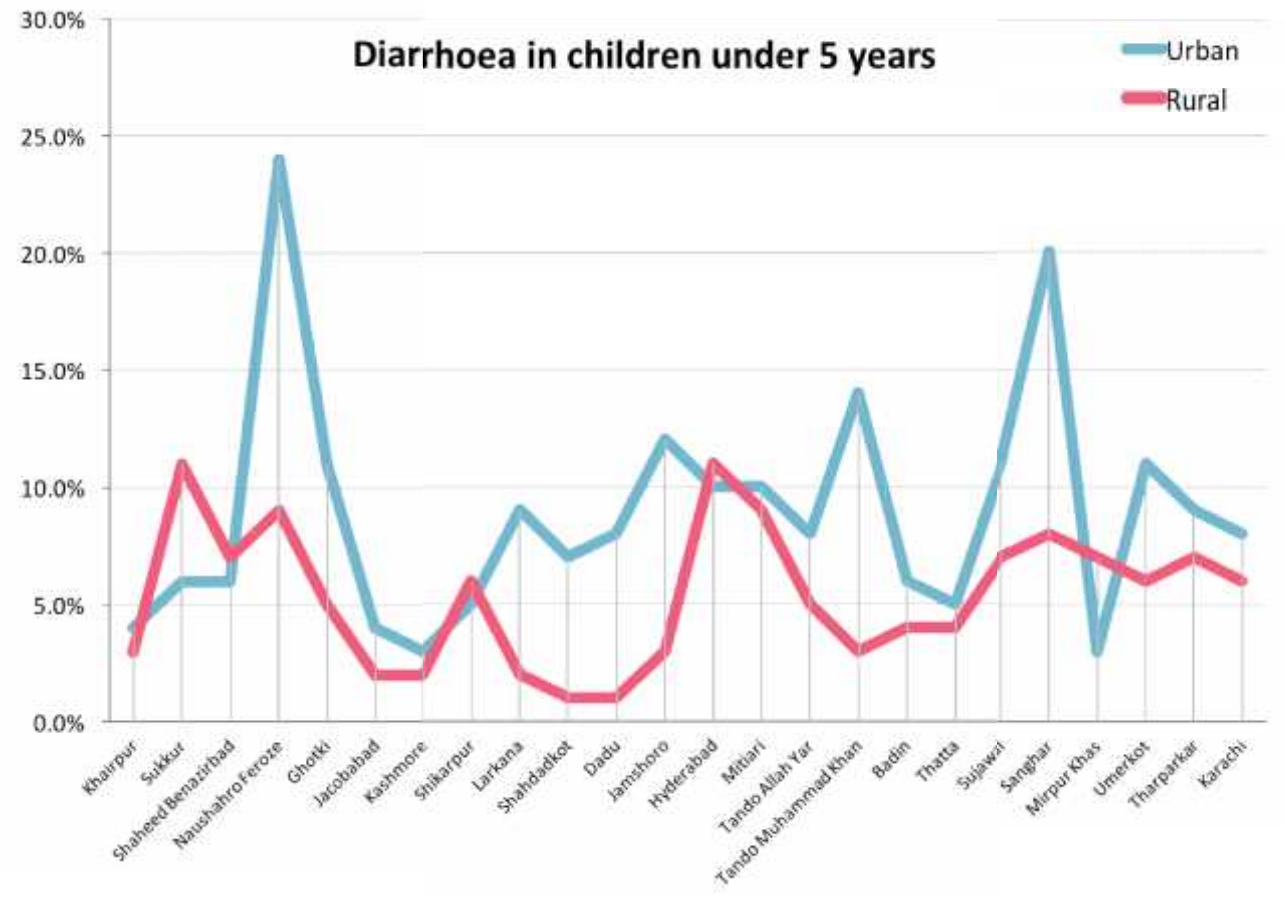
(Source: Sindh Multiple Indicator Cluster Survey 2014)

Diarrhoea

On a review of the status of diarrhoea in the last 30 days in children under 5 years, generally the prevalence of diarrhoea is more in urban areas than rural areas (**Fig 44**). Of particular note are urban diarrhoea rates in Naushahro Feroze (24%), Sanghar (20%), and Tando Muhammad Khan (14%). Hyderabad has similar rates for urban (10%) and rural (11%). A high rural rate is also seen for Sukkur (11%).

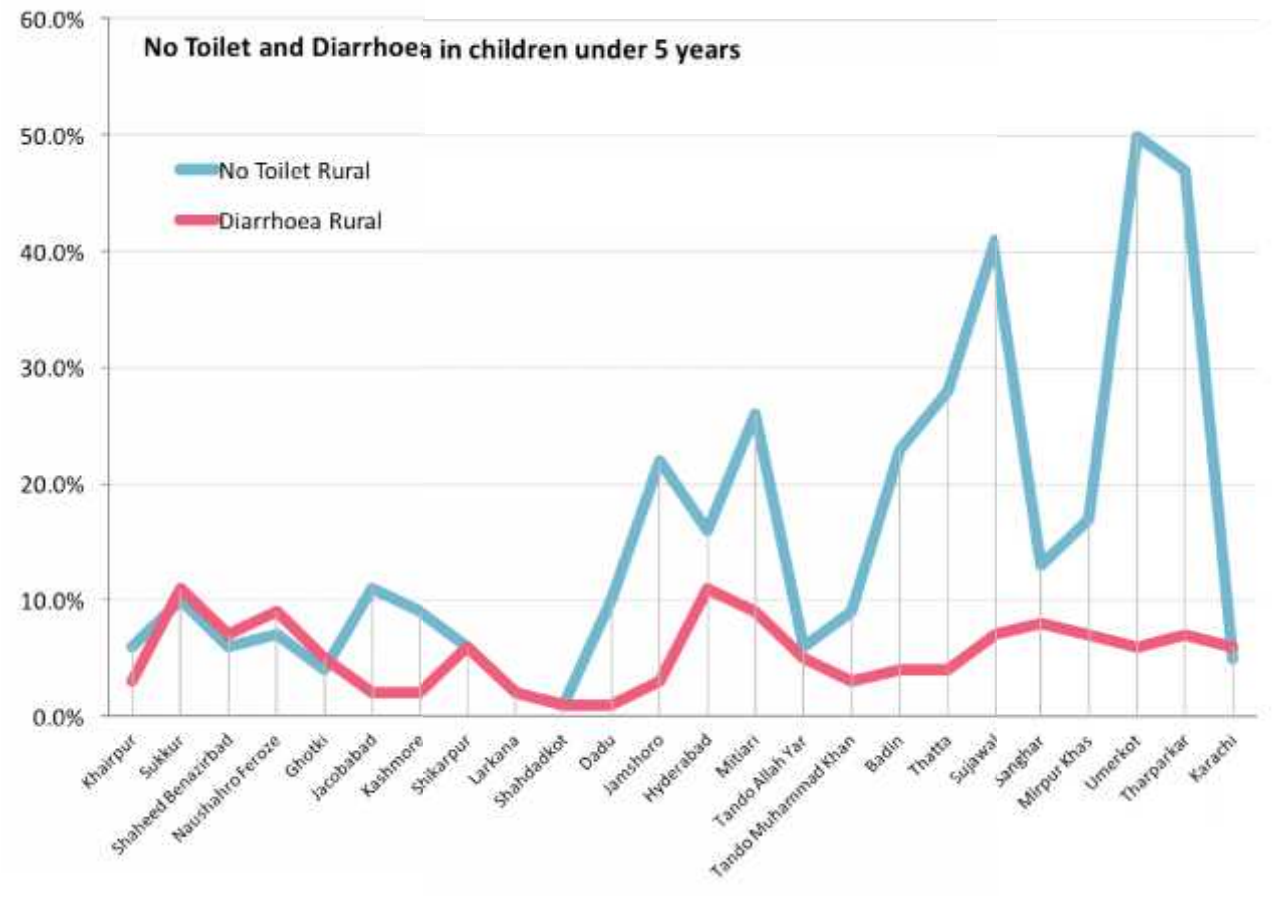
When rural diarrhoea rates for each district are overlain with no toilet rates, the data suggests that in most districts there may be other factors like water quality that may be responsible for diarrhoea in children under 5 years (**Fig 45**). The trends in Sukkur and Naushahro Feroze are suggestive of an association between no toilet and diarrhoea. Similar trends are also observed for Shaheed Benazirabad, Ghotki, Shikarpur, Larkana, Shahdadkot, Tando Allah Yar and Karachi.

Figure 44 – Diarrhoea in last 30 days in children under 5 years



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 45 - No Toilet and Diarrhoea in last 30 days in children under 5 years

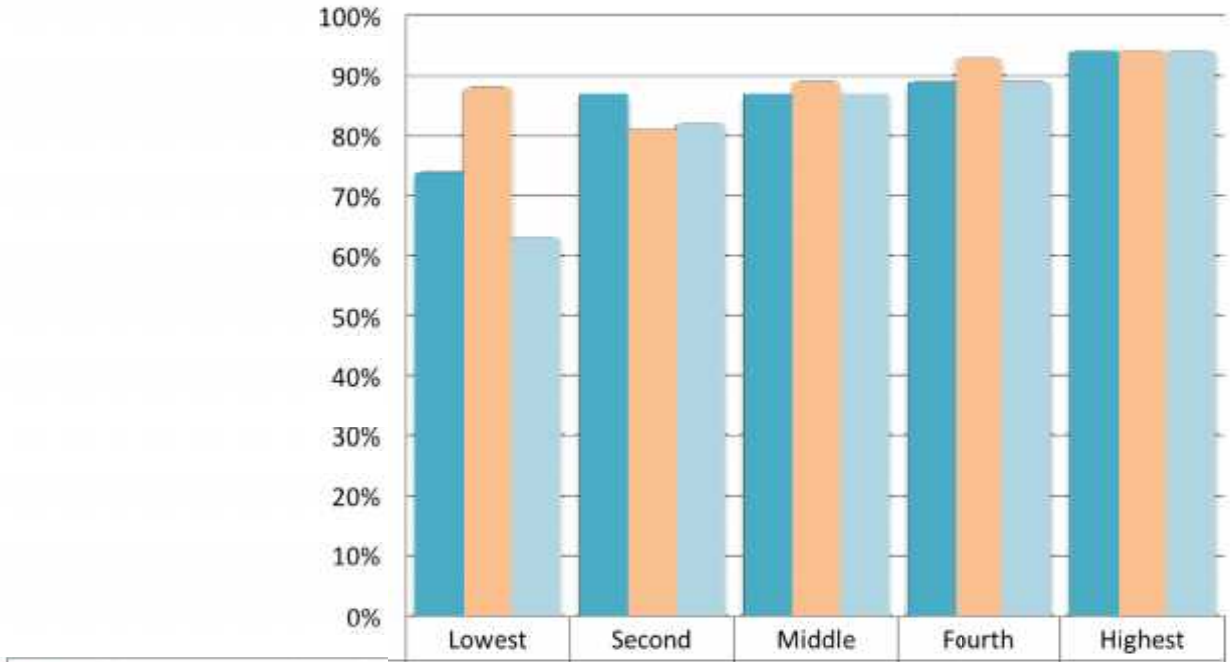


(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Economic Quintiles

Figures 46 and 47 show that the lowest quintile is the most vulnerable to health risks and has the least access to improved drinking water and improved sanitation. Interestingly, in the higher quintiles, the rate of improved water supply actually decreases due to use of other sources of water supply like tanker. Furthermore, **Fig 48** illustrates the high prevalence rates of no toilet in the poorer quintiles compared to the richer ones. The issue of no toilet is found predominantly in the rural compared to urban areas.

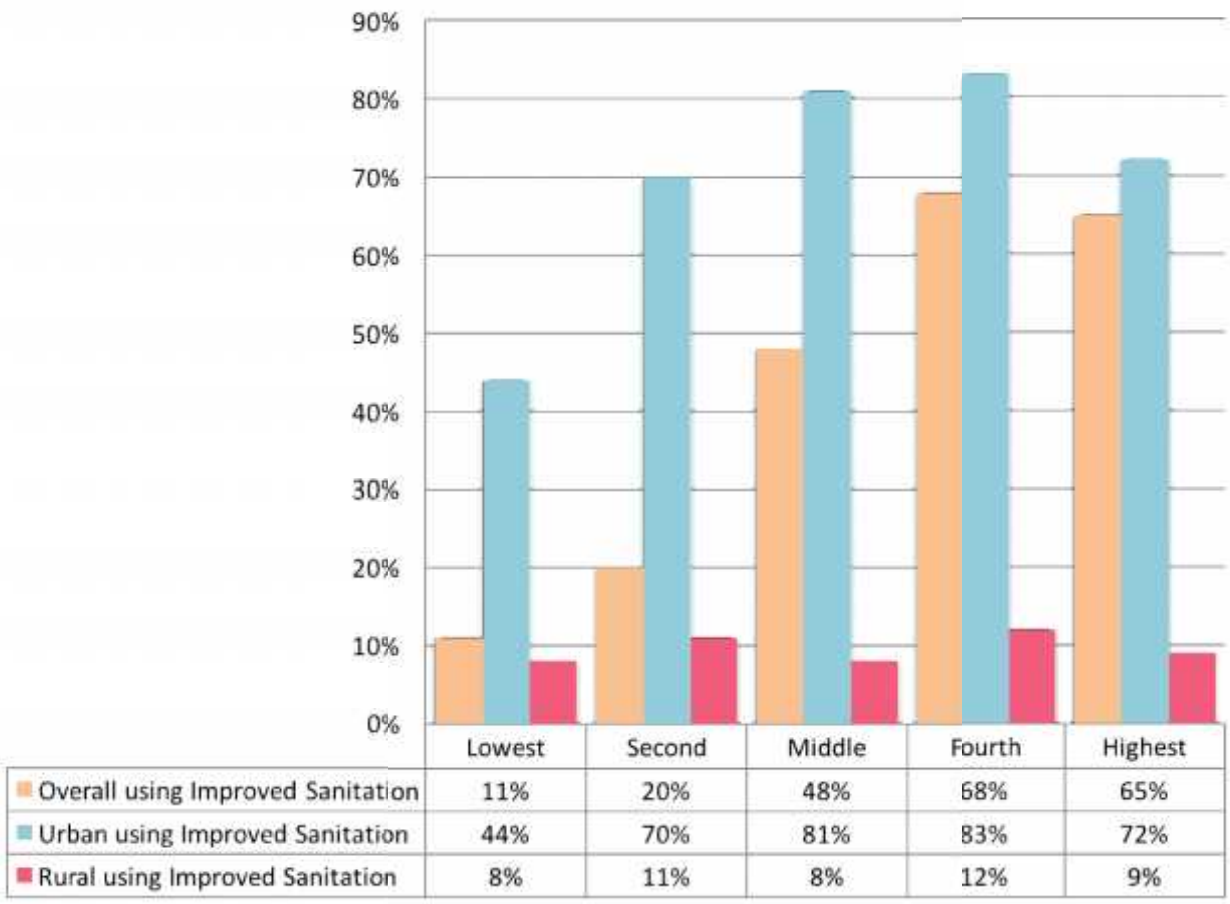
Figure 46 – Improved Water Supply and Economic Quintiles



	Lowest	Second	Middle	Fourth	Highest
Overall using Improved Drinking Water Supply	74%	87%	87%	89%	94%
Urban using Improved Drinking Water Supply	88%	81%	89%	93%	94%
Rural using Improved Drinking Water Supply	63%	82%	87%	89%	94%

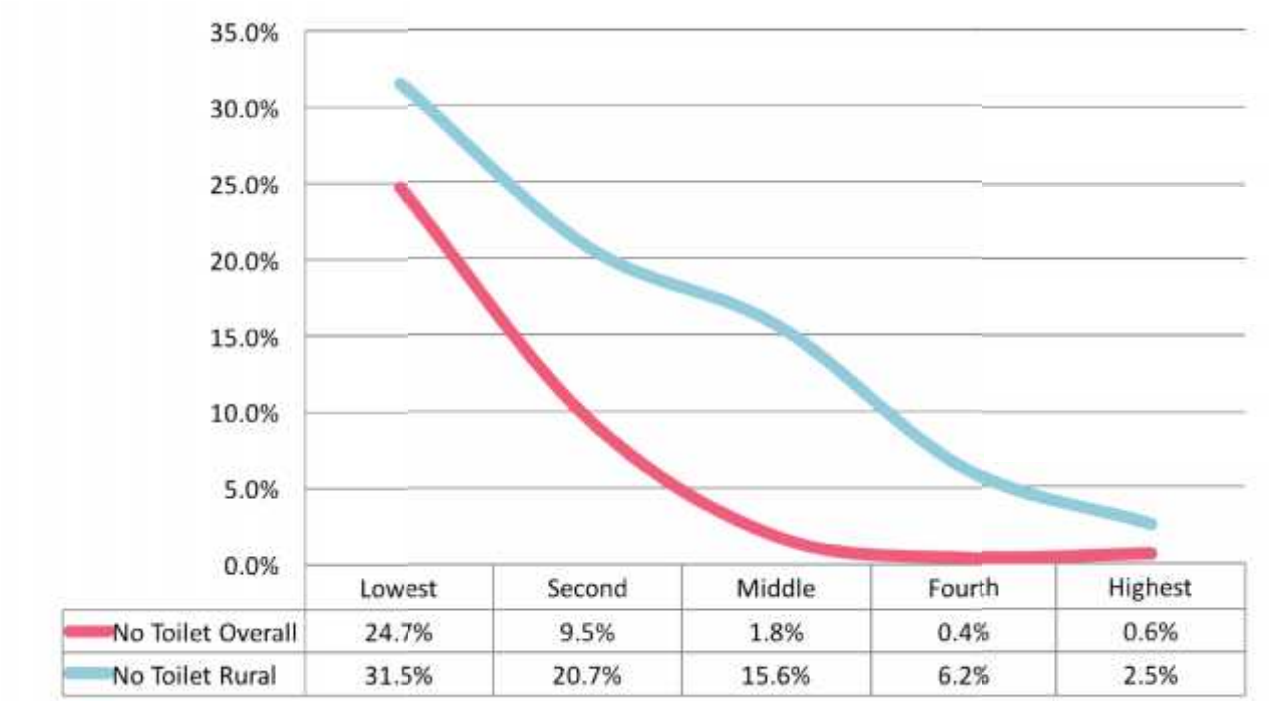
(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 47 - Improved Sanitation and Quintiles



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Figure 48 – No Toilet and Economic Quintiles



(Source: Pakistan Social and Living Standards Measurement Survey, 2014-15)

Economic Impacts of Diarrhoea

The cost of diarrhoeal health impacts is determined using the human capital approach since both diarrheal and typhoid mortality predominantly affects children. The cost of morbidity includes the cost of illness (medical treatment, medicines, and value of lost time). About 50% of these costs are associated with the value of time lost to illness (including care giving), and another 50% are from cost of treatment and medicines[125].

2.5 million DALYs are lost annually from diarrhoeal mortality and morbidity associated with inadequate water, sanitation and hygiene. The annual economic loss was estimated at PKR 114 billion by the World Bank in 2006[126].

A study[127] on cost and impact analysis of water supply and environmental sanitation in Pakistan revealed that if water supply facilities are available to 90% of households and latrine facilities

[125] Pakistan Strategic Country Environmental Assessment – World Bank 2006

[126] Pakistan Strategic Country Environmental Assessment – World Bank 2006

available to at least 60% of households in villages, the Benefit to Costs ratio is 2.7 at 6% discount rate and 1.75 at 12% discount rate.

Recent data from the Economics of Sanitation Initiative supported by WSP suggests that the economic impact of poor sanitation and water in Pakistan may be as high as 3.94% of GDP[128].

A report from the World Bank on water and sanitation to reduce child mortality[129] found that 25 deaths or more per 1000 children born could be prevented by investing in water and sanitation infrastructure. This difference accounts for about 40% of the gap between current child mortality rates and the 2015 target set in the Millennium Development Goals. For Pakistan, the cost per Life Year Saved relative to GDP per capita (in 2007) is about 20%, which is highly cost-effective.

The report also found that the average cost per life-year saved ranges between 65% and 80% of developing countries' annual gross domestic product per capita. The results suggest that investment in water and sanitation is a highly cost-effective policy option, even when only the mortality benefits are taken into consideration. Taking into account the additional expected benefits, such as reduced morbidity, time spending, and environmental hazards, would further increase the benefit-cost ratio.

The WHO estimates that the return on US$1 investment is in the range US$5 to US$36, with a global average of US$8[130]. Using meta-analysis, a reduction in diarrhoea frequency include:

- Improved hygiene - 37% reduction
- Improved sanitation - 32% reduction
- Improved water supply - 25% reduction
- Improved water quality - 31% reduction
- Multiple - 33% reduction

Economic benefits that arise from water and sanitation improvements include:

- Direct economic benefits of avoiding diarrhoeal disease - less expenditure on treatment of diarrheal disease and related health seeking costs
- Indirect economic benefits related to health improvement - value of avoided days lost at work or school, impact on school attendance of girls, avoided time lost of caretaker of sick children, and economic contribution of a saved life due to diarrheal disease
- Non-health benefits related to water and sanitation improvement - time savings related to water collection or accessing sanitary facilities; benefits to agriculture and industry of improved water supply; more efficient management of water resources

A per capita annual economic benefit of at least US$15 is achieved, if universal coverage for combined water and sanitation interventions is done.

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[127] Cost and impact analysis of water supply and environmental sanitation in Pakistan. Pakistan Institute of Development Economics, 2002

[128] Pakistan Briefing: Economic impact of water and sanitation. Sanitation and Water for All, 2012

[129] Water and sanitation to reduce child mortality, World Bank 2011

[130] Economic and health effects of increasing coverage of low cost household drinking water supply and sanitation interventions to countries off-track to meet MDG target 10. World Health Organisation, 2007

Hygiene

Data from the Sindh MICS 2014 found the following:

- 43.7% of children age 0-2 years had their last stools disposed of safely
- 66.5% of households had a specific place for hand washing where water and soap or other cleansing agent were present
- 82% of households had soap or other cleansing agent available

Personal hygiene and household sanitation

A baseline cross-sectional household survey was conducted of eight key family practices in Sindh in 5 districts, which were selected using criteria for representing different socio-cultural and geographical strata in the province of Sindh[131]. These included: Malir, Hyderabad, Tando Allah Yar, Naushahro Feroze and Jacobabad, which represented 58% rural and 42% urban areas.

The survey found that about 94% mothers reported that water was always available. The main source of water for 62% of the population was a hand pump, particularly in rural areas. Similarly, the majority of the study population in rural areas did not have modern flush system for safe disposal of faeces. Around 52% mothers reported rinsing off neonatal faeces while 20% threw it away. Most of the responding mothers mentioned that they used soap for hand washing after using the toilet (81%) and after attending a child who had defecated (76%). Data collectors observed that houses they visited were generally clean. 72%, had water containers covered (88%), soap was present in bathroom/toilet and a dust bin was present in the house (42%). Only 25% mothers reported to use dustbin for collecting garbage while rest would throw it in the street.

Furthermore, assessment of hygiene and sanitation practices revealed that despite wide spread availability of water and toilet facilities, caregivers still throw faeces of neonates outside home. Majority of study respondents reported to throw household garbage in the street/yard. The study found wide variability in the availability of toilet facilities between study districts, and urban and rural areas indicating inequity and geographical disparity. Practice of hand washing with soap after using a toilet or attending a child for defecation has been reported as adequate while only few reported washing hands with soap before and after eating and cooking, which might have increased the risk of transmitting infection to the newborn.

[131] Baseline survey of eight key family practices in Sindh, June 2010 –June 2011. A project funded by The Maternal and Newborn Health Programme-Research and Advocacy Fund (RAF). Implemented by Provincial Health Development Centre Sindh, Jamshoro and Department of Health, Government of Sindh

Nutrition and Diarrhoea

Recent data from Sindh MICS 2014 (Table 13) shows that more than four out of ten children under the age of five years in Sindh are underweight (42%) and 17% are classified as severely underweight. Almost half of children under five years (48%) are stunted or short for their age and one fourth (24%) children are severely stunted. The results also show that 15% of the children are wasted or thin for their height and only 1% of children are overweight or too heavy for their height.

Table 13 - Nutritional status of children under five years in Sindh

Description	Indicator	Value in %
Underweight Prevalence		
Percentage of children under age 5 who fall below (a) minus two standard deviations (moderate and severe) (b) minus three standard deviations (severe) of the median weight for age of the WHO standard	(a) Moderate and severe	42.0
	(b) Severe	17.0
Stunting Prevalence		
Percentage of children under age 5 who fall below (a) minus two standard deviations (moderate and severe) (b) minus three standard deviations (severe) of the median height for age of the WHO standard	(a) Moderate and severe	48.0
	(b) Severe	24.4
Wasting Prevalence		
Percentage of children under age 5 who fall below (a) minus two standard deviations (moderate and severe) (b) minus three standard deviations (severe) of the median weight for height of the WHO standard	(a) Moderate and severe	15.4
	(b) Severe	3.6

(Source: Sindh MICS 2014)

Evidence from studies around the world have demonstrated unequivocally the link between inadequate sanitation, diarrhoea and nutritional deficiency. The key findings include:

- Improvements in **sanitation** were associated with increases in height ranging from **0.8 cm to 1.9 cm**[132]
- Odds of stunting at 24 months of age increase by a factor of **1.05 with each episode of diarrhoea**[133]
- **Hand washing** reduced the risk of diarrhoea by **30%**[134]

[132] Steven Esrey. Water, waste and well being. Am J Epidemiol Vol 143 No 6:608-623, 1996

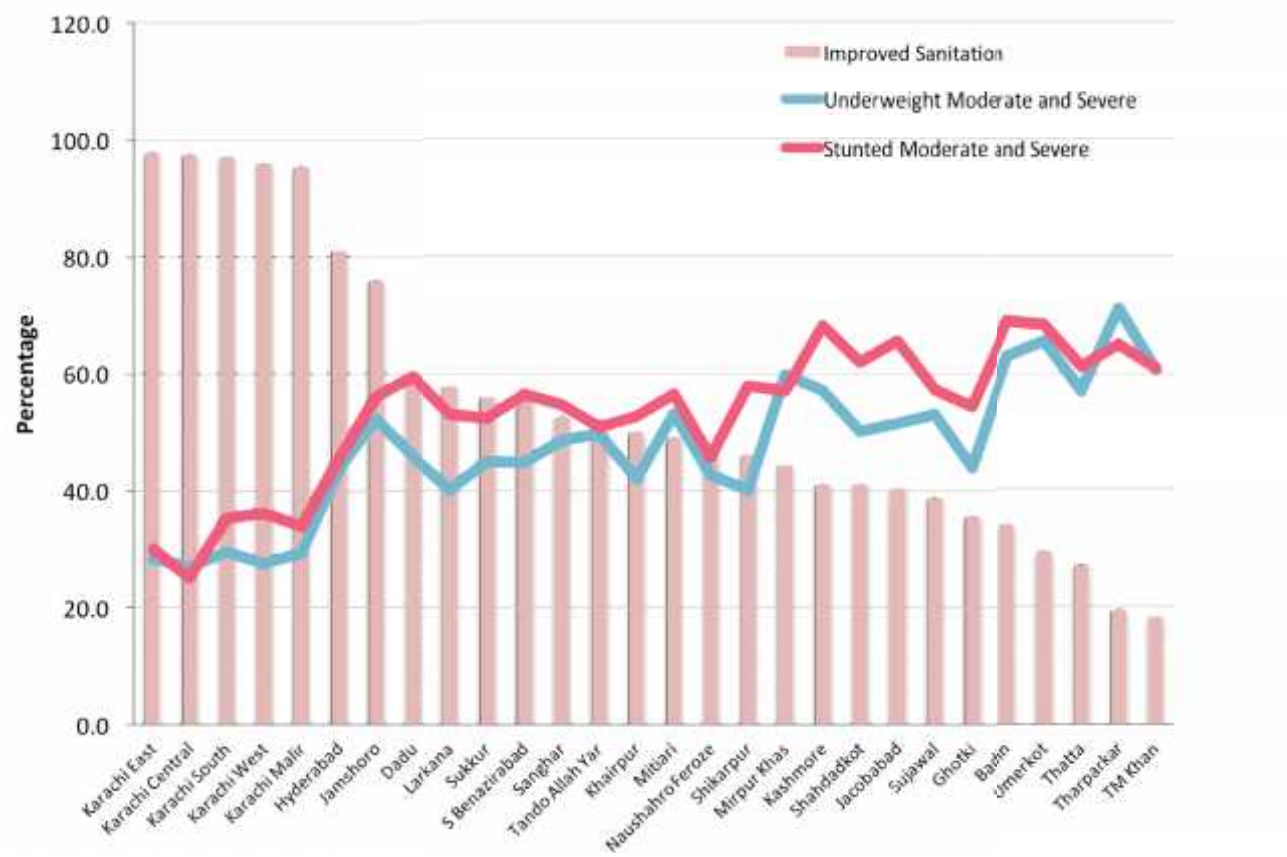
[133] William Checkley et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. Int J Epidemiol. Aug 2008; 37(4): 816–830

[134] Zulfiqar Bhutta et al. What works? Interventions for maternal and child undernutrition and survival. Published Online

- **WASH interventions** reduced the frequency by diarrhoea by almost **a third** – hygiene (37%); sanitation (32%); water supply (23%); water quality (31%); and multiple (33%)[135]

Evidence from Sindh MICS 2014 indicates that nutritional deficiency rates show an increasing trend when use of improved sanitation decreases further suggesting that low use of improved sanitation is a risk factor for poor nutrition status (**Fig 49**).

Figure 49 - Nutritional status and improved sanitation



(Source: Sindh Multiple Indicator Cluster Survey 2014)

Health, Nutrition and Hygiene

Health, nutrition and hygiene modules with special emphasis on water and sanitation would need to be developed for incorporation in training programmes for LG&HTPD and PHE&RDD. Similar modules would need to be developed for integration into training curricula of Lady Health Workers for health promotion in communities. All new drinking water supply schemes would need

January 17, 2008 DOI:10.1016/S0140-6736(07)61693-6

[135] Prüss-Üstün A, Bos R, Gore F, Bartram J. Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health. World Health Organisation, Geneva, 2008

to incorporate a mandatory nutrition-sensitive health, nutrition and hygiene component as part of the community participation process.

Drinking water supply and sanitation schemes would need to be made nutrition-sensitive and where feasible an integrated multi-sectoral approach adopted with health, nutrition and education programmes. This may include the adopting an integrated nutrition-sensitive WASH and Nutrition approach[136], which includes among others:

- Handwashing with soap at critical times
- Safe disposal of infant and animal faeces
- Safe water treatment and storage
- Exclusive breastfeeding
- Complementary feeding
- Prevent stunting and maternal and child anaemia in the first 1,000 days and improve infant and young child feeding
- Referring malnourished children to health care facilities
- Rehabilitating drinking water supplies
- Promoting point-of-use water treatment
- Conducting nutrition (cooking) and food hygiene demonstrations

Communities would need to be encouraged to adopt essential food safety actions that include:

- Keep food preparation areas clean, including hands, surfaces, and utensils
- Separate raw and cooked food
- Cook food thoroughly
- Keep foods at safe temperatures
- Use safe water and raw materials

Essential Nutrition Actions would need to be adopted within integrated nutrition-sensitive WASH programmes and include the following:

- Promotion of optimal breastfeeding during the first six months
- Promotion of optimal complementary feeding starting at six months with continued breastfeeding to 2 years old and beyond
- Promotion of optimal nutrition for women
- Promotion of optimal nutritional care of sick and severely malnourished children
- Promotion of adequate intake of iron and folic acid and prevention and control of anaemia for women and children
- Promotion of adequate intake of iodine by all members of the household
- Prevention of vitamin A deficiency in women and children

[136] WASH & Nutrition. Water and Development Strategy. Implementation Brief January 2015. USAID

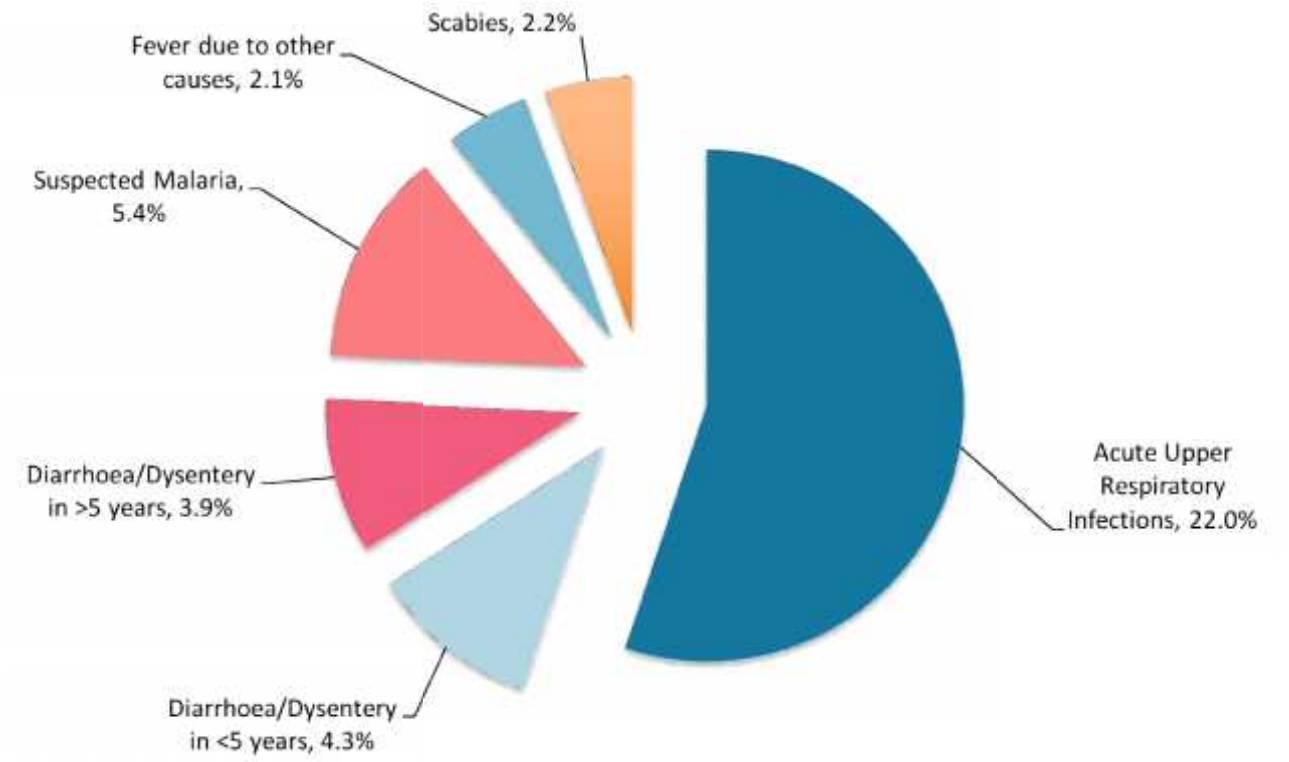
Public awareness campaigns on water and health and nutrition issues would need to be promoted with the help of non-governmental agencies, educational institutions and mass media. Standardised messages and effective materials would need to be developed for use within health, nutrition and WASH programmes.

Recent Initiatives for Health in Sindh

District Health Information System

The District Health Information System (DHIS) is an improvement to the earlier Health Management Information System and now collects and reports health data from all districts. In Sindh, by 2012 DHIS had been implemented in 21 districts[137]. By 2012, the overall reporting compliance in Sindh was 79%. District data for 2012 shows that the commonest single cause for admission to secondary hospitals in Sindh was diarrhoea/dysentery accounting for 27.5% of all admissions to secondary hospitals. DHIS 2015 data for Sindh[138] shows that the top five diseases include acute respiratory infections, diarrhoea/dysentery, fever due to other causes, suspected malaria and scabies. Diarrhoea/dysentery alone accounts for about 8.1%, which is the single largest category after acute respiratory infections (Fig 50).

Figure 50 - Top five diseases seen as outpatients in Sindh in 2015



(Source: District Health Information System, Annual Report 2015. PPHI, Sindh)

[137] National Integrated Feedback Report 2013. District Health Information System. NHIRC, Departments of Health and WHO

[138] http://203.170.79.131/DHISReport/dhis_sindhwise.php accessed on 29 April 2016

Multi-Sector Nutrition Support Programme

In order to address the issue nutritional deficiency, the Government of Sindh has planned a nutrition specific intervention called the Nutrition Support Programme (NSP). The overall goal of the project[139], costing Rs. 4.118 billion is to improve the nutritional status of male and female children under five years and that of pregnant and lactating women in nine selected districts (Jacobabad, Kashmore-Kandhkot, Larkana, Qambar-Shahdadkot, Badin, Tando Muhammad Khan, Sanghar, Umerkot and Tharparkar). The project will be implemented with the support of the People's Primary Healthcare Initiative (PPHI) Sindh through the use of their staff and primary health care facilities. The key role in implementing the project will belong to the Lady Health Workers (LHWs) and Community Midwives (CMWs) who will mainly focus on community awareness, screening and referrals.

The Sindh Department of Health/World Bank-funded PC-1 is approved for 9 of Sindh's 23 districts for nutrition programming and will be integrated within the primary health care activities. Non-governmental organisation (NGO) partners will implement activities in non-LHW covered areas. The World Bank is also implementing a WASH project coordinated with the Sindh Nutrition Cell in addition to its support to the public sector's Integrated Management of Childhood Illnesses (IMNCI), Mother Newborn and Child Health (MNCH) Programme, and Expanded Programme of Immunisation (EPI) in Thatta-Sujawal districts.

Currently, USAID's flagship Maternal and Child Health Programme focuses on 15 districts of Sindh with an aim to improving reproductive, maternal, newborn, and child health through enhanced service delivery at 1,500 fully functional, standardised 24/7 MNCH Centres. Merlin is implementing a European Union-funded Women's and Infant Nutrition Program (EU WINS) (2013 -2016) project in Thatta, with Action against Hunger (ACF) working in Dadu, and Save the Children working in Shikarpur districts. The Pakistan Emergency Food Security Alliance (PEFSA) is a consortium of NGOs, funded by the European Community Humanitarian aid Office (ECHO), which is implementing a WASH/Nutrition programme and, UNICEF plans to layer additional elements of WASH or infant and young child feeding activities in order to have a full slate of stunting reduction activities. This type of layering could allow for consolidation of funding from a variety of sources to achieve a common impact. Currently, the Sindh Nutrition Cell, Micronutrient Initiative, UNICEF, and WFP are collaborating on fortification initiatives, such as universal salt iodization and wheat flour fortification.

A multi-sector project has been launched (the partners include UNICEF Nutrition, UNICEF WASH and The World Bank) whose purpose is to contribute towards a reduction in stunting rates by focusing on the 1,000 days critical window, through a multi-sectoral approach in targeted districts of Sindh. The project aims to support the scale up of evidence-based nutrition-specific interventions and nutrition-sensitive interventions, with emphasis on greater equity for greater impact. UNICEF has initiated its first phase of the project in collaboration with Plan International in Taluka Moro (District Nausharo Feroze), Taluka Mirpur Mathelo (District Ghotki), and Taluka Kotdiji (District Khairpur).

[139] Annual Plan 2015-16. Ministry of Planning, Development and Reform, Government of Pakistan

Nutrition-specific interventions will aim to improve outcomes in the following focus areas:

a. Infant and young child feeding and care (IYCF) in the first two years of life
b. Micronutrient nutrition and anaemia control in young children
c. Early detection and treatment of severe wasting in young children
d. Women's nutrition with a focus on pre pregnant, pregnant and lactating mothers
e. Cross-cutting communication elements – which will include harmonised training for NGO implementing partners and LHWs consisting of health, WASH and nutrition elements to be developed and implemented during the first year of the programme

Nutrition-sensitive interventions will aim to improve outcomes in Water, Sanitation and Hygiene (WASH). With WASH, the main focus will be on reducing the incidence and severity of infection in children while controlling environmental enteropathy and its potential negative impact on children's linear growth. This will encompass efforts to maintain an adequate water supply, both in terms of quality and quantity, sufficient means of sanitation (encouraging community-based approaches for 'total sanitation' that seek to eliminate the practice of open defecation), capacity development of service providers and improved hygienic practices (hand washing with soap).

Sindh Accelerated Action Plan for Reduction of Stunting and Malnutrition – Sehatmand Sindh

In view of the urgency to address malnutrition as a top priority in Sindh, an Accelerated Action Plan (AAP) namely Sehatmand Sindh" has been prepared for the reduction of stunting and malnourishment by 2021 with a ten years aim to reduce stunting from 48% to 30% in first five years (by 2021) and 15% by 2026 in Sindh by increasing and expanding coverage of multi-sectoral interventions, that are known to reduce stunting in first five years of children's lives.

A number of interventions are proposed under various sectors, some of which will have direct and immediate impact on prevention of stunting - health, sanitation, hygiene, social protection and Social & Behavioral Change Communication (SBCC) - while a couple of sectors like agriculture and education that will manifest their impact on stunting rates in longer term period interventions. The strategic focus of all interventions will be on all such segments of the population that are nutritionally vulnerable and on whom stunting prevention strategies could be most responsive. These include: the first 1,000 days of child's life, children of 24-59 months and the women of reproductive age with particular attention to adolescent girls.

The key areas proposed here include: Expanding Coverage of nutrition specific services through strengthening facility based care, revitalising the LHW programme, leveraging NGOs and various health department programmes; dovetailing nutrition services with the Costed Implementation Plan for family planning; agriculture for nutrition, improved sanitation and hygiene with focus on making districts open defecation free and hand washing practices; social protection support to poorest pregnant women for seeking health care and improving nutrition related behavior; and engaging education sector for improving nutrition knowledge, skills and behaviors among children and adolescent girls. All these areas will be supported by intensive SBCC, engaging civil society

organizations and enhanced monitoring and supervision mechanisms including a third party evaluation at mid-term and end of five years.

Nutrition sensitive Conditional Cash Transfers for the poor in Sindh

Social protection through Conditional Cash Transfers (CCT) is one of the important interventions for prevention of stunting. CCT is one of the mechanisms included in the Sehatmand Sindh programme. The Government of Sindh shall fund the CCT using the same mechanism and channel as being envisaged for other sectors whereby the development partner will support the proposed plan by matching the commitment of government.

The CCT interventions are proposed to be implemented in a phased manner. To begin with a pilot shall be undertaken in two districts (Tharparkar and Umerkot) where most of the NSP (Nutrition Support Programme) interventions are already being rolled out including community based nutrition service contracts with NGOs to those villages that are not covered through LHWs. The one-year pilot shall help in streamlining the process, develop registration and disbursement mechanisms and test the feasibility of attaching the nutrition services conditionality to cash transfers. The marketing and education material prepared for the pilot could also be tested for its effectiveness and acceptability. Once the pilot is evaluated, the lessons would be applied and the CCT intervention then rolled out to Phase 1 districts.

Sindh Health Sector Strategy 2012-2020

The Health Sector Strategy has a special focus area on Nutrition and stresses on need for mainstreaming of key evidence based nutrition interventions through health sector and coordination with other department on nutrition as part of a larger provincial inter-sectoral strategy on nutrition inclusive of micro-nutrient supplementation, community based awareness and counselling, and inter-sectoral measures such as birth spacing, water and sanitation and food security programmes.

Under Strategy 1.6a: Intersectoral district based pilots on nutrition and social development through collaboration with BISP, water and sanitation, education and other sectors:

- *Strategic Action 1.6.1a Inter-sectoral pilots on nutrition* - Inter-sectoral pilots on nutrition Pilots in catchment area of FLCF
    - Links for inter-sectoral action on under-nutrition with other departments such as water and sanitation, food, education, PDMA etc. Poverty reduction projects in conjunction with BISP, Bait-ul-Mal and NGOs

Under Strategy 3.2: Mainstreaming of evidence based action for under-nutrition in health packages and establishing linkages with other sectors for integrated pilots:

- *Strategic Action - 3.2.3 Inter-sectoral action* - Inter-sectoral pilots at district level for multi - pronged enhancement of nutrition with related departments such as food, water and sanitation, education, BISP etc

Under Key Performance Indicators – Targets for 2020

1.6 a Intersectoral district based pilots on nutrition and social development through collaboration with BISP, water and sanitation, education and other sectors

Indicator	Target
1.6.1: 1 pilot in place in each district by 2018	22 districts

Strategy

Health and Hygiene			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Fully functional and safely managed water and sanitation services in health facilities DHQs, THQs/CHs, RHCs, CDs, MCHs at communal and facility level For Basic Health Units with missing facilities for water and sanitation (about 20% of BHUs), provide extension of water distribution pipe from water supply scheme, water tank and 2 latrines per BHU	Health Department and PHE&RDD to jointly conduct a situation analysis and update the status of missing facilities for safely managed water and sanitation in all health facilities and develop a Joint Action Plan (JAP) to address these Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 13 priority districts Provide water distribution point to local health facility in all new water supply schemes in 13 priority districts	Provide water distribution point to local health facility in all new water supply schemes Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 6 additional districts	Provide water distribution point to local health facility in all new water supply schemes Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 10 additional districts
Hospital Waste Management Rules implemented in 88 hospitals as initial priority.	Implement Hospital Waste Management Rules in 27 hospitals	Implement Hospital Waste Management Rules in additional 27 hospitals	Implement Hospital Waste Management Rules in additional 34 hospitals Hospital Waste Management Rules to be implemented in all health facilities.
Multi-sector nutrition-sensitive WASH programme implemented in nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 3 nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 10 nutritionally deficient districts	Surveillance and consolidation of multi-sector nutrition-sensitive WASH programme implemented in 13 nutritionally deficient districts
Nutrition-sensitive WASH integrated in health promotion in primary health care	Nutrition-sensitive WASH health education module added to curriculum of LHWs/CMWs/LHVs with supporting training material as part of multi-sector nutrition-sensitive WASH interventions	At least 60% of LHWs/CMWs/LHVs receive refresher training in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department	At least 100% of LHWs/CMWs/LHVs receive refresher training in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department

	Master trainers, district trainers and facility trainers oriented in key nutrition-sensitive WASH messages and LHWs/CMWs/LHVs provided training on nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department At least 100% of LHWs/CMWs/LHVs trained in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department		
Nutrition-sensitive WASH integrated in health advocacy and BCC campaigns and health weeks	Nutrition-sensitive WASH component of health promotion and hygiene integrated in mother and child health weeks as part of on-going campaign by health department across the province Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Continue Nutrition-sensitive WASH component of health promotion and hygiene disseminated in mother and child health weeks as part of on-going campaign by health department across the province Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Continue Nutrition-sensitive WASH component of health promotion and hygiene disseminated in mother and child health weeks as part of on-going campaign by health department Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns
IEC materials with key nutrition-sensitive hygiene messages distributed at health facility level	Development of nutrition-sensitive IEC materials for primary, secondary and tertiary health facilities; CBOs and faith based facilities Availability at and dissemination of IEC materials for 50% primary, secondary and tertiary health facilities; CBOs and faith based facilities	Availability at and dissemination of nutrition-sensitive IEC materials for 75% primary, secondary and tertiary health facilities; CBOs and faith based facilities	Availability at and dissemination of nutrition-sensitive IEC materials for 100% primary, secondary and tertiary health facilities; CBOs and faith based facilities
WASH services at health facilities monitored regularly by Health Department	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders

EDUCATION

National Sanitation Policy 2006

The National Sanitation Policy 2006 of Pakistan recommends a sanitation training/awareness raising programme at all educational and teachers training institutes. The National Education Policy 2009 lays emphasis on a school health programme along with health education.

With the support of United Nations Programme for Pakistan, the school health initiative has been piloted in selected districts of four provinces, and school health education materials have been developed. The materials include the importance of hand washing and clean drinking water. However, these training materials have not been institutionalised in pre-service and in-service teachers training curriculum as envisaged in both national policies.

Sindh Education Sector Plan 2014 - 2018

The Sindh Education Sector Plan[140] (SESP) 2014-18 developed by the Education and Literacy Department, Government of Sindh has the following components:

1) Increasing Equitable Access to Early Childhood Education, Primary, Middle/Elementary and Secondary education
2) Improving the Curriculum and Learning Outcomes
3) Improving Teacher Quality
4) Strengthening Governance and Service Delivery
5) Improving Resource Allocation
6) Adult Literacy and Non-formal Basic Education
7) Cross-cutting areas (ICT, Education in Emergencies, Gender Equity, Social Cohesion and Public-Private Partnerships for Education)

In 2011-12, Sindh Education Management Information System (SEMIS) found that 45% of schools had no toilet facilities and 53% had no drinking water facility; both presenting particular barriers for girls.

The SESP identified lack of basic facilities (e.g. proper classrooms, washrooms, drinking water, security, etc.), especially in rural areas as one of the top seven key issues in the provision of primary and elementary education.

SEMIS 2011-12 identified the following missing facilities with respect to toilets and drinking water.

[140] Sindh Education Sector Plan 2014-2018. Education and Literacy Department, Government of Sindh.

Missing Facilities (identified by SEMIS in 2011-12)

- Out of 43,089 primary and 2,554 elementary schools, 17,299 primary and 586 elementary schools are without toilet; and 20,346 primary and 945 elementary schools are without drinking water
- There are 175 secondary and higher secondary schools without toilet; and 294 without drinking water

The SESP has the following objectives, strategies and targets with respect to toilets and drinking water.

Objective	Strategy	Targets/Outcomes
Increase Access at Primary Level	▪ Provision of basic facilities in schools ▪ Basic facilities will be provided on a priority basis, i.e. toilets will be given preference over boundary walls	▪ 6,920 schools with toilet facilities (40%) ▪ 20,346 with drinking water (100%)
Ensure balanced and standardised infrastructure facilities in the province and build capacity at all levels through dissemination of standards	▪ Develop infrastructure standards ▪ Well-defined budget allocations for school facilities ▪ Capacity building for the approved standards	**Activities** ▪ Prepare proposal for well-defined budget allocations and secure approval (55-75% for classroom development; 25-45% for other facilities such as boundary walls and school gate, drinking and domestic water facilities, separate toilets for girls and boys, provision of alternate sources of electricity where required)

Design parameters

- Toilet facilities
    - 25:1 for girls
    - 40:1 for boys
- Water facilities
    - For domestic use: 45-100 litres per head
    - Separate drinking water system 4-6 litres per head

Sindh Teacher Education

Sindh Teacher Education Development Authority

The Sindh Teacher Education Development Authority (STEDA) has been established to oversee and regulate the teacher training activities and to maintain the standards of the trainings and the training providers. The Education Department, through STEDA, has introduced higher professional qualification for teachers (4 year B.Ed. Honours)

Provincial Institute of Teacher Education

The Provincial Institute of Teacher Education (PITE) is the main structure[141] that assists the Education and Literacy Department and STEDA in formulation of policy and teacher development. Its main functions include:

- Undertake qualitative and quantitative research in Teacher Education
- Design and experiment research based innovative approaches and programmes in teacher education
- Develop leadership qualities in management of Teacher Education Institutes (TEIs) through professional development courses
- Assist STEDA in quality assurance in Teacher Education Programmes
- Develop strong coordination and linkage with the partners at district, provincial, national and international level for the development of the teacher education

Since its establishment, some of the major achievements of PITE Sindh include:

- Training of 30000 teachers across Sindh province
- Training of 2000 Education Officers
- Development of several Modules and manuals of the Training
- Participation in the process of National Curriculum 2006
- Participation in the National Education Policy 2009
- Collaborated with national and international development partners in the implementation of variety of interventions in Sindh province
- Supported Reforms Support Unit (RSU) in the implementation of Teacher Education Development Policy 2009: Pilot of Continuing Professional Development framework in Sindh province in year 2010 and 2011
- Supported RSU in the implementation of Education Management Reforms Policy 2009: Pilot of Sindh Education Sector Management Course in year 2011 and 2012

PITE Sindh has six major components. These include:

- Initial Teacher Education (ITE)
- Continuing Professional Development (CPD)
- Educational Leadership Development Centre (ELDC)
- Human Resource Development Centre (HRDC)

[141] Education and Literacy Department, Government of Sindh

- Quality Assurance and Support Centre (QASC)
- Educational Technology Resource Centre (ETRC)

Sindh Curriculum Implementation Framework

The Sindh Curriculum Implementation Framework (CIF) has the following institutional arrangements.

Institution	Role
Education and Literacy Department (ELD)	Shall be responsible for the overall realisation of curriculum implementation with its true spirit and shall coordinate with its allied departments and agencies established for curriculum development, implementation, monitoring and evaluation. It shall delegate certain aspects of the curriculum implementation to its departments and agencies established for that purpose.
Bureau of Curriculum and Extension Wing (BCEW)	▪ Devise school education standards in line with guidelines provided by the Education and Literacy Department ▪ Commission evidenced-based research to inform policy, curriculum design, development and review, textbook and learning material development, and assessment of and /or for learning ▪ Develop, implement and evaluate curriculum by working closely with Sindh Textbook Board, Directorates of School Education and other related line departments ▪ Review textbooks and learning material for alignment with the school education standards and curriculum goals ▪ Develop training packages for Training of Trainers (TOTs) / Master Trainers ▪ Conduct training of TOTs / Master Trainers
Provincial Education Assessment Centre (PEACe)	▪ Develop assessment framework that are student learning outcomes (SLO) based to align existing system (internal & external) with the curriculum standards ▪ Conduct students' achievement tests at grade 3, 5 and 8 ▪ Promote continuous assessment of students learning across all school levels.
Boards of Intermediate and Secondary Education (BISE)	Shall conduct annual examination of students at Secondary and Higher Secondary levels.
Sindh Textbook Board (STBB)	Shall continue to arrange for the production and publication of textbooks and learning material for all stages and types of school education. It shall further be strengthened as an effective regulating and monitoring authority to improve efficiency in managing authorship, production, copyrights, printing, and distribution of textbooks and learning materials in a timely manner.
Sindh Teacher Education Development Authority (STEDA)	Shall certify and accredit teacher education programmes and ensure the quality of both pre and in-service teacher education programmes to prepare professionally competent teachers to teach curriculum effectively. It shall also be responsible for teacher licensing for promoting culture of professionalism among teachers.
Provincial Institute of Teacher Education (PITE)	Shall implement pre-service teacher education and continuous professional development programmes based on school education standards and curriculum for developing professionally competent teachers, teacher educators, and head teachers. PITE shall be responsible for academic supervision of teacher education programmes, whereas all constituent teacher education institutes as well as PITE shall work under the administrative control of Education and Literacy Department.
Directorates of School Education (DSE)	Shall monitor, through their District Education Officers, implementation of curriculum and gather relevant information on the attainment of school education standards and report to the Education and Literacy Department in a timely manner.
Public Private Partnership	Mutual collaboration between the government and the private sector that could help reduce public spending, improve access, quality, equity and relevance in education.

(Source: Sindh Curriculum Implementation Framework, 2014. Sindh Education Sector Support Programme (SESSP), Reform Support Unit. Education and Literacy Department, Government of Sindh)

Missing Facilities

The Sindh Education Management Information System (SEMIS) of Education and Literacy Department[142] indicates that there are the following schools in Sindh:

- 42,900 primary schools – of which 9,532 are boys, 6,264 are girls and 27,104 are mixed
- 2,429 elementary and middle schools – of which 577 are boys, 695 are girls 1,157 are mixed
- 2,065 higher secondary and secondary schools – of which 716 are boys, 633 are girls and 716 are mixed

The Annual Status of Education Report[143] (ASER) for 2015 presents the scorecard for rural Sindh as follows:

- 42,297 children aged 3-16 years in 25 districts surveyed
- 727 schools in 703 villages surveyed
- A total of 13,984 households visited
- The current state of enrolment is:
    - Children 3-5 years – 37% enrolled (of which 70% are in government schools and 30% in non-state schools)
    - Children 6-16 years – 73% enrolled (of which 82% are in government schools and 18% in non-state schools). Of the 33% who are out of school, 52% are girls and 48% boys
- Of all rural government primary schools – only 59% have usable water and 48% have usable toilets

The recent Pakistan Education Statistics Report 2014-15[144] indicates that only 47.0% of primary, 60.3% of middle, 86.4% of secondary schools have availability of water (**Fig 51**). The report further indicates (**Fig 52**) that:

- 50.7%, 69.6% and 93.7% of boys primary, middle and upper secondary have improved sanitation facilities
- 54.0%, 69.3% and 95.7% of girls primary, middle and upper secondary have improved sanitation facilities

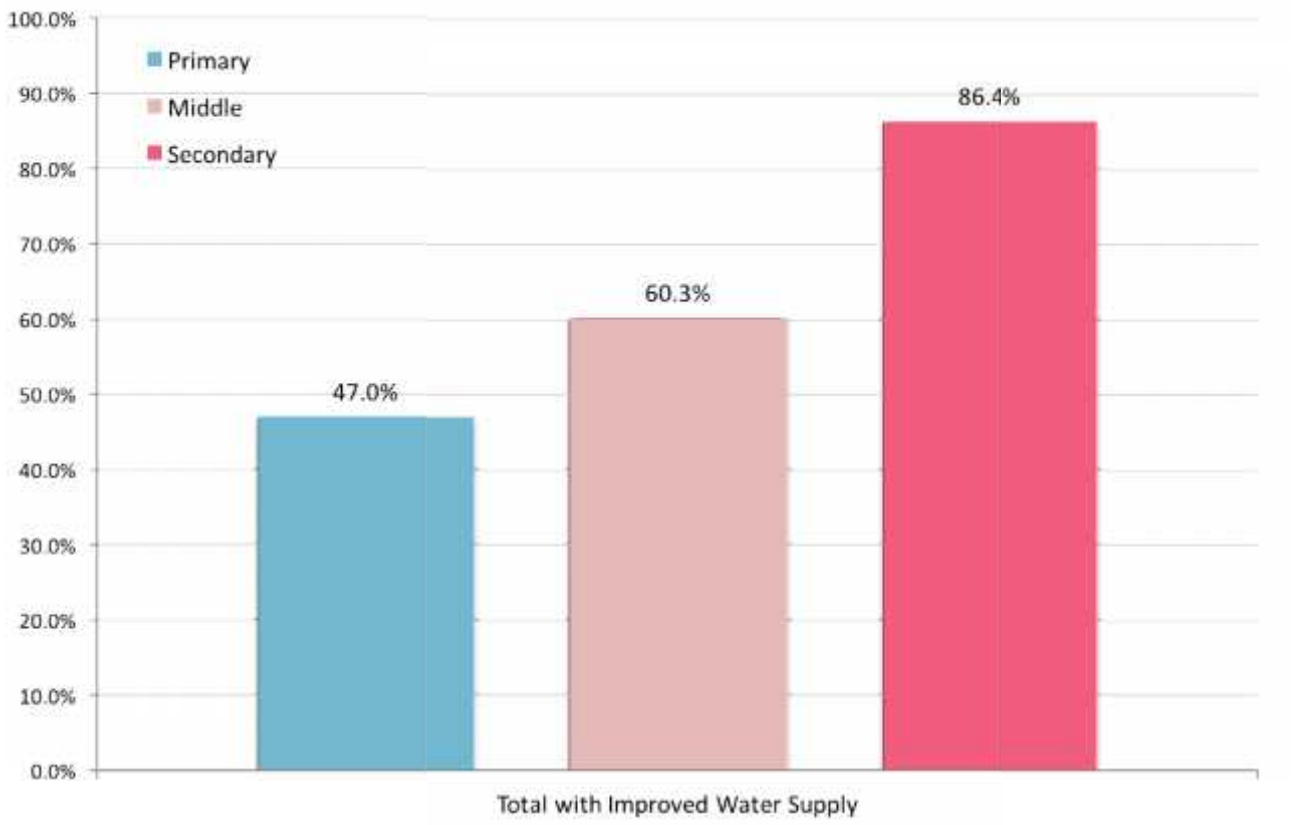
Figures 53 and 54 illustrate the status of availability of drinking water in urban and rural schools, while **Figs 55 and 56** illustrate the status of availability of student latrine facilities in urban and rural schools.

[142] Pakistan Education Statistics 2014-15. National Education Management Information System, Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016

[143] Annual Status of Education Report. ASER-Pakistan 2014. Sindh (Rural) Scorecard

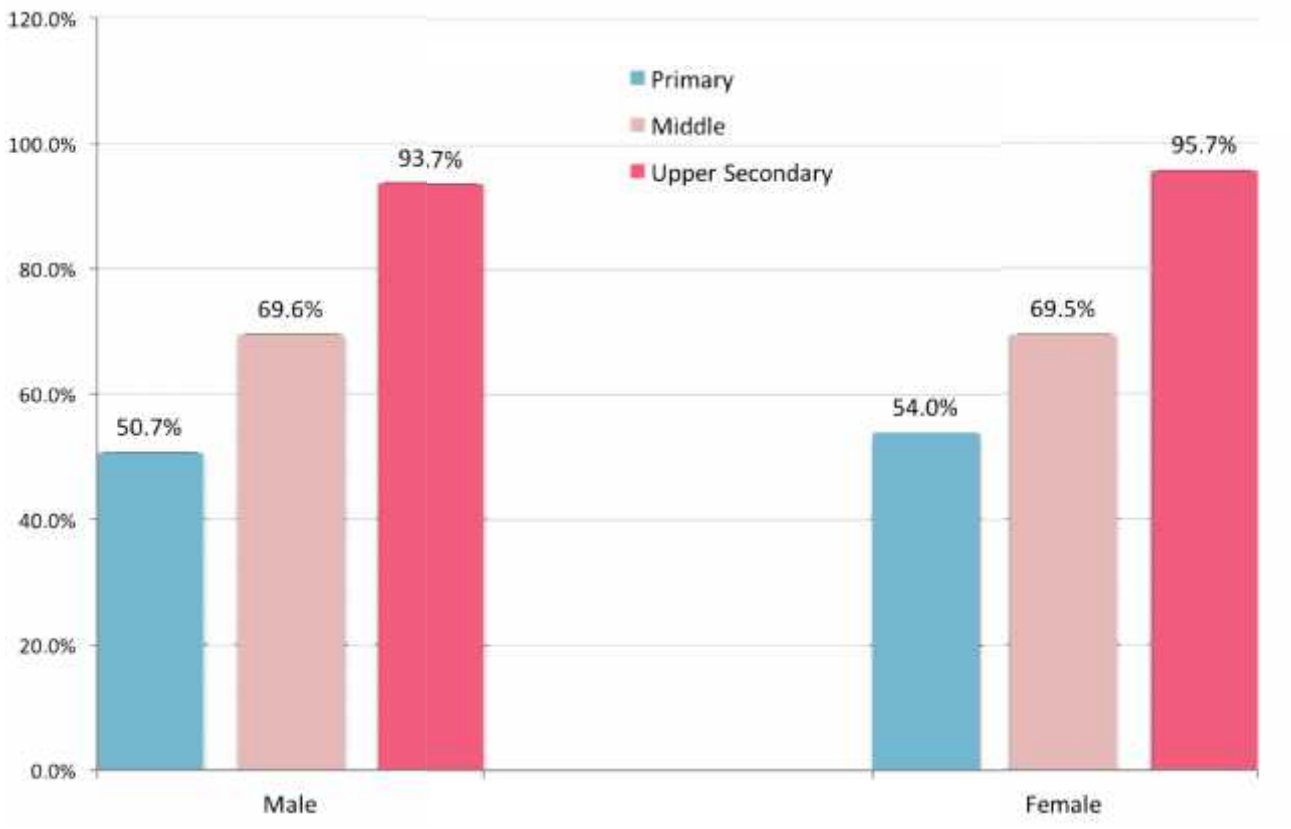
[144] Pakistan Education Statistics 2014-15. National Education Management Information System, Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016

Figure 51 – Improved water availability in schools in Sindh



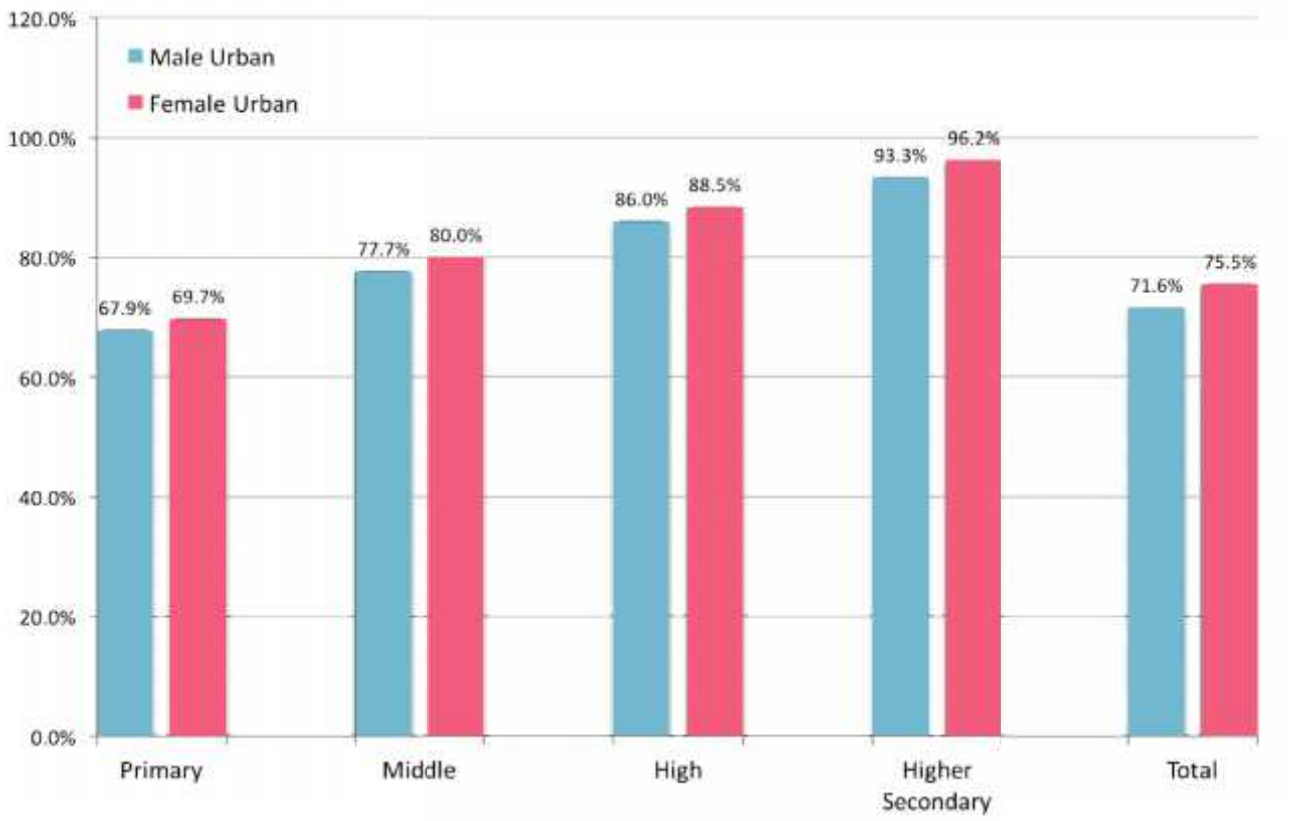
(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

Figure 52 - Improved sanitation in schools in Sindh



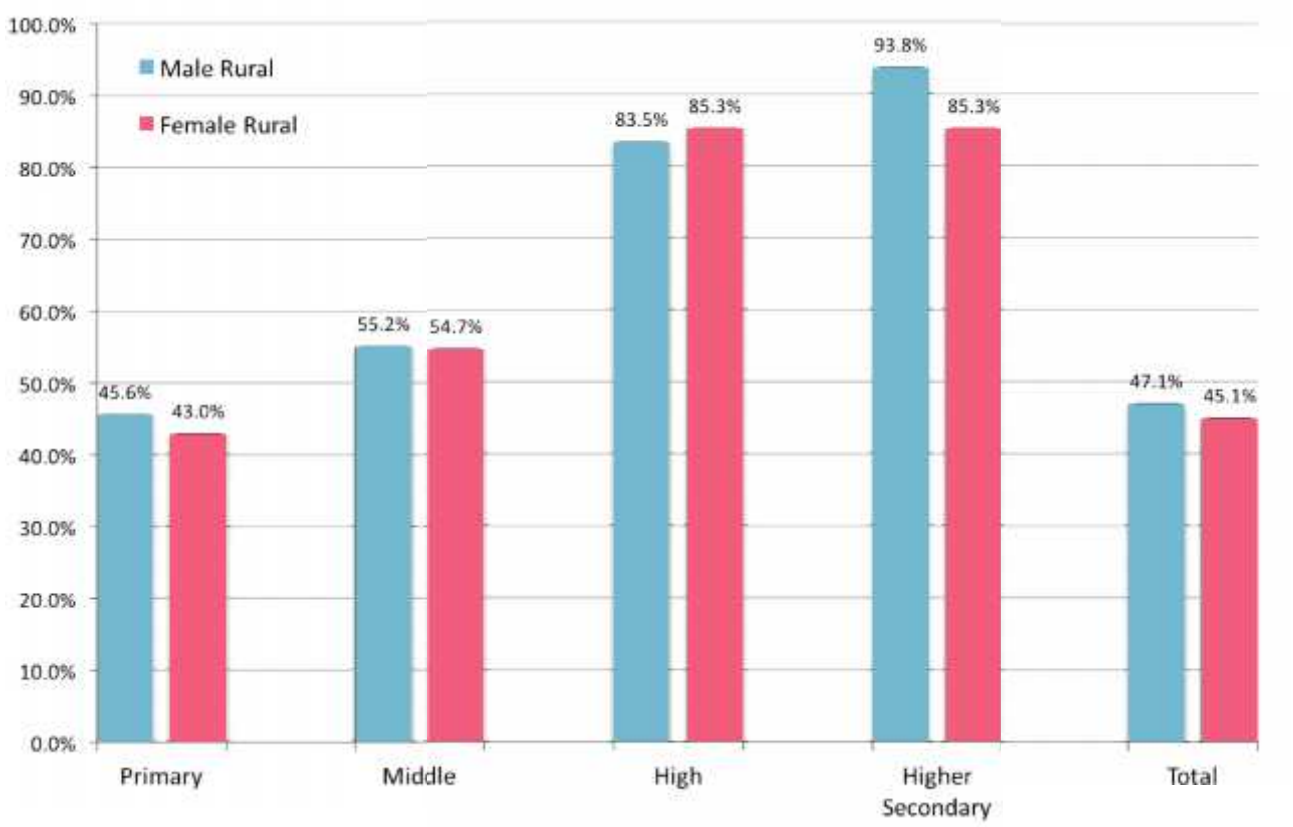
(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

Figure 53 - Availability of drinking water in urban schools in Sindh



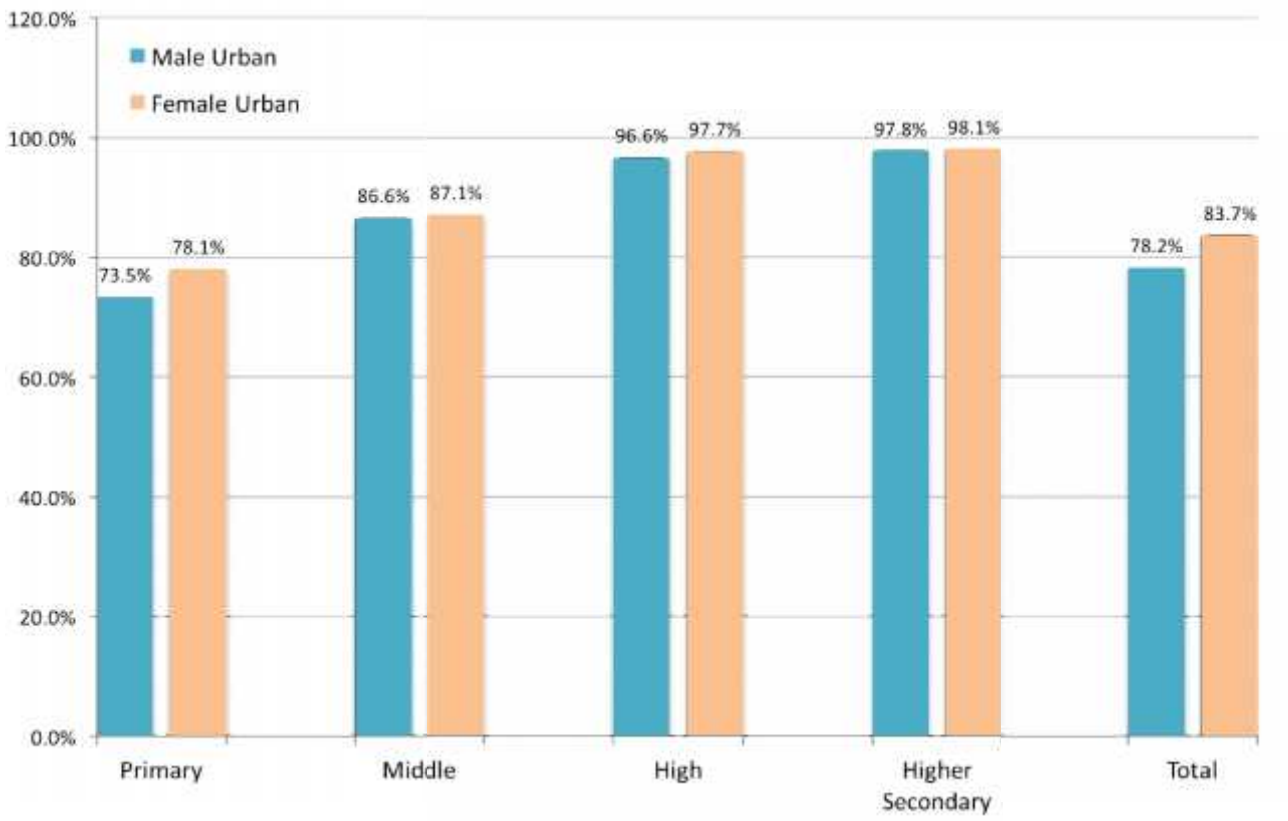
(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

Figure 54 - Availability of drinking water in rural schools in Sindh



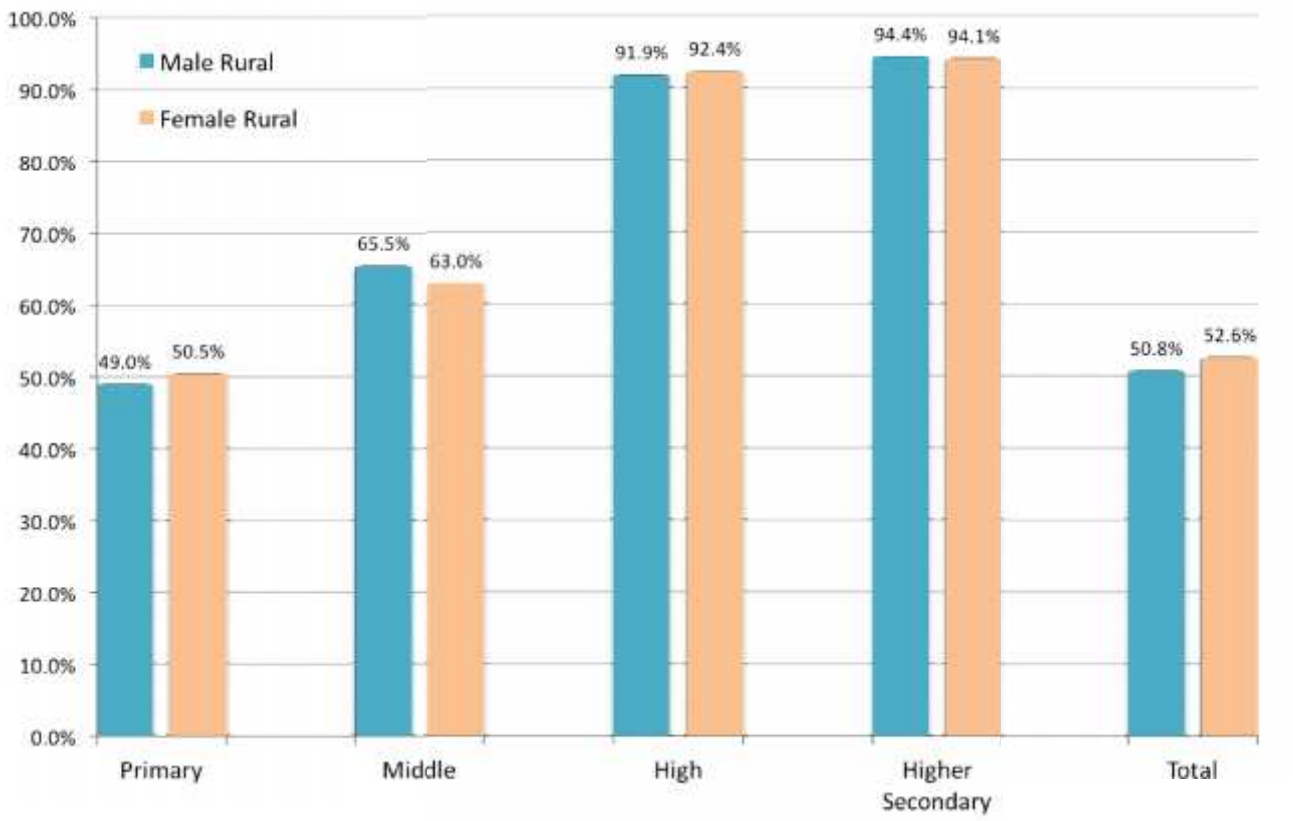
(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

Figure 55 - Availability of student latrines in urban schools in Sindh



(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

Figure 56 - Availability of student latrines in rural schools in Sindh



(Source: Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016)

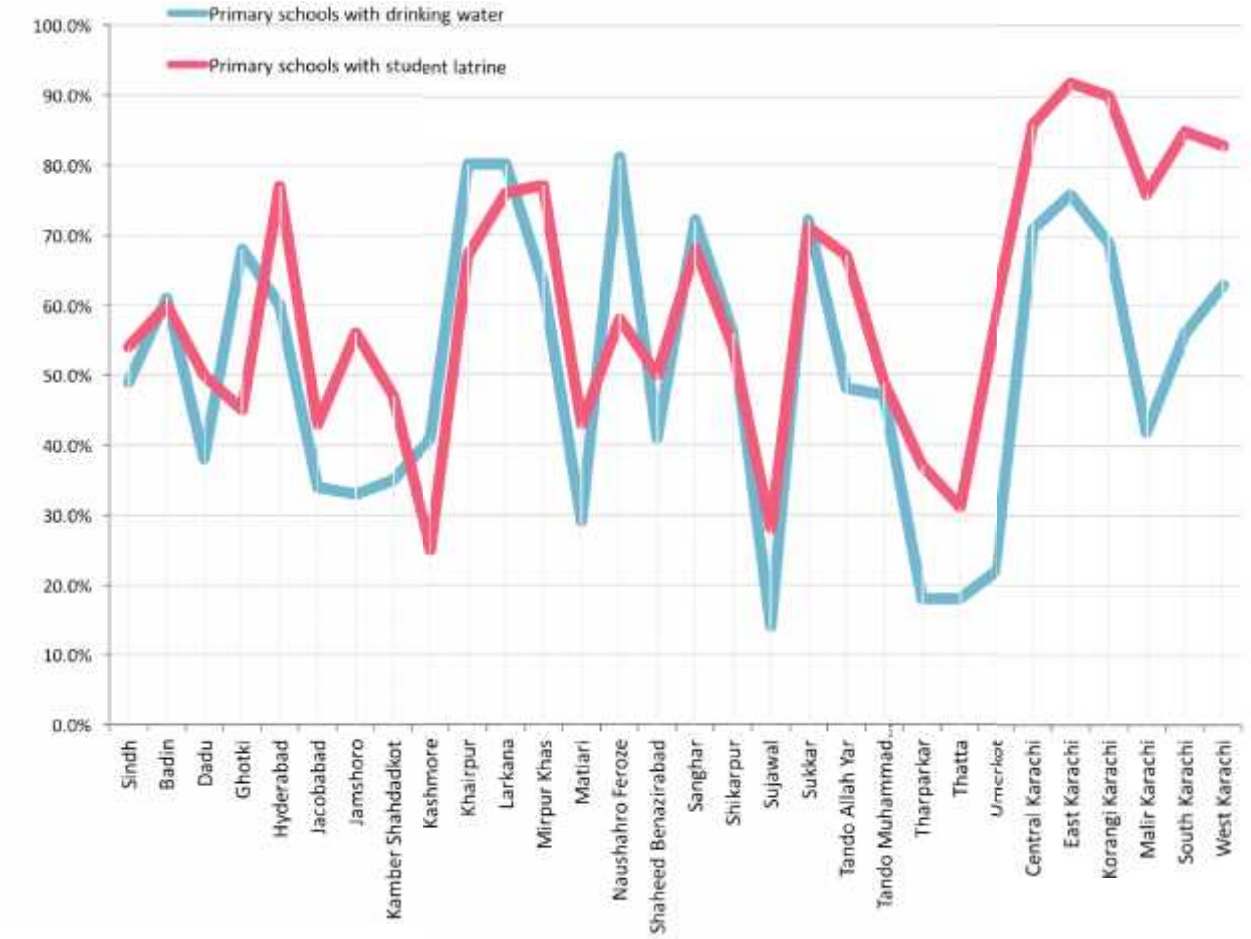
The Pakistan Education Atlas 2015[145] was launched recently and is a joint project between National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Ministry of Education, Trainings and Standards in Higher Education, Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan in collaboration with UNESCO and UNICEF.

The atlas shows that in government primary schools in Sindh, (**Fig 57**). Kashmore (25%), Sujawal (28%) and Thatta (31%) stand out with very low scores for availability of student latrines, while Matiari (29%), Sujawal (14%) and Thatta (18%) have very low scores for availability of drinking water.

In contrast, in government middle and secondary schools in Sindh, (**Fig 58**). Jacobabad, Sujawal and Tharparkar score 41% or less for drinking water supply, while Jacobabad and Tharparkar score less than 60% for student latrines.

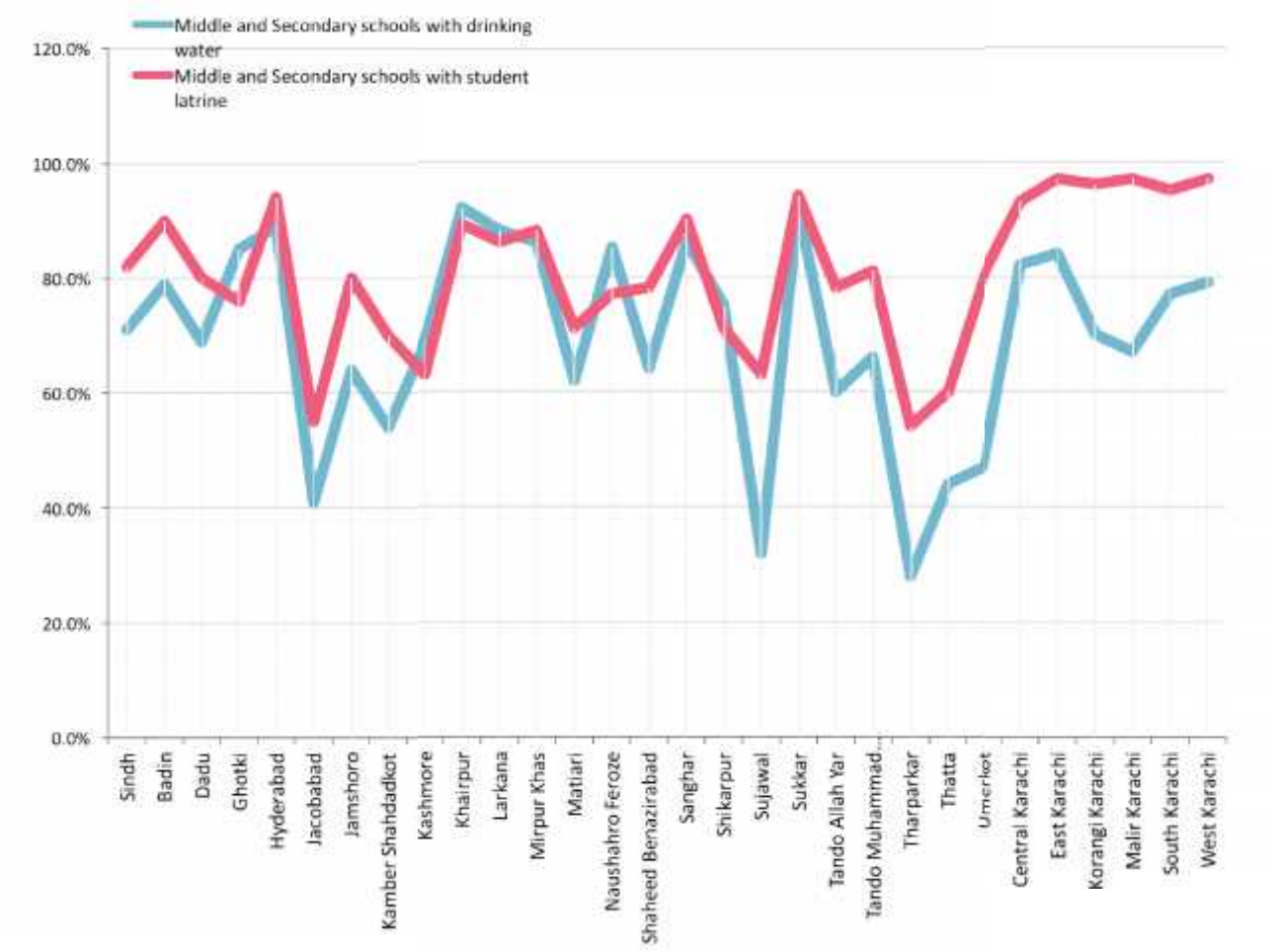
[145] Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan

Figure 57 - Status of school facilities in government primary schools



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Figure 58 - Status of school facilities in government middle and secondary schools



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Synopsis of missing facilities for WASH in schools

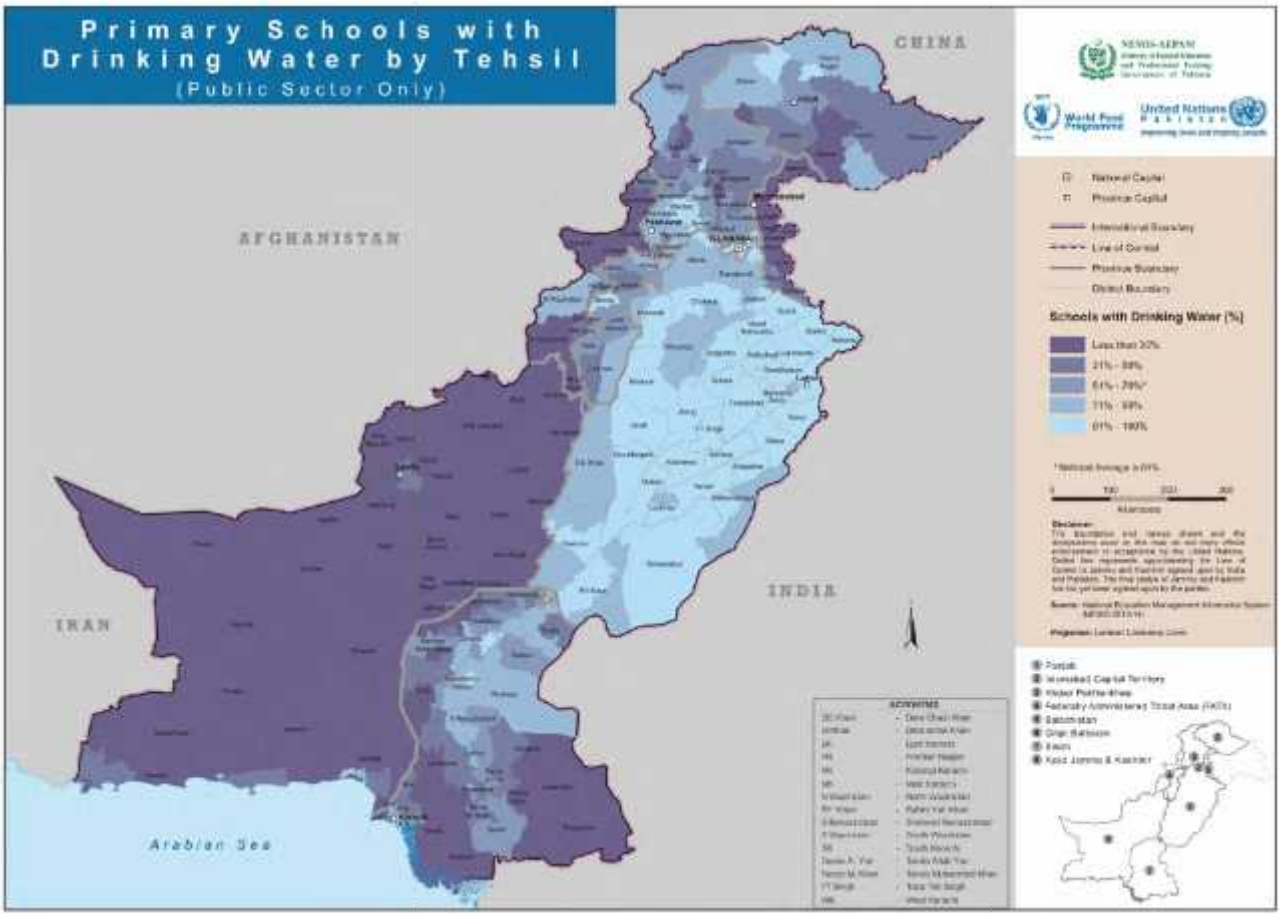
Currently, the situation of water facilities in schools is worrisome and is summarised below[146]:

- Out of 41,724 primary schools, 19,599 have water facilities and 21,438 have latrines
- Out of 2,316 middle schools, 1,397 have water facilities and 1,612 have latrines
- Out of 1,706 high schools, 1,455 have water facilities and 1,607 have latrines
- Out of 283 higher secondary schools, 273 have water facilities and 280 have latrines

This implies that of 46,039 educational institutions, only 22,724 (just under 50%) have water facilities and 24,937 (just under 55%) have latrines.

[146] Pakistan Education Statistics 2014-15. National Education Management Information System Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Government of Pakistan, February 2016

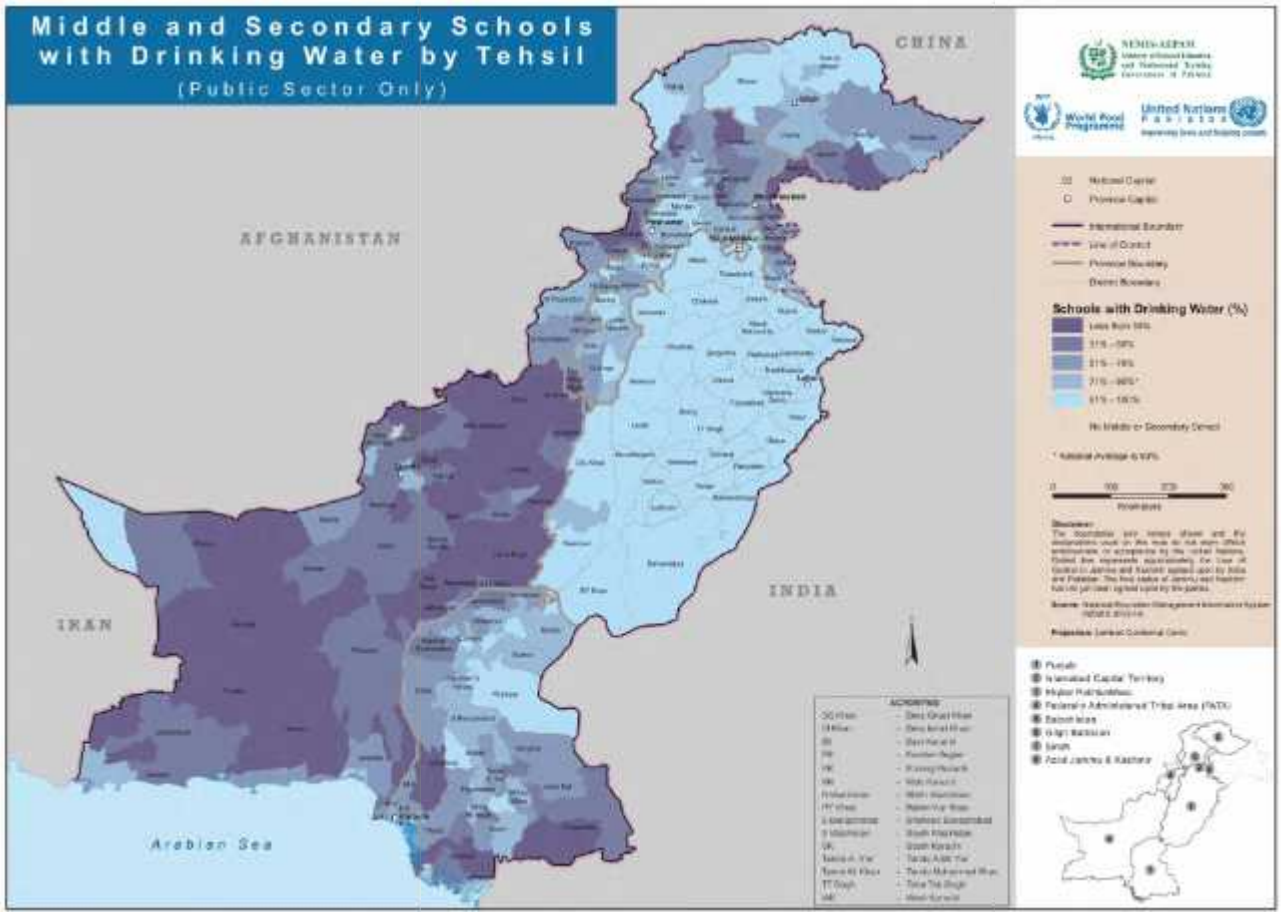
Figure 59 - Primary schools with drinking water by tehsil



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Figure 59 illustrates the status of availability of drinking water in primary schools by tehsil.

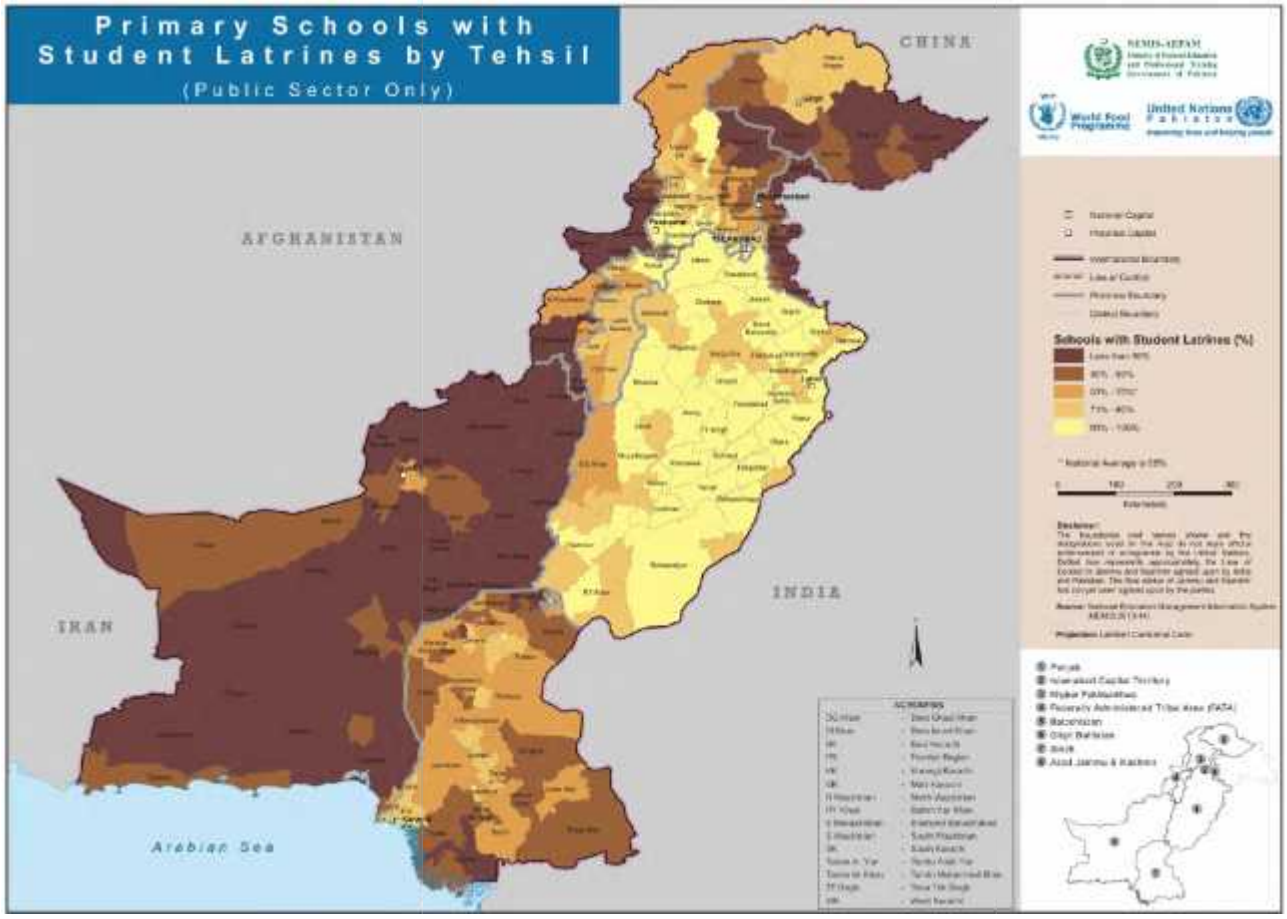
Figure 60 - Middle and secondary schools with drinking water by tehsil



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Figure 60 illustrates the status of availability of drinking water in middle and secondary schools by tehsil.

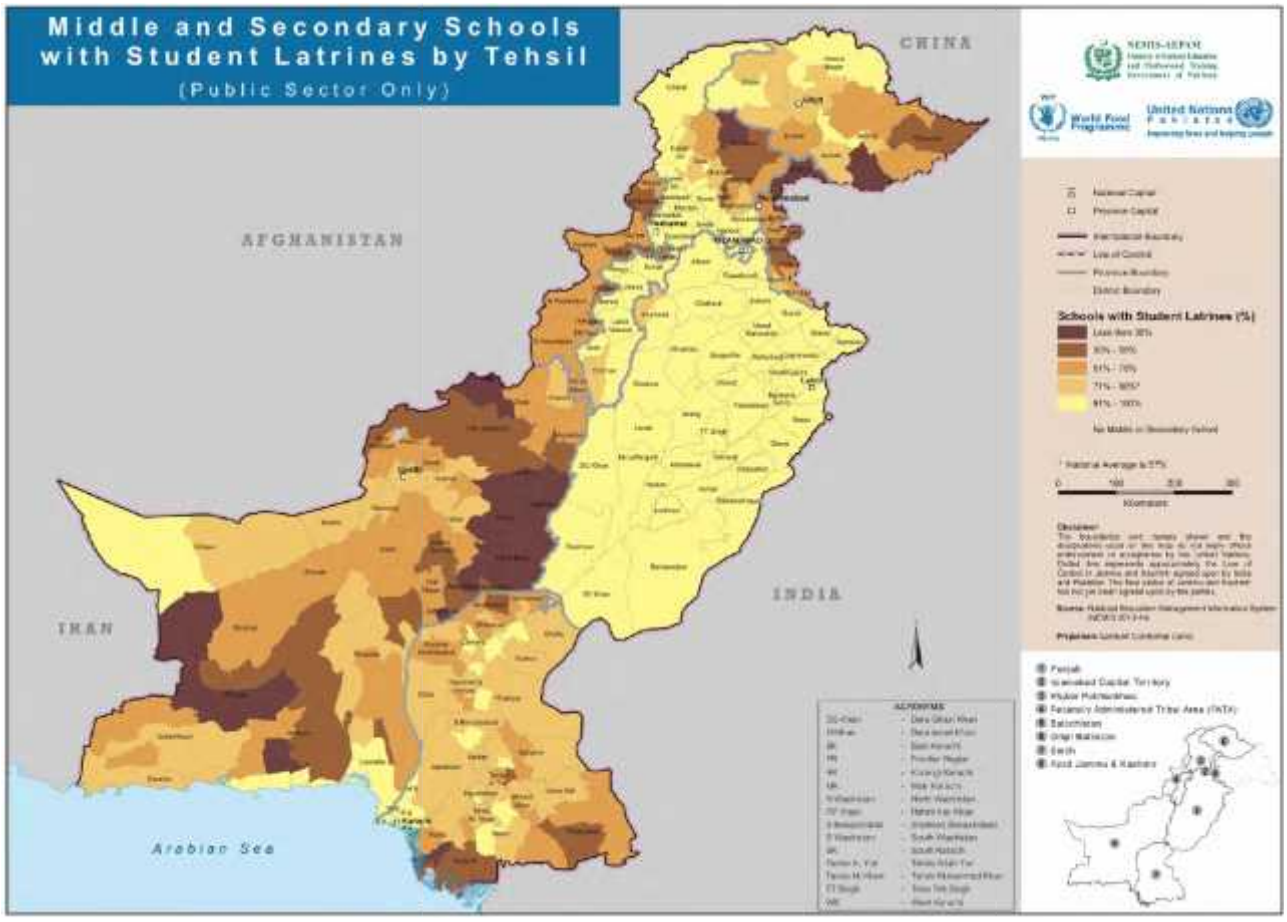
Figure 61 - Primary schools with student latrines by tehsil



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Figure 61 illustrates the status of availability of student latrines in primary schools by tehsil.

Figure 62 - Middle and secondary schools with student latrines by tehsil



(Source: Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan)

Figure 62 illustrates the status of availability of student latrines in middle and secondary schools by tehsil.

Health and Hygiene Education

The Sindh Education Sector Plan 2014-18 states that '*Utilities management is not given due attention. Drinking water standpoints are rarely available or are either not functional or of low quality; toilets are not built as per quotas (25:1 for girls and 40:1 for boys) and design standards; awareness campaign drives to motivate children for proper use of facilities are very limited; and the promotion of good health and hygiene practices is almost negligible'*. The sector plan has therefore identified health and hygiene as vital components under its strategic objective to 'Develop a contextually relevant and broad-based curriculum'.

One of the areas that can have a sustained impact on long term sustainability of improved hygiene and sanitation practices is by institutionalising and integrating teacher training in nutrition-sensitive WASH as part of Sindh Teacher Education Development.

There is no health screening of school children at present.

Presently, there is no module on WASH in either pre-service or in-service teacher training programmes. There is need for a curriculum review to incorporate a separate section/module on nutrition-sensitive WASH.

The Bureau of Curriculum and Extension Wing prepares and reviews the schools' curriculum. There is currently very little on WASH. There is need for a curriculum review to incorporate a separate section/module on nutrition-sensitive WASH.

Menstrual Hygiene Management

A study[147] conducted at the national level showed WASH facilities in schools are not supportive to menstrual hygiene management (MHM); majority of the girls rely on mothers and sisters for MHM related information; and little information is provided or discussed at school level. Most girls reported using reusable torn cloth during menstruation, but reported difficulties in washing and drying the cloth due to lack of privacy.

Trends of MHM in Azad Jammu Kashmir[148] showed the following:

- About 50% of schoolgirls dropped out of school during menstruation
- About 43% of schoolgirls said that there was no availability of protective material during their monthly periods
- About 72% of schoolgirls did not use any pads during their monthly periods
- About 70% of schoolgirls had some knowledge about menstrual periods
- About 50% responded that they had financial problems in buying protective material

In the earthquake affected areas, there was limited but good availability of low cost sanitary pads production. In addition, there was limited but good MHM Information Education and Communication (IEC) material available.

The study in Azad Jammu Kashmir found the following problems associated with Menstruation, which further resulted in limited coping strategies:

1) Shame during menses
2) Information on menstruation is provided by close family members, if at all
3) Teachers' unwillingness to discuss menstrual hygiene
4) Staying out of school for 3 -4 days: ridicule by boys, lack of facilities = poor school performance
5) Lack of designated washrooms with water and disposal facilities in schools
6) Changing, cleaning and drying of re-useable menstrual clothes
7) Unable to afford conventional sanitary pads

The menstrual hygiene management study and action research conducted in 2013 helped girls in Punjab and Khyber Pakhtunkhwa to access improved and customised WASH services. Through this pilot project, UNICEF developed monitoring tools to assist duty bearers to enforce the construction and maintenance of appropriate menstrual hygiene management facilities in schools. UNICEF has prepared a booklet on Menstrual Hygiene Management for Adolescent Girls[149].

The Integrated Rural Support Programme (IRSP) Pakistan in collaboration with Fresh Water Action Network South Asia (FANSA) conducted a situation analysis[150] on MHM in several districts in the

[147] Menstrual Hygiene Management for Adolescent School Girls in KP and PAK, Pakistan, May 2013, UNICEF Pakistan

[148] Muhammad Masud Aslam. Menstrual Hygiene Management for Schoolgirls in Pakistan. Thematic Session: MHM During Emergencies, UNICEF Pakistan 2011

[149] UNICEF Annual Report 2013 - Pakistan

[150] Menstrual Hygiene Management – a neglected right of Pakistani women. IRSP-Pakistan, 2013

country, which included Haripur, Swabi, Charsadda and Mardan in Khyber Pakhtunkhwa; Faisalabad, Sargodha, Lahore and Multan in Punjab; and Khairpur, Mirpur Khas and Sukkur in Sindh. Some of the key findings from this study were as follows:

- About two-thirds (65.6%) of the girls/women used a cotton cloth during menses, and only 16.8% used a sanitary pad
- About a third (30%) did not wash their hands after changing the cloth
- About half (49.3%) reused the cloth
- About a fifth (19.3%) reused the cloth for 2 months, while a fourth (25%) reused it for 3 months or more
- Just under a third (28.7%) burnt the cloth after washing, while about half (47.5%) threw it in the rubbish after washing it

The School of Nursing and Community Development Department of The Aga Khan University conducted a community-based study[151] in Hyderabad also conducted by the School of Nursing and Community Development Department of The Aga Khan University, the findings showed that majority of women used some kind of material to absorb menses (98.5%). Most used a washed plain cloth (70.4%). However, unsanitary practices (e.g. unclean cloth) were used by 16.3%, and of those who washed the cloth, a large proportion (19.3%) did not dry the cloth in the sun, as is the best practice. The frequency of change of the menstrual material averaged 2.5 changes on the first day of menstruation to 0.6 change of material per day on the last days. Despite availability of bathing facilities for nearly all women, only 64% reported bathing during menstruation.

The School of Nursing and Community Development Department of The Aga Khan University conducted a cross-sectional study[152] to explore the menstrual practices among 1275 female adolescents of urban Karachi. Findings from the study showed that 50% of the girls lacked an understanding of the origin of menstrual blood and those with a prior knowledge of menarche had gained it primarily through conversations with their mothers. Many reported having fear at the first experience of bleeding. Nearly 50% of the participants reported that they did not take baths during menstruation. Further analysis showed that factors of using unhygienic material, using washcloths, and not drying under sun were found to be statistically significant among those going and not going to schools. The study concluded that there are unhygienic practices and misconceptions among girls that require action by health care professionals.

The Government of Pakistan initiated a dialogue related to Menstrual Hygiene Management (MHM) in selected schools, primarily to understand the scope of education impacts and challenges across cultural backgrounds.

While the issue of MHM relates more to reproductive health, it is an important hygiene and solid waste issue especially at schools and in communities. MHM needs to be integrated in health education and reproductive health programmes and communities sensitised about sanitary waste disposal of pads and cloths used during the menstrual periods. Furthermore, dissemination of

[151] Ali TS, Karmaliani R. Hygiene practices during menstruation and its relationship with income and education of women in Hyderabad, Pakistan. Pakistan Journal of Women's Studies. Alam-e-Niswan. Vol 13, No. 2, 2006, pp 185-199

[152] Ali TS, Rizvi SN. Menstrual knowledge and practices of female adolescents in urban Karachi, Pakistan. J Adolesc. 2010 Aug;33(4):531-41

information about preparation of low cost home-made sanitary pads needs to be disseminated through hygiene education for girls.

At present, there is no menstrual hygiene education for girls in middle and high schools in Sindh.

Sindh WASH in Schools (WinS) Strategic Plan 2017-2022

In view of the serious issue of missing facilities that not only had an impact on children's health but also on enrolment and retention in schools, Department of Education, Sindh, Ministry of Federal Education and Professional Training (MoFEPT) Islamabad and UNICEF collaborated to develop a strategic plan to address WASH in schools.

The objectives and targets of the strategic plan include creating awareness, providing latrines where not already available and provision of drinking water by 2022.

The strategies to achieve the objectives and targets are (I) preparation of WASH policy and planning guidelines (II) creating awareness amongst children and teachers and community about health, hygiene and sanitation (III) construction of latrines (IV) provision of drinking water in schools where not already available (V) ensure operation and maintenance (VI) address cross cutting issues, such as latrines for persons with disabilities and Menstrual Hygiene Management (MHM) facilities.

The estimated cost for the strategic plan comes out to be around PKR 24.6 billion. The major cost is on construction of latrines i.e. PKR 16.94 billion followed by drinking water i.e. PKR 7 billion and crosscutting issues i.e. PKR 700 million.

The plan includes an effective system and mechanism, supervision and evaluation. The strategies for M&E include on site supervision and monitoring by Joint monitoring teams; generation and sharing of periodic progress reports; and district, provincial and national level implementation review workshop. The proposed evaluation includes the baseline, interim and summative evaluation. Besides it has also been proposed to develop and integrate wash indicators in SEMIS.

Strategy

Education			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Nutrition-sensitive WASH integrated in teacher training programme	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board and incorporate nutrition-sensitive WASH hygiene promotion in pre-service and in-service teacher training programme and CPD training of teacher educators Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme
Nutrition-sensitive WASH integrated in schools' curriculum	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board for inclusion of topics on nutrition-sensitive water, sanitation and hygiene in curriculum for classes 1 to 12 WASH in Schools policy guidelines developed to ensure operation and maintenance of WASH infrastructure in schools Implement WASH in Schools policy guidelines in 30% schools	Implement WASH in Schools policy guidelines in additional 30% schools	Implement WASH in Schools policy guidelines in 100% schools
Menstrual hygiene management integrated in health and hygiene for girls	Nutrition-sensitive WASH hygiene promotion module incorporates menstrual hygiene management for girls Impart menstrual hygiene	Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 50% of girls middle and high schools as part of on-going school health	Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 75% of girls middle and high schools as part of on-going school health

	management education in nutrition-sensitive WASH hygiene promotion to at least 25% of girls middle and high schools as part of on-going school health education and WinS	education and WinS	education and WinS
100% of schools with missing facilities have safely managed drinking water and latrines (30% in short term, 30% in medium term, 40% in long term) (extension of water distribution pipe from water supply scheme, water tank and 2 latrines per school) in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** More than 68% of primary, 76% of middle and 91% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in at least 10% schools **Sanitation** More than 71% of primary, 82% of middle and 97% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** More than 89% of primary, 92% of middle and 97% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in 10% ongoing and 20% additional schools **Sanitation** More than 90% of primary, 94% of middle and 99% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** 100% of primary, 100% of middle and 100% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in 30% ongoing and 30% additional schools **Sanitation** 100% of primary, 100% of middle and 100% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022

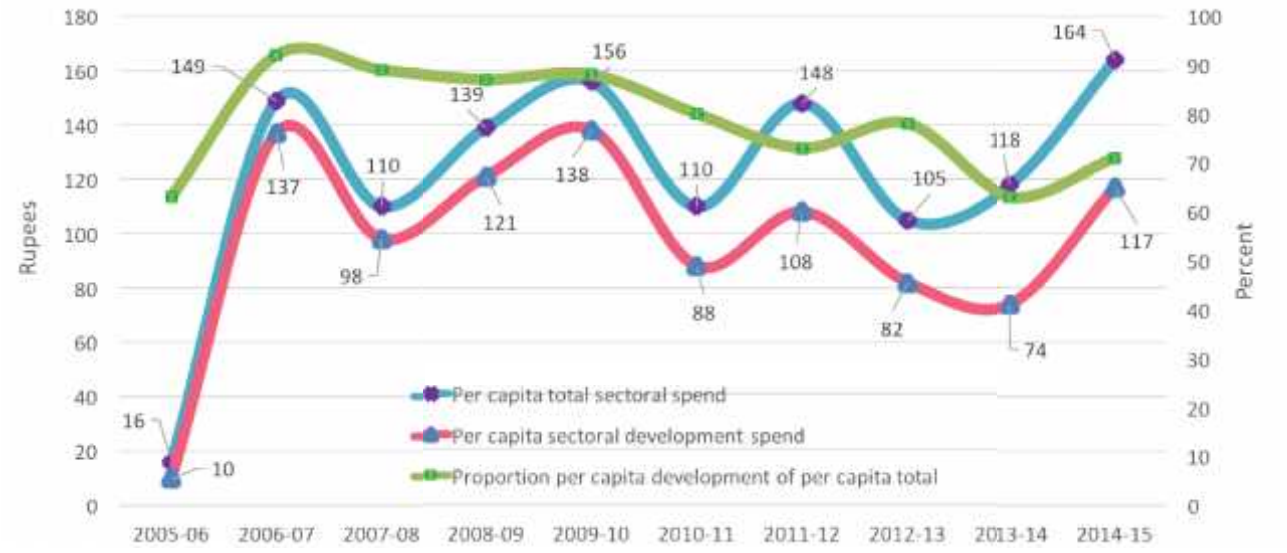
SECTOR EFFICIENCY AND CAPACITY

Service Efficiency

Over the last decade, the per capita total sectoral expenditure has increased marginally from PKR 149 in 2005-06 to PKR 164 in 2014-15, but when considered in the context of inflation, it is negligible (Fig 63). Further, the per capita sectoral development spend has actually decreased from PKR 137 in 2005-06 to PKR 117. This indicates diminishing prioritisation of public spending in the sector. On average, the proportion of per capita development spend to overall per capita sectoral spend between 2010-2015 is just under three-fourths (73%).

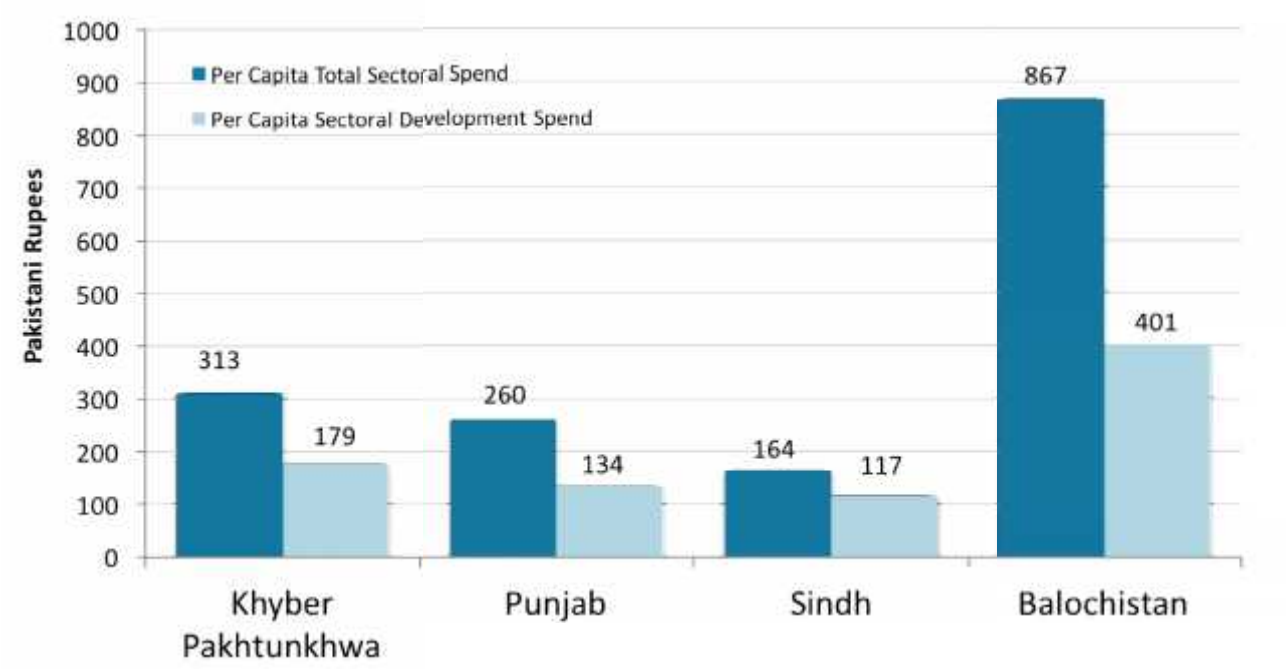
In 2014-15, the total per capita sectoral expenditure was PKR 867 in Balochistan, compared to PKR 260 in Punjab, PKR 313 in Khyber Pakhtunkhwa, and PKR 164 in Sindh. This indicates that Sindh has the lowest per capita sectoral spend of the provinces. Figure 64 illustrates the wide difference in per capita sectoral spending in water and sanitation compared to other provinces in 2014-15.

Figure 63 - Decadal Per Capita Sectoral Trends



(Source: Computation based on population projections for 2015 and PRSP expenditures - Annual PRSP Budgetary Expenditures for FY 2005-06 to 2014-15, Ministry of Finance, Government of Pakistan. Population estimates obtained from Development Statistics of Sindh 2013)

Figure 64 - Per Capita Sectoral Spend Trends 2014-15

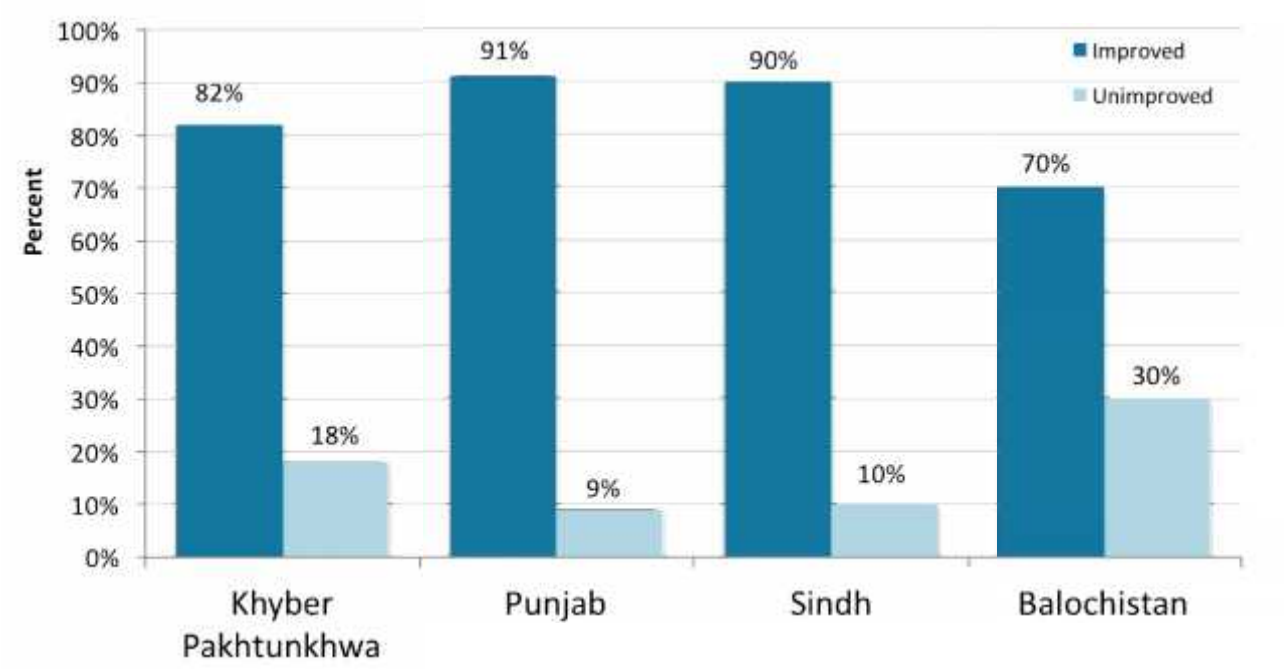


(Source: Computation based on population projections for 2015 and PRSP expenditures - Annual PRSP Budgetary Expenditures for FY 2014-15 (Provisional), Ministry of Finance, Government of Pakistan)

There are provincial differences in the access to and quality of improved drinking water supply sources, sanitation systems and garbage collection systems. The provincial trends are illustrated as follows:

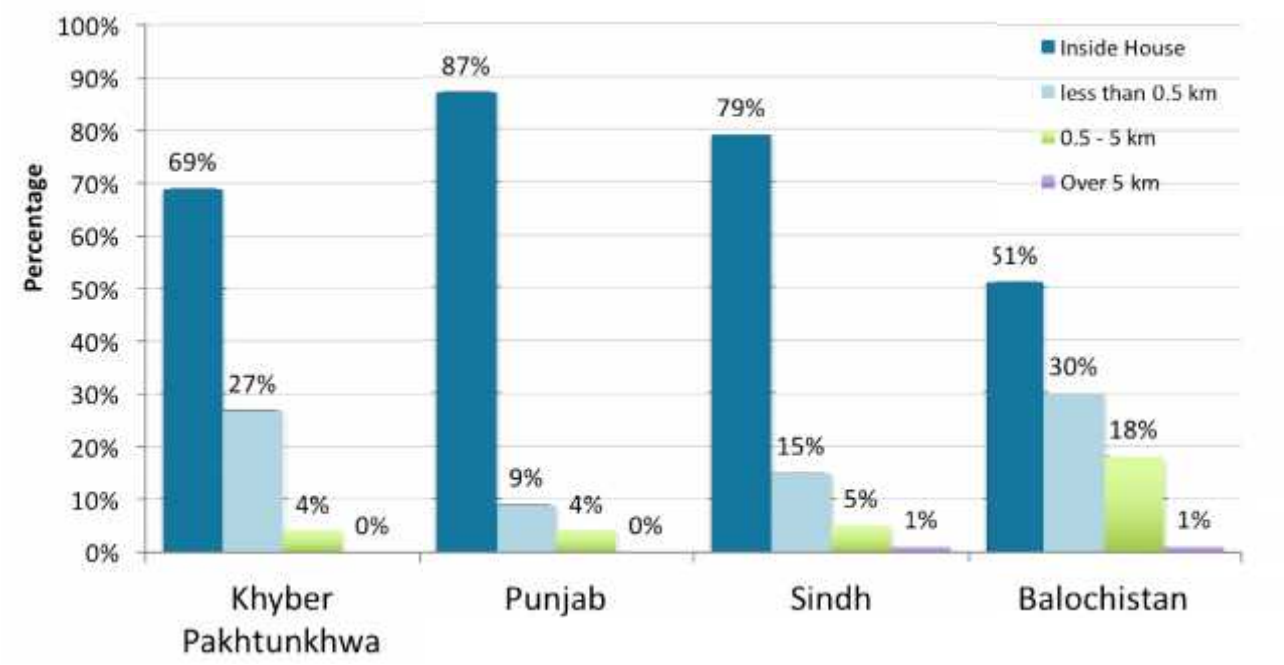
- **Fig 65** for sources of drinking water supply in which Sindh and Punjab are progressing at the same pace with 90% or more with access to improved water supply
- **Fig 66** and **Fig 67** for distance to source of drinking water supply in which Sindh is second to Punjab with 79% inside the house
- **Fig 68** shows who installed the water supply – it is important to note that 72% of hand pumps and 79% of motor pumps have been installed by the households themselves, while 96% of open wells were installed by NGOs. This raises serious concerns about the quality of installation and risk of using unsafe water supply
- **Fig 69** for type of toilet used which shows that Sindh still has about 7% population with no toilet
- **Fig 70** for type of sanitation system used which shows that in Sindh, 58% of the population uses unsafe sanitation systems (17% use open drains and 41% have no system)
- **Fig 71** for type of garbage collection system from household which shows that 69% of households do not have any garbage collection system
- **Fig 72** for type of urban garbage collection system from household which shows that 56% of households have a garbage collection system while 44% do not

Figure 65 - Provincial trends of source of drinking water supply



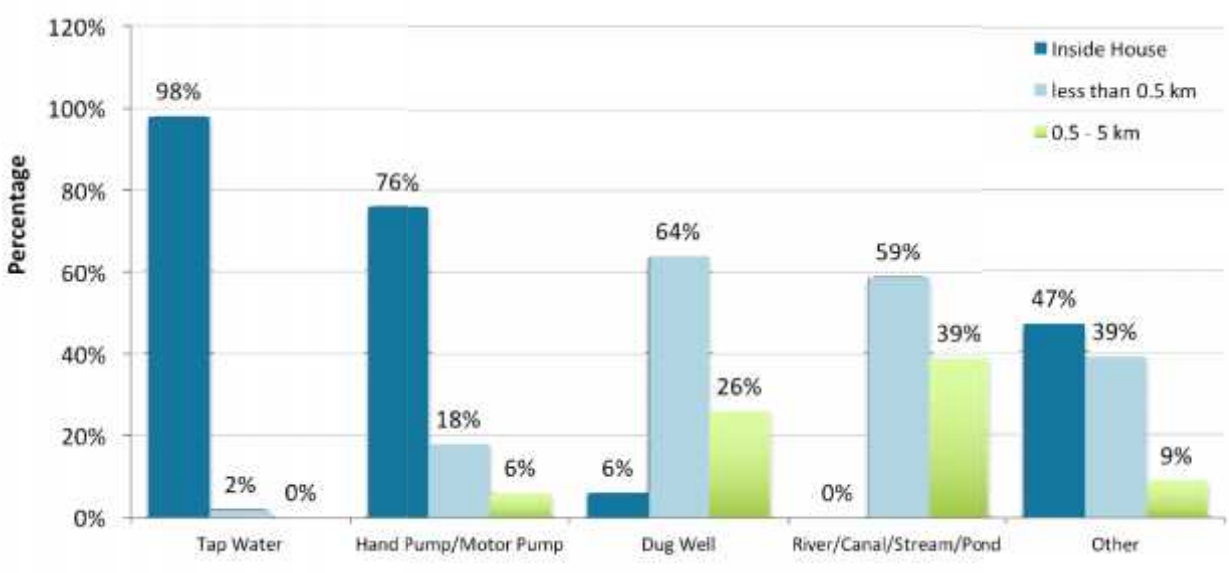
(Source: PSLM 2014-15)

Figure 66 - Distance to source of drinking water supply by province



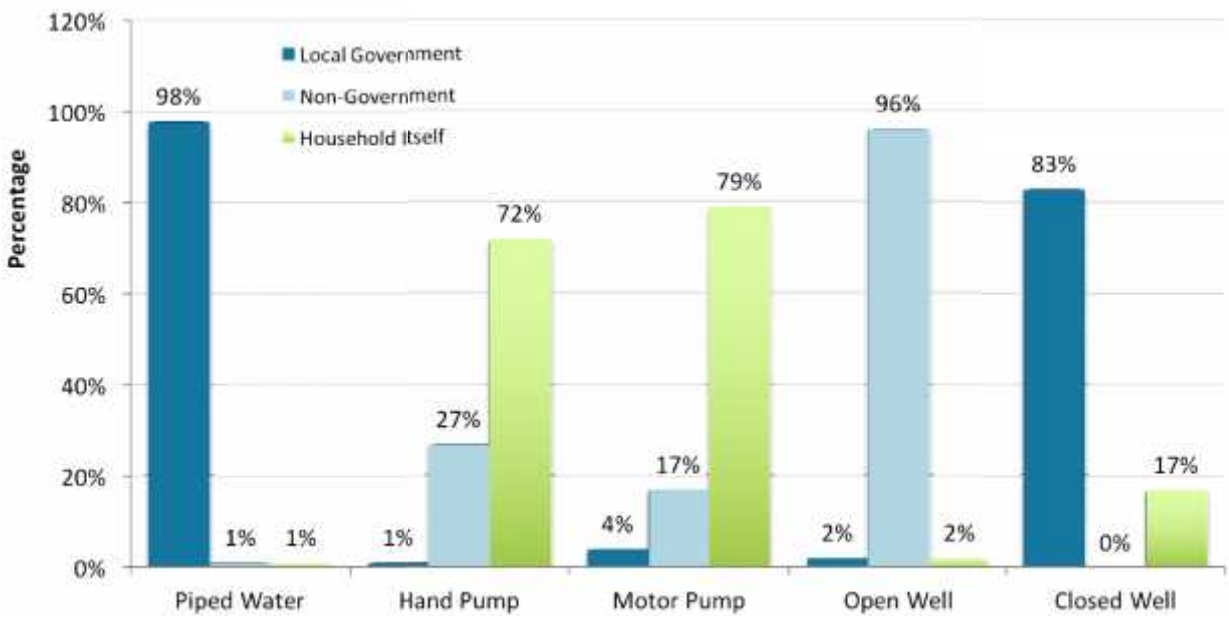
(Source: PSLM 2013-14)

Figure 67 - Distance to source of drinking water supply in Sindh



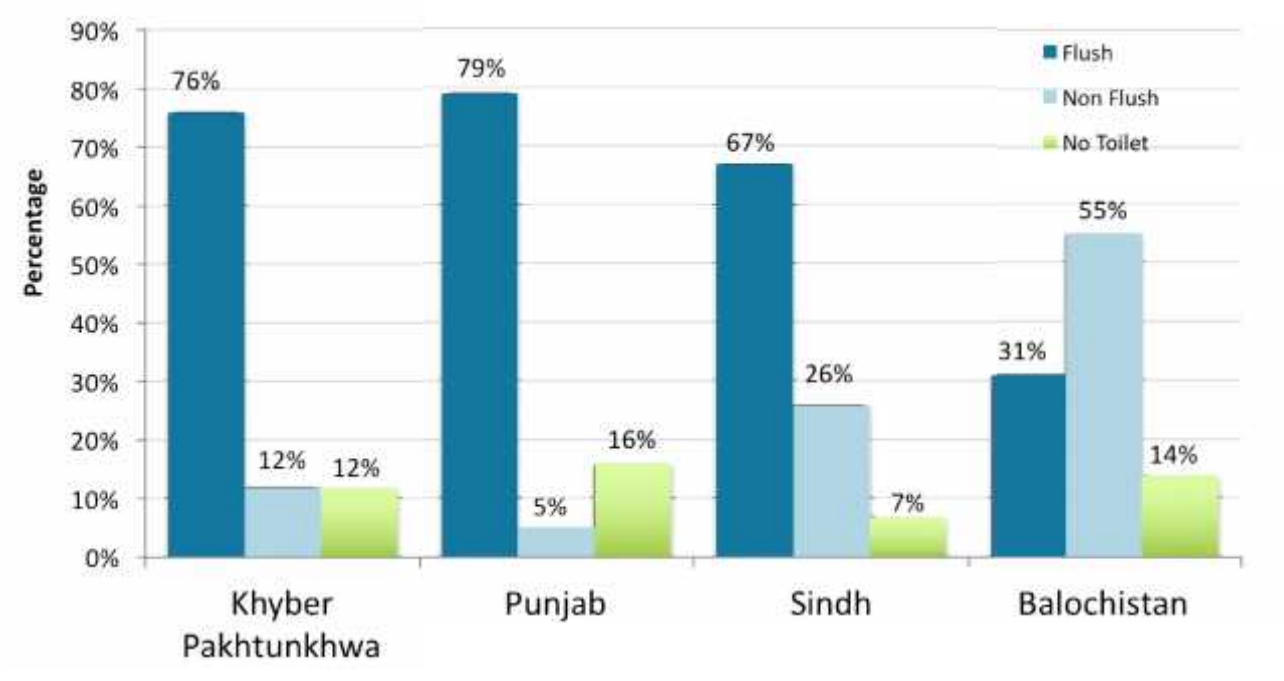
(Source: PSLM 2013-14)

Figure 68 - Who installed water supply



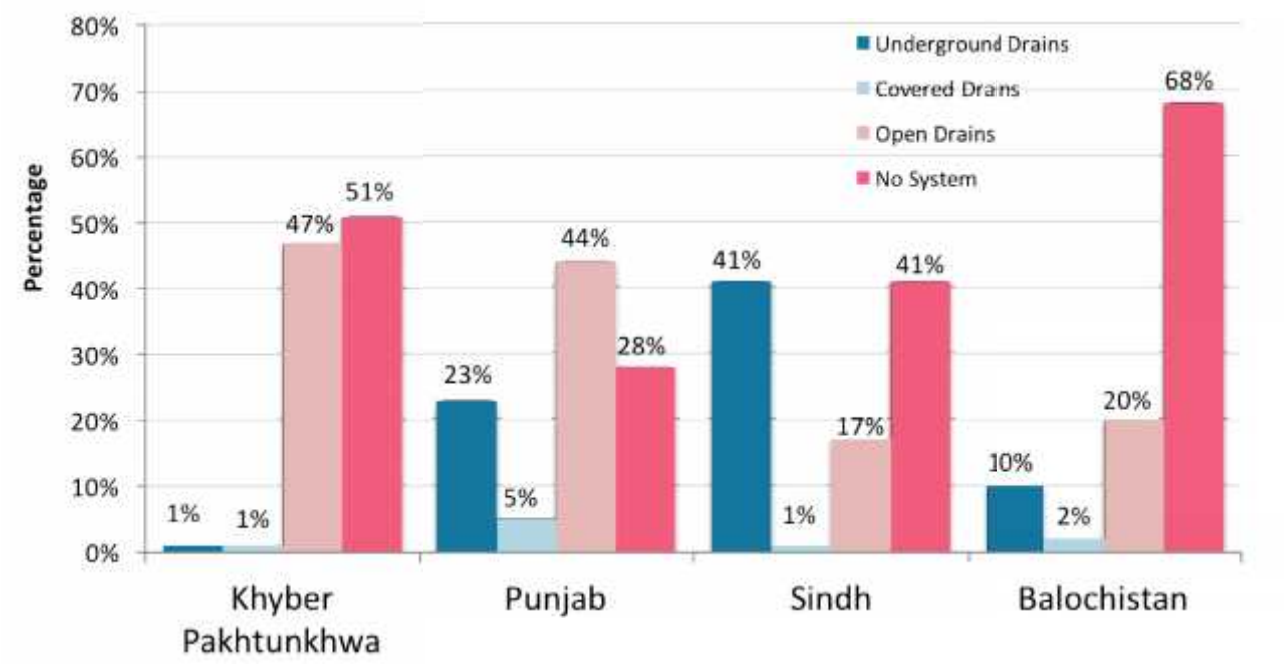
(Source: PSLM 2013-14)

Figure 69 - Type of toilet used by province



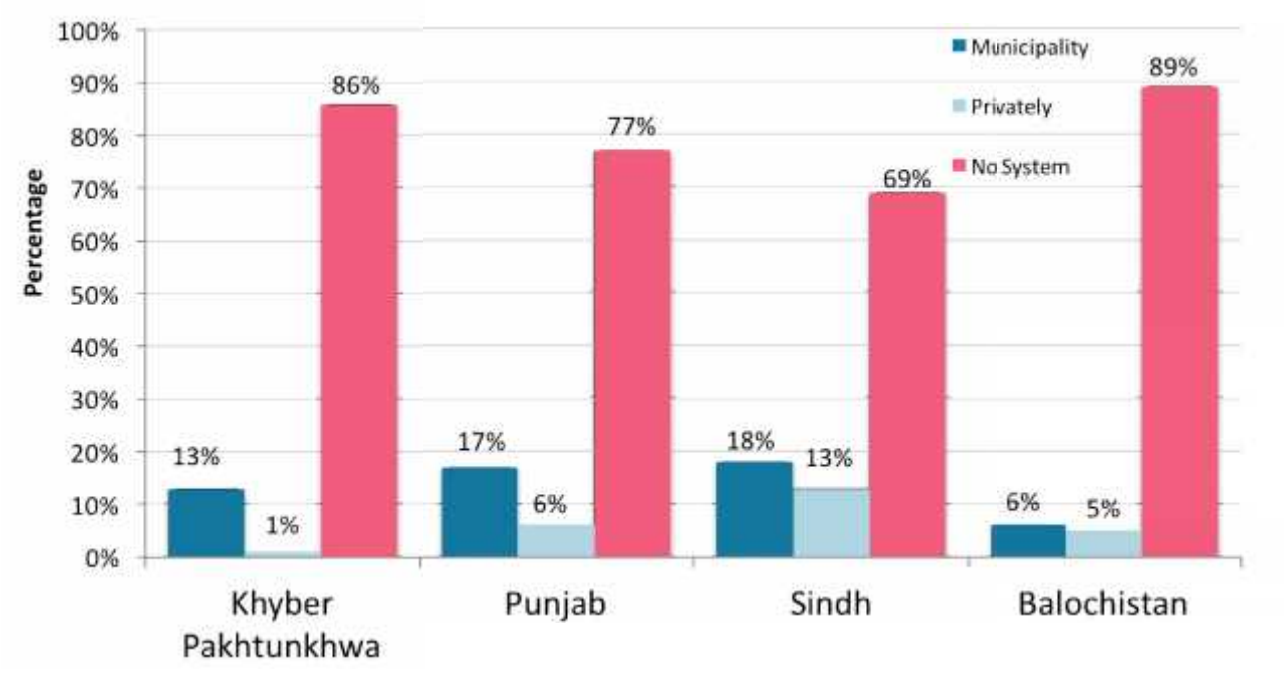
(Source: PSLM 2014-15)

Figure 70 - Type of sanitation system used by province



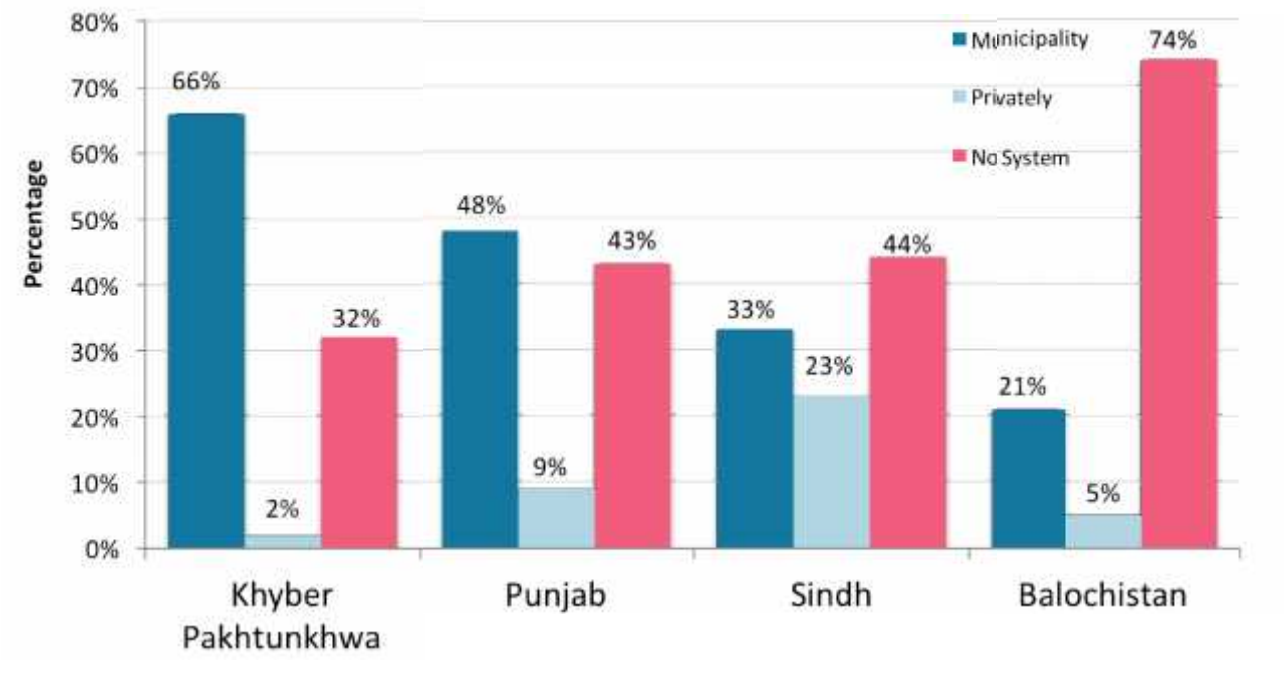
(Source: PSLM 2013-14)

Figure 71 - Type of overall garbage collection system from household by province



(Source: PSLM 2013-14)

Figure 72 - Type of urban garbage collection system from household by province



(Source: PSLM 2013-14)

Table 14 highlights the service efficiency of different water and sanitation agencies. It shows that KW&SB underperforms in most of the indicators only second to WASA Quetta. It has low billing and collection ratios, a high staffing ratio, and no fee for new sewerage connection. NSUSC has the lowest average unit production cost and staffing ratio. **Table 15** provides further insights to service efficiency.

Table 14 - Comparison of service efficiency in water and sanitation agencies

	Khyber Pakhtunkhwa WASA Peshawar	Punjab WASA Lahore	Sindh Karachi Water and Sewerage Board	North Sindh Urban Services Corporation Sukkur	Balochistan WASA Quetta
SERVICE					
Water coverage	100%	89%	90%	40%	70%
Sewerage coverage	100%	88%	80%	85%	12.5%
Water availability	9 hr/d per consumer	14-18 hr/d per consumer	5 hr/d per consumer	8 hr/d per consumer	1 hr/d per consumer
Per capita consumption	312 litres per day	327 litres per day	135 litres per day	77 litres per day	59 litres per day
EFFICIENCY					
Average unit production cost	PKR 7.90/m^3	PKR 6.73/m^3	PKR 7.69/m^3	PKR 0.08/m^3	PKR 0.75/m^3
Billing efficiency	100%	98%	70%	80%	60%
Collection efficiency	93%	80%	43%	60%	21%
Staffing ratio (staff/1000 water and sewerage connections)	7	4	7	3	24
ANNUAL O&M COST					
Salary	N/A	33%	65%	41%	47%
Power	N/A	46%	7%	30%	39%
Others	N/A	21%	28%	29%	14%
CONSUMER SERVICE					
Average water bill/month per connection	PKR 219	PKR 287	PKR 449	PKR 30	PKR 125
New connection fee water supply residential	PKR 2,300 – 5,750	PKR 6,400	PKR 3,207 (average)	PKR 365	PKR 1,000
New connection fee sewerage residential	PKR 1,500 – 4,600	PKR 400	NIL	NIL	Nil

(Source: Pakistan Water and Sanitation Operators Directory, 2012. Pakistan Water Operators Network)

Table 15 - Status of efficiency of service

	KW&SB (Q1 2012 data)	NSUSC Sukkur (Q1 2012 data)
SERVICE COVERAGE		
Water Coverage %	80.01	85.67
Sewerage Coverage %	80.00	95.35
CONSUMPTION AND PRODUCTION		
Water Production L/capita/day	197.35	N/A
Water Consumption L/capita/day	137.98	?
NON REVENUE WATER		
Non Revenue Water %	30.08	?
Unaccounted For Water %	30.08	?
METERING PRACTICES		
Metering Level %	0.21	N/A
Metered Water Sold %	N/A	N/A
NETWORK PERFORMANCE		
Pipe Breaks-Burst/km	0.51	2.81
Sewer System Blockages/km	38.46	31.79
Pipe Leakages/km	1.53	16.71
Replacement of Manhole Covers %	7.2	94.35
Cleaning/Desiltation of Manholes %	36	88.81
Cleaning/Desiltation of Sewers %	10	N/A
Storm Water Drain Used as Sullage Carrier %	N/A	100
Sewer Collapse/Crown Failure %	N/A	75
COST AND STAFFING		
Unit Operating Cost – Water Consumption Rs/m^3 water consumed	10.05	516.66
Unit Operating Cost – Water Production Rs/m^3 water produced	7.02	?
W&WW Staff Per 1000 W&WW Connections	9.56	6.53
Water Staff Per 1000 Water Connections	14.51	N/A
Waste Water Staff Per 1000 Waste Water Connection	4.07	N/A
Salary Cost as % of Total Operating Cost	37	82.48
Electricity Cost as % of Total Operating Cost	45.06	8.76
Maintenance Cost as % of Total Operating Cost	8.89	2.19
Contracted Out Cost as % of Total Operating Cost	9.05	6.57

N/A – Data Not Available
? - Unclear
(Source: Pakistan Water Operators Network)

Table 15 continued.

	KW&SB (Q1 2012 data)	NSUSC (Q1 2012 data)
QUALITY OF SERVICE		
Continuity of Service per day	5	9
Chemical Unfit Source(s) %	1.15	100
Biologically Unfit Source(s) %	2.07	100
Chemically Unfit at Taps %	2	100
Biologically Unfit at Taps %	2.53	100
Water Quality – % of Required Residual Chlorine Test	100	100
Water Quality – Samples Passing On Residual Chlorine %	78.75	100
Complaints About W&WW Services % of total connections	17.29	1.77
Waste Water Treatment – Primary Level %	61.1	0
Waste Water Treatment – Secondary Level %	0	0
BILLING AND COLLECTION		
Average Revenue Water and Waste Water Rs/m^3 water sold	6.16	176.21
Collection Period days	1910.39	N/A
Billing Efficiency %	94.88	?
Collection Efficiency (Physical) %	26.42	86.41
Collection Efficiency (Financial) %	61.5	400
FINANCIAL PERFORMANCE		
Operational Cost Coverage (ratio)	0.61	0.34
Working Ratio	1.63	2.93
Debt Servicing %	N/A	N/A

N/A – Data Not Available
? - Unclear
(Source: Pakistan Water Operators Network)

Table 15 presents the status of efficiency of KW&SB and NSUSC Sukkur in 2012. Some of the highlights are indicated below.

Service Coverage

Both show good coverage of 80% and above.

Consumption and Production

The production in KW&SB is 197.35 L/capita/day, while the consumption is 137 L/capita/day. There is an apparent good correlation between production and capacity with 70% consumption being matched by production.

Water consumption rates in litres per person per day are shown below for selected countries [153]:

- Germany – 193 L/capita/day
- Brazil – 187 L/capita/day
- Philippines – 164 L/capita/day
- United Kingdom – 149 L/capita/day

[153] http://www.data360.org/dsg.aspx?Data_Set_Group_Id=757 accessed on 22 May 2016

- India – 135 L/capita/day
- China – 86 L/capita/day

This shows that the median consumption rate is about 156 L/capita/day, and when about 20% is added for NRW/UAW, the figure comes to about 187 L/capita/day. This is equivalent to about 40 gallons per person per day.

The water needs per person per day are estimated to be about 120 L/capita/day[154] as shown below:

- Drinking – 5 litres
- Food preparation – 10 litres
- Bathing – 25 litres
- Sanitation – 45 litres
- Laundry – 35 litres

This is about 26 gallons per person day.

From the available data, the production and consumption rates at KW&SB seems to be at optimal level.

Non Revenue Water

Non Revenue Water and Unaccounted for Water is still high at 30% and KW&SB should strive to bring these close to 10% or lower.

Metering Practices

Metering practices are dismal with KW&SB at less than 1%.

Network Performance

Cleaning and de-silting of drains and sewers varies from KW&SB and NSUSC. Higher cleaning rates of about 88.81% are noted in NSUSC compared to 36% at KW&SB for cleaning/desilting of manholes. However, factors like gravity, pumping house functionality, and overall O&M probably determine need and frequency for cleaning. Both KW&SB and NSUSC show high rates of sewer system blockages/km of over 30%.

Cost and Staffing

The Water and Waste Water staff per 1000 connections ranges from 9.56 at KW&SB to 6.53 at NSUSC. The desired rate should be closer to 2-3 staff per 1000 connections. A higher rate indicates lesser efficiency. Further, KW&SB has a much higher proportion of electricity to total operating costs (45%) compared to 8.76% at NSUSC. Most of the operating cost at NSUSC is salary cost (82.48%).

[154] Adapted from Arlene B. Inocencio, Jose E. Padilla and Esmyra P. Javier. Determination of Basic Household Water Requirements. February 1999. Philippine Institute for Development Studies

Quality of Service

The quality of water shows that 'chemically unfit at source' and 'biologically unfit at source' at KW&SB is generally 1.15% and 2.07% respectively. However, 'chemically unfit at taps' and 'biologically unfit at taps' at KW&SB is 2% and 2.53% respectively. The data for NSUSC is unclear.

Billing and Collection

The collection period at KW&SB is a staggering 1910.3 days. On the positive side, it has a high billing efficiency at 94.88%, but falls short again in its collection efficiency (physical) of 26.42%. NSUSC has a high collection efficiency (physical) of 86.41% and also a high collection efficiency (financial) of over 400%.

Financial Performance

The operating cost coverage ratio is better at KW&SB with 0.63, and also a better working ratio of 1.63. Optimal financial performance requires for the operating cost coverage ratio to be more than 1.0 and working ratio to be less than 1.0.

Specific recommendations of the Reform Led Investment Plan of KW&SB

Tackle inefficiency by promoting institutional reforms:

- Enhance governance and insulate the utility from political interference while maintaining public accountability: i.e. Corporatize KW&SB
- Strengthen KW&SB Board of Directors
- Institutional restructuring of KW&SB
- Amend KW&SB Act to revisit board composition and role and responsibilities of the utility management
- Enhance civil society and citizen engagement with specific focus on gender and marginalised segments
- Introduce a new KW&SB Brand responding to customers
- Reaching out to Urban Poor

Improve the Financial with careful attention to poor households.

- Develop and implement WSS financial viability plan for revenue mobilization, recovering arrears (incrementally) and collecting current bill (100%), introducing domestic metering in pilot areas with volumetric tariff and rationalizing tariff (Target: recovering 100% OpEx)
- Outsourcing of billing and collection to private sector on pilot basis in selected towns/districts.
- Improve water availability by reducing losses
- Develop and implement a performance improvement plan for KW&SB (Target: Universal access, Reliability: 8 hours/day)
- Establish pro-poor service unit in KW&SB for improving service delivery in low income and informal settlement

Social Audit of Local Governance and Delivery of Public Services

A Social Audit of Local Governance and Delivery of Public Services[155] conducted by United Nations Development Programme (UNDP) in 2011 – 2012 indicated the following findings in the different provinces:

Drinking Water Supply

- A higher proportion of respondents in Punjab (39%) indicated that they do not have access to government drinking water compared to any other province. Punjab is followed by Balochistan, where 30% of households do not have access to government water services. The situation is far better in Sindh and Khyber Pakhtunkhwa, where 89% and 85% of respondents respectively indicated that they do have access to government water services. The better situation in Sindh may be due to high urbanisation in the province with a large population of the province residing in Hyderabad and Karachi. However, the rural marginalised community of Sindh reported clean drinking water as a major problem of their area
- Residents in Sindh are most satisfied with government water services, with three-fifths (60.4%) of respondents indicating that they are satisfied. This is only slightly higher than the satisfaction in Punjab (55.2%), which is in turn significantly higher than the satisfaction in Khyber Pakhtunkhwa where only 44.8% of respondents indicated they were satisfied with water supply. The situation in Balochistan with respect to this question is by far the worst, with less than one-third (31.6%) of respondents indicating they were satisfied with government water supply. There is, therefore, a clear ranking in the satisfaction with water among provinces, with Sindh displaying the highest satisfaction followed by Punjab, Khyber Pakhtunkhwa and Balochistan. The high percentage of dissatisfied households in Balochistan, with government water services, is corroborated by the findings of focus group discussions conducted with different groups in Balochistan. According to the rural marginalised community of Balochistan, there has not been any change for the better in the present system, rather the situation has grown from bad to worse – "Drinking water is the biggest issue of our area but nothing has been done in this regard"

Sewerage and Sanitation

- Availability of adequate sewerage and sanitation in the country, particularly in urban and peri-urban areas, is a key indicator of development and affects living standards of citizens. In Pakistan, sewerage and sanitation has been on the agenda of local governments since 1960's with this service being implemented at the tehsil and/or union council levels through various local government systems. Indeed, its importance in maintaining hygiene standards of settlements, preventing outbreaks of epidemics and its impact in the health of communities make this public service an essential element of measuring the state-citizen relationship
- Punjab and Khyber Pakhtunkhwa have similarly high levels of sanitation service availability at 85.5% and 82.1%. Sindh has lower access to sanitation than Khyber Pakhtunkhwa and Punjab, at 73.5%. Access in Sindh is still higher than Balochistan, however, which lags behind all the other three provinces with only 54.5% of respondents indicating that they have access to sanitation services

[155] Adapted from Social Audit of Local Governance and Delivery of Public Services 2011 – 2012. National Report, 2012. UNDP

- Households in Sindh (31.3%) and Punjab (30.6%) are more likely to be satisfied with sanitation compared to those in Khyber Pakhtunkhwa and Balochistan. Among Khyber Pakhtunkhwa and Balochistan, there is also a significant difference in satisfaction with only 11.4% of households in Balochistan expressing satisfaction with sanitation compared to 21.6% in Khyber Pakhtunkhwa. This suggests that the government is failing to satisfy citizen's demand for sanitation in all four provinces, but more so in Khyber Pakhtunkhwa and Balochistan, and especially so in Balochistan where only 1 out of 9 households are satisfied with sanitation compared to 2 out of 9 for Khyber Pakhtunkhwa and almost 3 out of 9 for Sindh and Punjab

Garbage Disposal

- Khyber Pakhtunkhwa (30.7%) and Punjab (33.1%) have similarly low levels of access to garbage disposal services, with one-third or less of respondents indicating that they do not have access. Surprisingly, Balochistan has higher levels of access to garbage disposal services with 44.4% of respondents indicating so. Sindh has higher access compared to all three other provinces, with a majority (61.3%) of respondents indicating that they have access to garbage disposal services. Hence the garbage disposal service is much more likely to be available in Sindh than other provinces
- Residents in Balochistan are least satisfied with garbage disposal with only 13% of respondents who have access to garbage disposal indicating they were satisfied. Satisfaction levels were also low, but higher than Balochistan, in Khyber Pakhtunkhwa where a little more than a fifth (21.1%) of respondents indicated they were satisfied. The situation is comparatively better in Punjab (40.1%) and Sindh (37.0%) compared with Khyber Pakhtunkhwa and Balochistan

Public Opinion on Quality of Governance in Sindh

A survey on Public Opinion on Quality of Governance in Pakistan[156] was undertaken by the Pakistan Institute of Legislative Development And Transparency (PILDAT) in 2014-15. The key findings with regards to water and sanitation in Sindh included the following:

- Provincial Government performance with regards to access to safe drinking water supply – 1% indicated very good, 17% good, 38% bad, and 39% very bad
- Provincial Government performance with regards to Sanitation (Sewerage, Solid Waste Collection and Disposal) – 2% indicated very good, 21% good, 33% bad, and 38% very bad

These findings suggest that 82% of the population is not satisfied with drinking water services, while 77% are dissatisfied with sanitation services.

A survey on Assessment of the Quality of Governance in Sindh[157] was undertaken by the Pakistan Institute of Legislative Development And Transparency (PILDAT) in 2014-15. There was extreme dissatisfaction of the public with the Government's performance. Public approval fell from 28% in 2013-2014 to 18% in 2014-2015. This is reflective of the acute water shortage problem that people of Karachi have been facing this year. According to statistical reports at KW&SB's official website, the present supply of water to Karachi from Indus and Hub sources is approximately 650 million gallons per day (MGD) and the demand for 20 million population is estimated to be 1080 MGD (54 gallons per capita per day). The current shortfall is calculated to be 430 MGD. By the end of the year 2020, the population of Karachi is expected to be around 23 million and the demand of 49 water would be 1242 MGD (54 GPCD). And the short fall of water will be of 600 MGD (2700 ml/day.

According to PILDAT's Public Opinion Poll on Quality of Governance, the Approval Rating for the provision of sewerage and solid waste collection in Sindh was 24% in 2013-2014. In 2014-2015, this figure further declined to 23%, suggesting an increasing dissatisfaction of the public regarding the Government's performance in improving sanitation in the Province.

Citizen Report Card

A project designed to test the feasibility of using a Citizens Report Card was undertaken in collaboration with KW&SB and supported by WSP to gain insights about perceptions and attitudes of citizens towards services, and identify local issues pertaining to water and sanitation in Karachi. A quantitative survey of 4500 households was conducted in 9 towns of Karachi covering the north, south, central, north east, and south west areas of the city representing low, middle and high income groups.

[156] Public Opinion on Quality of Governance in Pakistan. Second Year of the Federal and Provincial Governments June 2014 – May 2015. Pakistan Institute of Legislative Development And Transparency (PILDAT), October 2015

[157] Assessment of the Quality of Governance in Sindh. Second Year of the Provincial Government May 2014 – May 2015. Pakistan Institute of Legislative Development And Transparency (PILDAT), March 2016

Eight themes were analysed:

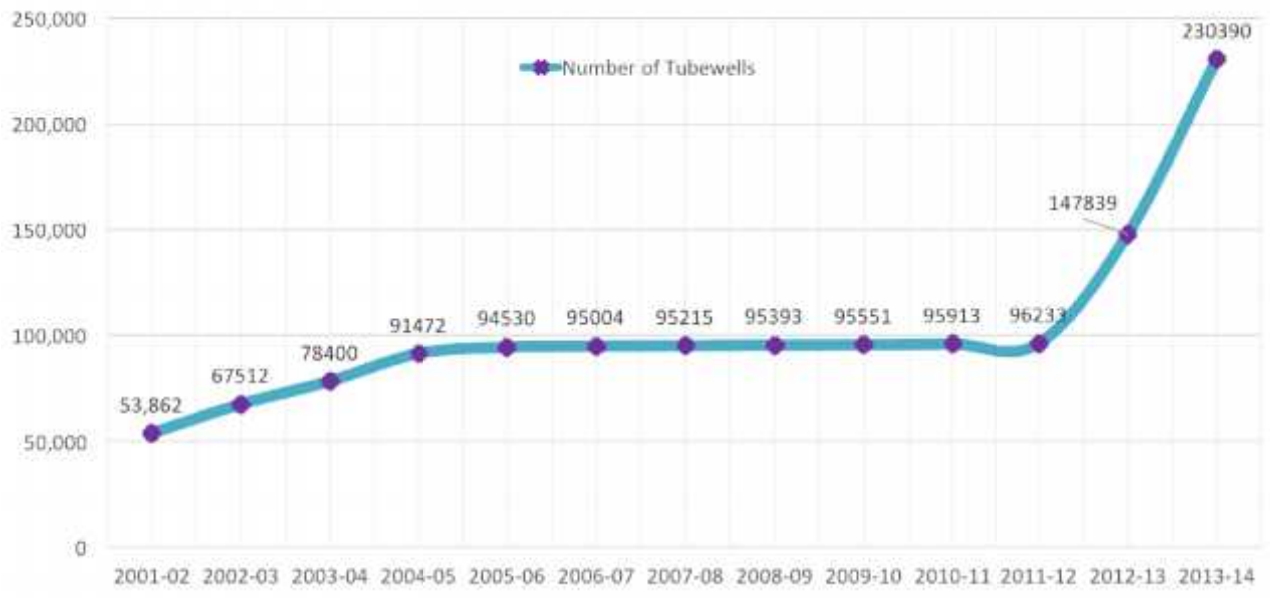
- Availability, access and use of services
- Reliability of services
- Perceptions on water quality
- Costs incurred by customers
- Interactions with KW&SB
- Transparency in service provision
- Satisfaction with services
- Priority areas for improvement

Key findings revealed that KW&SB's services were found satisfactory and above average by 6.5% of users, and that both users and utility staff want improvement in systems and services. The project has built in a strong demand side advocacy component and a supply side willingness to reform.

Tube wells in Sindh

Figure 73 illustrates the exponential increase of tube wells in Sindh from 2011-12 to 2013-14. While over 90% of tube wells are for agricultural purposes, it indicates an increasing trend of groundwater mining and thereby reducing valuable freshwater resources. There is need to enhance efficient use of surface water and reduce groundwater abstraction.

Figure 73 - Tube wells in Sindh



(Source: Agricultural Statistics of Pakistan 2013-14. Government of Pakistan)

Sector Capacity

Municipal Training and Research Institute (MTRI)

Municipal Training and Research Institute (MTRI)[158] was an attached department of Ministry of Local Government and Rural Development to impart training and orientation facilities to elected representatives i.e. Nazims/Naib Nazims, Members/ Councillors, Officers and staff of Local Government Institutions viz District Governments, TMAs and Union Councils as well as the representatives of NGOs. MTRI was established in the year 1986. However, it became functional during the year 1988-89. The Mission Statement of MTRI is to strengthen a sound Local Government System consisting of trained professionals in the country who are responsive to public needs at the grassroots.

Municipal Training and Research Institute (MTRI), Karachi being a local Government Institute at the apex level provides a comprehensive training forum to the participants from all over Pakistan and other regional countries to exchange views and share their experiences and knowledge on the problems and constraints being faced by them in the field of Local Government, Management of Local Affairs and Sustainable Local Development. The training also aims to raise their knowledge and skill and to equip them with modern techniques for making positive contribution to the development process carried out in their respective localities.

Sindh Local Government and Rural Development Academy

Sindh Local Government and Rural Development Academy[159] was originally established as village aid training institute in 1953 at Sakrand. In 1956, it was shifted to Tandojam in the present campus. In the first phase, the institute was confined to the level of imparting pre-service and in-service trainings to the newly recruited male and female village workers under the Village-Aid Programme in the subjects of agriculture, animal husbandry, horticulture, poultry, carpeting, smiting, home economics, community development, first aid and child card. During the above period, eight long term courses, each of one year duration, were conducted at the institute and 522 male and female workers were trained in 1960. The second phase started after the wind up of the Village Aid Programme and introduction of Basic Democracies system in the country in July 1960.

The institute was renamed Basic Democracies Training Institute Southern Zone. The institute catered for the training needs of offices/officials and the elected representatives of various tiers of Basic Democracies in Karachi, Hyderabad, Khairpur, Multan, Bahalwalpur, Quetta and Kalat division of the then province of West Pakistan. In all, 93 courses of two or three weeks and three to six months duration were conducted and 3188 participants were trained in the subjects of Public Administration, Office Procedure, Basic Democracies Order 1959, Municipal Administration Ordinance 1960 and rules framed thereunder, Accounts, Budget, Taxation, Conciliation Courts Ordinance, etc. 1970. Subsequent to Basic Democracies system, the nomenclature of the institute was changed as Sindh Local Government Training Institute, with the object of catering the training

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[158] A Study on the Civil Service Structure, Civil Servants Training and an Overview of National Commission of Government Reforms in Pakistan, 2013. Government of Khyber Pakhtunkhwa, German Federal Ministry of Economic Cooperation and Development (BMZ) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

[159] A Study on the Civil Service Structure, Civil Servants Training and an Overview of National Commission of Government Reforms in Pakistan, 2013. Government of Khyber Pakhtunkhwa, German Federal Ministry of Economic Cooperation and Development (BMZ) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

needs of the officers/officials of local councils, constituted under Sindh Peoples Local Government Ordinance 1979. During this phase, 74 training courses were conducted and 4858 participants were trained.

In July 1983, the institute was raised to the status of academy and renamed as the Sindh Local Government and Rural Development Academy. In 2006, the Academy was renamed and upgraded as Sindh Civil Services and Local Government Academy Tandojam. Presently, the Academy has an enhanced scope in its activities and a well-articulated methodology of training in the field of rural development to the functionaries of various departments at Taluka, district and division level and elected representatives of local councils and village leaders are being sponsored to acquaint them with the nature and scope of the problem of rural development. The functionaries are being kept abreast of the latest knowledge and skills to improve their efficiency. The Academy is also conducting different training programmes in the disciplines of local government system, financial management and public administration for the employees and elected representatives of local councils.

The Academy has four facilities namely, Local Government, Rural Development. Financial Management and Public Administration and each faculty is headed by one post of Chief Instructor (BS-18) and three posts of posts of Senior Instructors BS-17[160].

The main objective of these courses is to acquaint local council employees at various level and elected representatives about the working of local government system and to create in them professional skills and to enhance their capability and aptitudes for better management of local councils.

Achievements

- The Academy has imparted trainings to trained 13,096 participants through 317 courses from 1982 to September-2015, conducted and organised different in-campus and off-campus Trainings / Workshops / Seminars and Conferences
- Apart from above according to NRB instructions, 426 notified trainers were trained by the Master Trainers at this Academy from 15th April to 6th July- 2001
- Through these trainers, 21,637 Councillors including Nazims and Naib Nazims of entire Sindh were also trained before taking their oath i.e. 14th August- 2001
- 844 Chief Municipal Officers of Municipal Committees, Town Officers of Town Committees and Secretaries, Union Councils were trained in collaboration with UNDP, on “Water Sanitation and Hygienic” and “Local Government Budgeting for WASH” in this Academy in 2015
- 4,000 Elected Members of Local Government were trained through a one day Seminar / Workshop in 2005, under the directives of the Chief Minister at 14 District Headquarters
- 300 Mukhtiarkars, Supervising Tapedars and Tapedars of five districts i.e. Thatta, Umerkot, Sanghar, Mirpurkhas and Badin were trained in-collaboration with the Board of Revenue Sindh
- Provided managerial support to WPSS for imparting trainings to 3635 Women Councilors of Sindh at Taluka level
- 1,289 Nazims/Naib Nazims/Women Councilors/ Potential Local Women Leaders and Secretaries of Union Councils were trained in eight district of Sindh in collaboration with Gender Based Governance System Project

[160] Update information provided by the Sindh Civil Services and Local Government Academy Tandojam

Staffing Capacity for Solid Waste Management

Table 16 indicates the staffing capacity for solid waste management in selected secondary cities in Sindh. This needs to be viewed together with Table 12 in the Chapter on Solid Waste.

Table 16 - Staffing Capacity for solid waste management in selected secondary cities

	Mirpur Khas	Umerkot	Johi	Larkana	Shikarpur	Sukkur
Chief Officer	1	1	1	1	1	1
Chief Sanitary Inspector	1			1	1	1
Sanitary Inspectors	8	3	1	11	2	7
Supervisors		4	5			
Drivers	6	4		13	5	14
Sanitary Jamadars	8			23	8	17
Collectors	18	12	3	40	18	28
Sanitary Workers	305	120	21	290	118	364

(Source: Capacity Building for Environmental Management in Sindh, 2006. Asian Development Bank TA 4432-PAK)

There is insufficient data regarding other cities at present and warrants further study.

Staffing Capacities in Local Government and Public Health Engineering

A comparison of the basic structure in Local Government and Public Health Engineering is shown in Table 17. It illustrates that the technical capacity for water supply and sewerage and drainage lies in public health engineering, while administrative capacity lies with Local Government. This presents a major challenge to Local Government for providing O&M services as per current regulations. This anomaly needs to be corrected so that both installation and O&M of water supply and sewerage and drainage schemes rest with Public Health Engineering, while solid waste management and general sanitation services rest solely with Local Government.

The Government of Sindh has recently issued a notification directing O&M functions to be executed by PHE&RDD and financing for this is being provided.

Table 17 - Comparative structure in Local Government and Public Health Engineering

Local Government	Public Health Engineering
LG&HTPD Secretariat - Karachi	PHED Secretariat – Karachi
Sindh Civil Services and Local Government Academy - Tandojam	
MTRI - Karachi	
Provincial Local Government Commission (IM&EC) - Karachi	Chief Engineer – Hyderabad. The Chief Engineer is supported by a Director (Technical), 2 Superintending Engineers, 1 Research Officer, 2 Design Officers, 1 Executive Engineer, 1 Senior Geophysicist, 1 Junior Geophysicist, 1 Chief Head Draughtsman and 1 Hydro-geologist
Rural Development Department Secretariat - Karachi	Chief Engineer – Sukkur. The Chief Engineer is supported by a Director (Technical), 2 Superintending Engineers, 2 Design Officers, 1 Executive Engineer, 1 Senior Geophysicist, 1 Junior Geophysicist, 1 Chief Head Draughtsman and 1 Hydro-geologist
Director General Rural Development Department - Hyderabad	Research Laboratory - Hyderabad
Field Office Local Government – one each in 23 districts. A Field Office is staffed by a Local Government Support Officer assisted by 3-9 Development Officers	Superintending Engineer – one each in 4 divisions
Field Office (SAP) – one each in 15 districts. A Field Office (SAP) usually has 3-9 District Officers	Executive Engineer – one each in 25 districts. One Executive Engineer is supported by 3-4 Assistant Engineers and 1 Sub-Engineer
Directorates of Local Government – one each in 5 divisions	
Divisional Office of Director RDD	
Field Office (SAP) of Executive Engineer	
Administration cadres BPS 16-20 – 238 nos	Administration cadres BPS 16-20 – 24 nos
Technical cadres BPS 16-20 – 12 nos	Technical cadres BPS 16-20 – 187 nos
Other cadres BPS 14 and below – 1090 nos	Other cadres BPS 14 and below – 3075 nos

(Source: Government of Sindh, Annual Budget 2015-16)

Strategy

Sector Efficiency and Capacity			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Reduced systems leakages of Non Revenue Water and Unaccounted for Water	Map out points of system leakages area by area and take remedial measures for Distribution Network Improvements (DNI) Reduce NRW losses from 60% to 30% in Karachi Reduce NRW and UAW to 20% or less Outsource at least 25% of revenue collection	Reduce NRW and UAW to 20% or less in Karachi and other cities of Sindh	Reduce NRW and UAW to 10% or less in Karachi and other cities of Sindh
Increased household water metering	Introduce water metering in phases All new connections to be metered At least 100% of high income areas have metering in place All commercial and business premises have water metering	At least 10% of medium income areas have metering in place	At least 20% of medium income areas have metering in place
Efficient Billing and Collection	Collection period reduced to less than 30 days Billing efficiency increased to 50% Financial collection efficiency increased to 50% Outsource billing and collection	Collection period reduced to less than 15 days Billing efficiency increased to 75% Financial collection efficiency increased to 75%	Collection period maintained at less than 15 days Billing efficiency increased to 90% and above Financial collection efficiency increased to 90% and above
A functional Biometric tracking system in all cities and towns	All mega cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 50% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles	At least 75% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 60% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles	At least 90% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles

	At least 30% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles		
Human Resource Development for the sub-sectors	Conduct a human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors and develop a human resource development plan Strengthen infrastructure and training capacities at Local Government Training Institutes		
Technical training / workshops conducted for town level Local Government staff	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year
Capacities developed of CBOs and civil society in solid waste management (LG&HTPD)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)
Technical training / workshops conducted for district PHED staff	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year
Capacities developed of CBOs and civil society in O&M of water supply schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)

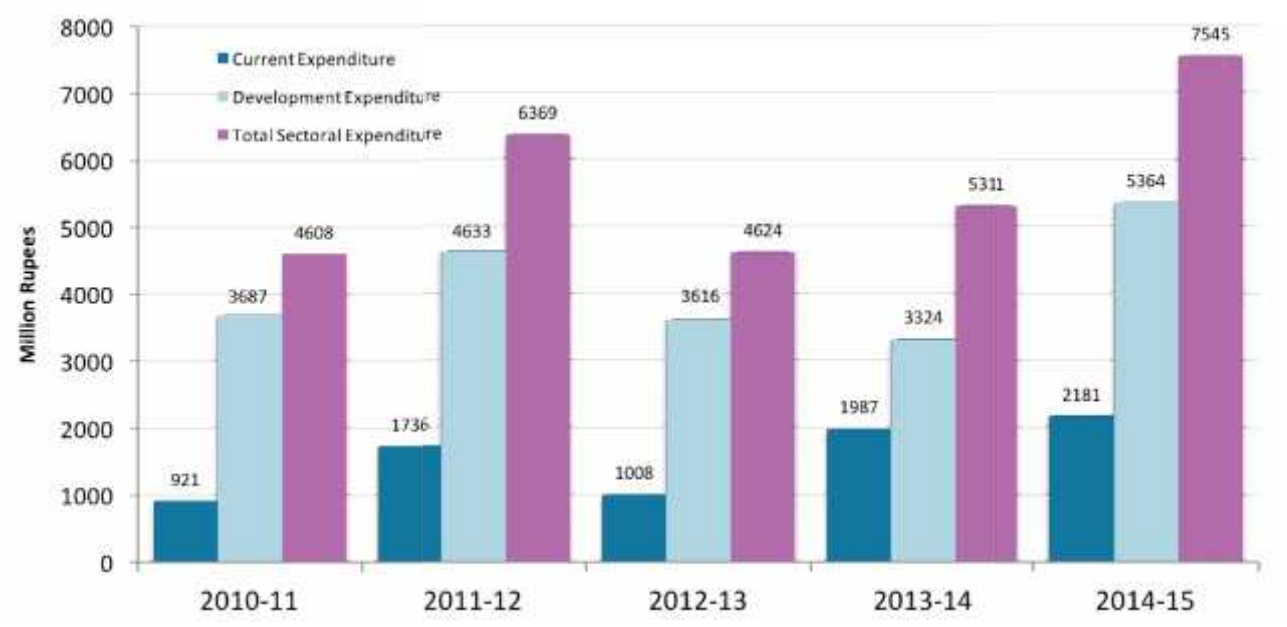
SECTOR FINANCING

Sectoral Expenditure Review

The Government of Sindh has had vacillating investments in water supply and sanitation in the last five financial year periods. There was a spike in sectoral spend in 2011-12 following the 2010 floods. Figure 74 illustrates the sectoral investment trends from PKR 4.6 billion in 2010-11 to PKR 7.5 billion in 2014-15. Pro-poor sectoral current expenditure has also increased over three-fold during this period from PKR 921 million to 2.1 billion, a significant proportion of which is due to salaries and utilities.

Overall, the increase in pro-poor sectoral development expenditure has been modest from PKR 3.6 billion in 2010-11 to PKR 5.3 in 2014-15.

Figure 74 - Current, Development and Total Pro-Poor Expenditure in Water and Sanitation

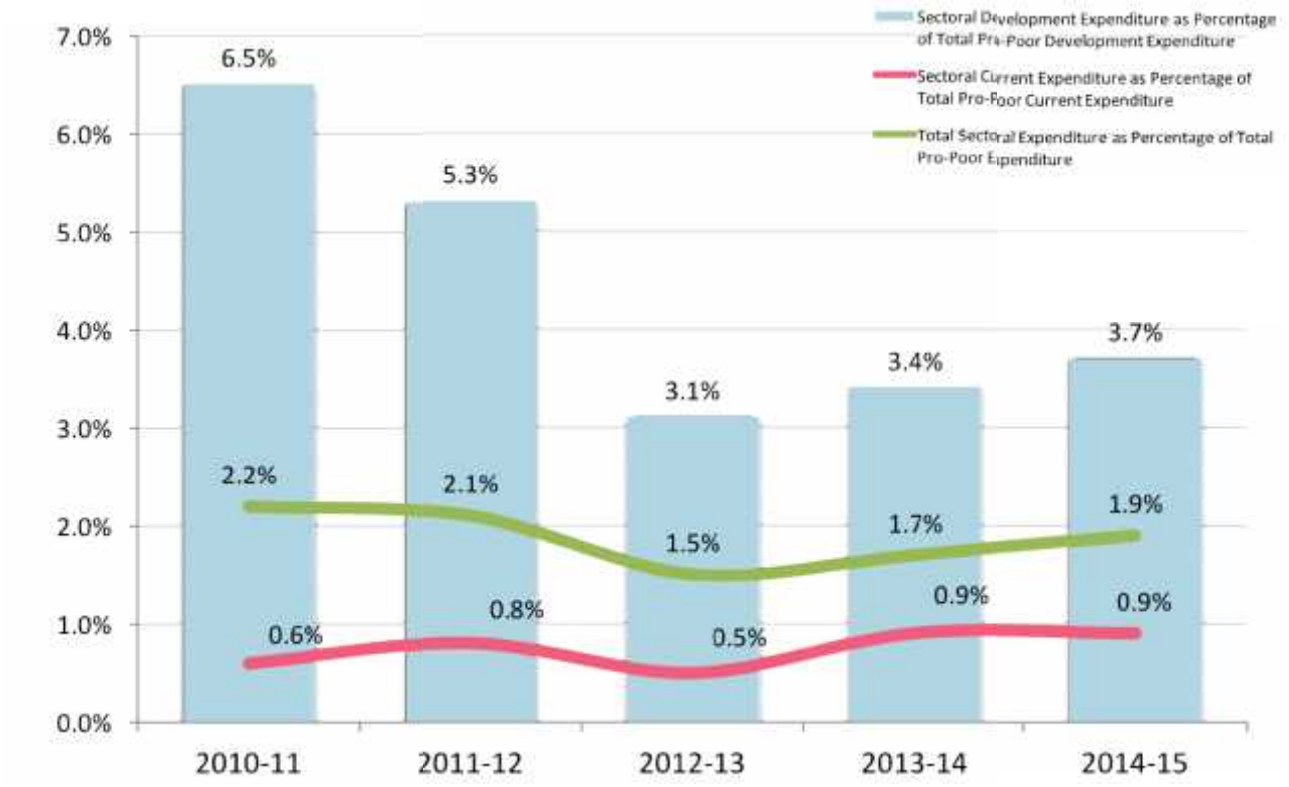


(Source: PRSP Annual Progress Reports, Ministry of Finance, Government of Pakistan – 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15)

Sectoral Development Expenditure Trends

The overall pro-poor sectoral expenditure in water supply and sanitation averages around 1.9% of total pro-poor expenditure between 2010-11 to 2014-15 (Fig 75). Current expenditure during this period averages at about 0.7% of total pro-poor current expenditure, while development expenditure averages at 4.4% total pro-poor development expenditure. There has been a gradual but definite reduction in development expenditure in proportion to overall total pro-poor expenditure from 6.5% in 2010-11 to 3.7% in 2014-15.

Figure 75 - Sectoral expenditure as percentage of total pro-poor expenditure

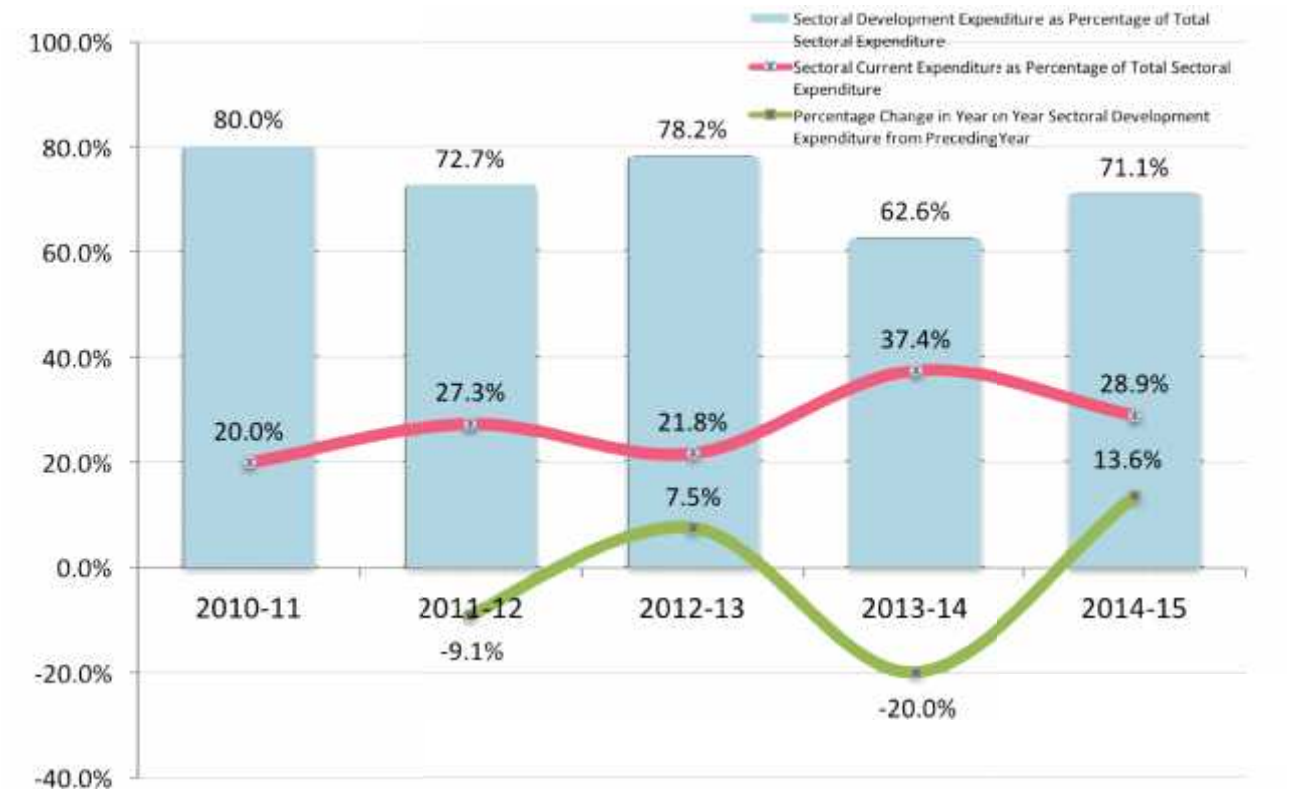


(Source: PRSP Annual Progress Reports, Ministry of Finance, Government of Pakistan – 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15)

On analysis of sectoral expenditure trends, current expenditure as a percentage of total sectoral expenditure has increased from 20.0% in 2010-11 to 28.9% in 2014-15 (Fig 76). Conversely, development expenditure as a percentage of total sectoral expenditure has decreased from 80.0% in 2010-11 to 71.1% in 2014-15. The year on year change in development expenditure from the preceding year has vacillated from a -9.5% decrease in 2011-12, a 7.5% increase in 2012-13, followed by a -20.0% decrease in 2013-14, and then a 13.6% increase in 2014-15.

These figures suggest that while there has been an overall increase in sectoral funding for water and sanitation, overall investment in the sector in relation to total pro-poor development spending has actually reduced. Further, there is diminishing prioritisation of investment in the sector compared to other sectors.

Figure 76 - Sectoral expenditure trends



(Source: PRSP Annual Progress Reports, Ministry of Finance, Government of Pakistan – 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15)

Sectoral Development Allocation and Expenditure Trends

Table 18 indicates the various departments under which sectoral spending takes place. The majority of schemes are under PHED followed by LG&HTPD. However, in terms of financial outlay, the largest schemes are found under Federal Matching Grants and Special Initiatives. Overall, there is 28.9% utilisation of cost of ongoing scheme, while ADP allocations for new schemes are about 25% of the cost of the scheme. The total estimated cost of ongoing schemes is Rs 101,599.479 million, while the estimated cost of new schemes is Rs 14,968.25. The total ADP allocation for ongoing and new schemes for 2015-16 is Rs 22,129.253.

Furthermore, about 69% of the ADP allocation is for ongoing schemes, while 31% is for new schemes. There is need to further increase allocation for ongoing schemes to minimise cost-overruns and limit new schemes until ongoing ones are completed. **Table 19** and **Fig 77** indicates the proportionate allocation and spend by department, while **Fig 78** illustrates the sub-sectoral allocation in the ADP 2015-16.

Table 18 - Sectoral development allocation and expenditure

	Number of ongoing schemes	Estimated cost of ongoing schemes	Actual expenditure up to June 2015	ADP allocation 2015-16 ongoing schemes	Number of new schemes	Estimated cost of new schemes	ADP allocation 2015-16 new schemes	Total number of ongoing and new	Total allocation ongoing plus new schemes 2015-16	Percent utilisation in ongoing schemes	Percent allocation of new scheme cost
LG&HTPD	42	16063.821	3638.065	5020.977	21	3761.549	940.387	63	5961.364	22.6%	25.0%
PHED	146	22814.074	7262.076	2409.341	59	1962.637	490.659	205	2900.000	31.8%	25.0%
RDD	5	177.992	32.032	67.250	1	25.000	6.250	6	73.500	18.0%	25.0%
Federal Matching	6	36278.120	6588.971	4381.708	0	0	0	6	4281.708	18.2%	0.0%
P&DD	2	7926.000	587.250	1169.000	0	0	0	2	1169.000	7.4%	0.0%
Special Initiatives	6	12589.154	9750.420	1853.000	2	3400.000	850.000	8	2703.000	77.5%	25.0%
Services	0	0	0	0	7	5819.064	3016.764	7	3016.764	0.0%	51.8%
Thar Coal	3	2191.416	2014.098	186.889	0	0	0	3	186.889	91.9%	0.0%
Industries and Commerce	1	20.000	0.000	20.000	0	0	0	1	20.000	0.0%	0.0%
Information, Science and technology	1	59.000	0.800	58.200	0	0	0	1	58.200	1.4%	0.0%
Irrigation	1	3422.782	2665.000	68.000	0	0	0	1	68.000	77.9%	0.0%
Katchi Abadis	1	57.120	0.000	57.120	0	0	0	1	57.120	0.0%	0.0%
Community Develop Programme SDGs	0	0	0	0	215	0	1119.641	215	1119.641		
Priority Development Programme	0	0	0	0	121	0	514.067	121	514.067		
Total	**214**	**101599.479**	**32538.712**	**15291.485**	**426**	**14968.25**	**6937.768**	**640**	**22129.253**	**28.9%**	

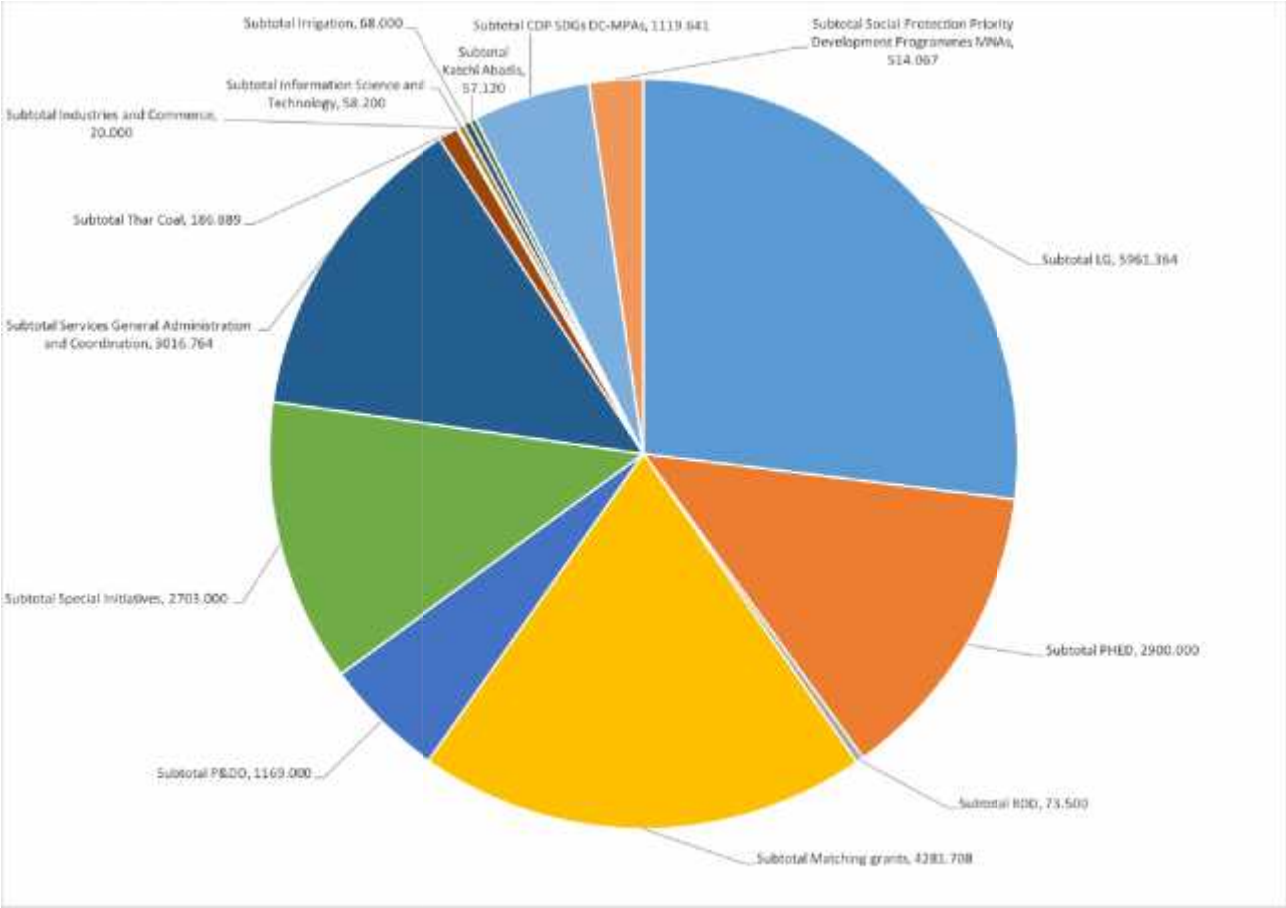
(Source: Government of Sindh, Annual Budget 2015-16) Rupees Million

Table 19 - Proportionate sectoral allocation by department

	ADP 2015-16	Percentage
LG	5961.364	26.9%
PHED	2900.000	13.1%
RDD	73.500	0.3%
Matching grants	4281.708	19.3%
P&DD	1169.000	5.3%
Special Initiatives	2703.000	12.2%
Services General Administration and Coordination	3016.764	13.6%
Thar Coal	186.889	0.8%
Industries and Commerce	20.000	0.1%
Information Science and Technology	58.200	0.3%
Irrigation	68.000	0.3%
Katchi Abadis	57.120	0.3%
Community Development Programme for SDGs DC-MPAs	1119.641	5.1%
Social Protection Priority Development Programmes MNAs	514.067	2.3%
Total	**22129.253**	**100.0%**

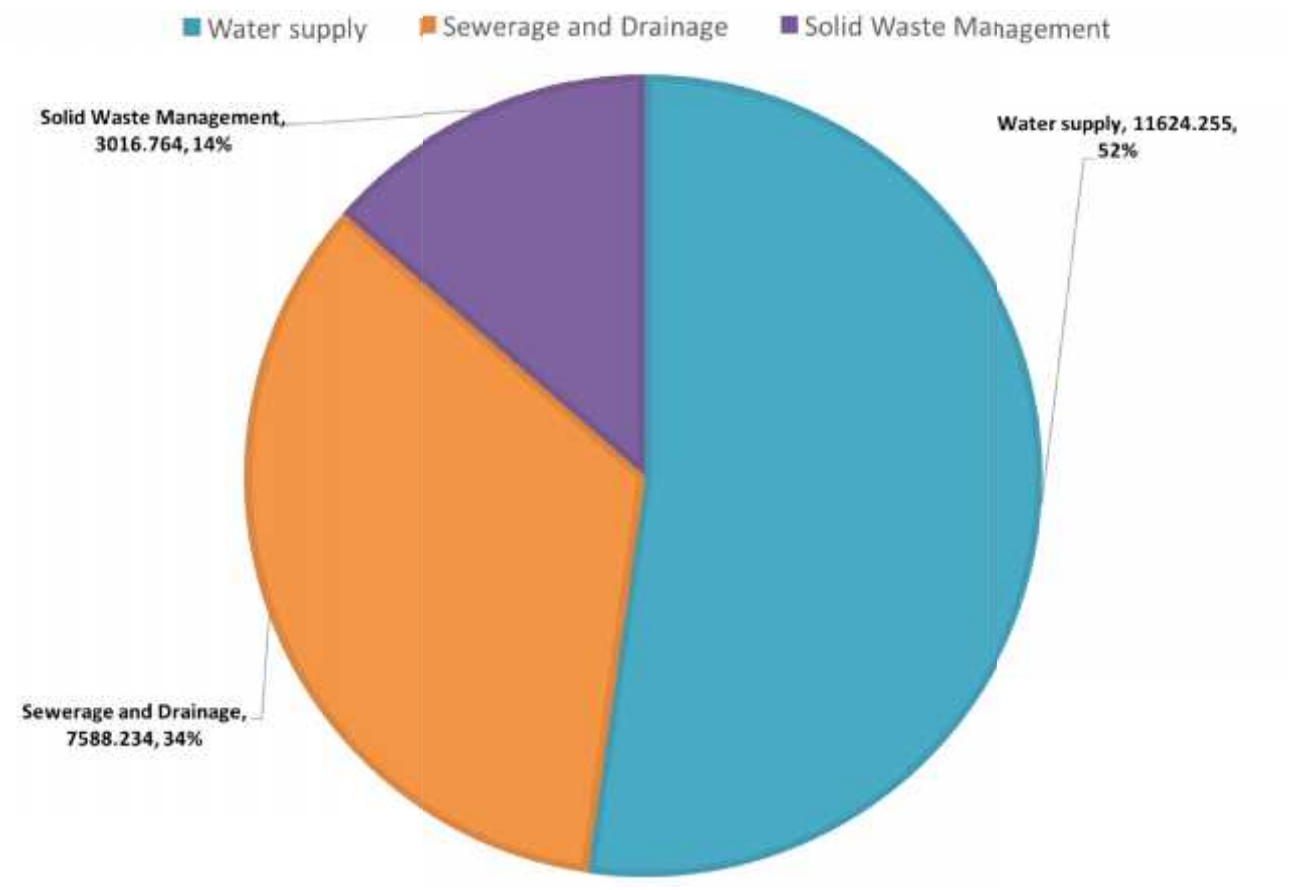
(Source: Government of Sindh, Annual Budget 2015-16) Rupees Million

Figure 77 - Proportionate allocation and spend by department



(Source: Government of Sindh, Annual Budget 2015-16) Rupees Million

Figure 78 - Sub-sector allocation and percentage of sectoral allocation



(Source: Government of Sindh, Annual Budget 2015-16) Rupees Million

Estimating Cost for Sectoral Investment

Medium Term Budgetary Framework

Medium Implementation of Medium Term Budgetary Framework (MTBF) is at the heart of Public Financial Management Reform initiatives in Balochistan. One of the aims of MTBF is to establish a link between outcomes, outputs and costs. Contrary to annual budgeting, MTBF is a multi-year approach to budgeting which links the spending plans of the government to its policy objectives set out in a fiscal framework. Multi- year horizon provides the line departments the requisite space and flexibility to formulate, plan and implement the policies focusing solely on service delivery and outputs. Given the fact that public policy decisions normally take more than one year for their implementation, it is important to keep the multi-year horizon in determining the resource allocation amongst the different functions of the Government.

The aim of this sector development plan is to align with MTBF processes and:

- ensure systematic use of rolling multi-year perspective to formulate annual budgets
- link resources with Medium Term Fiscal Framework and fiscal/policy indicators
- facilitate strategic prioritisation of expenditures which synchronise with the departmental priorities

Sustainable Development Goals

The Sustainable Development Goal (SDG) for water and sanitation (Goal 6) is “Ensure availability and sustainable management of water and sanitation for all”. This shall serve as the overarching guide for setting targets for the Balochistan WASH sector development plan.

The SDG targets are as follows:

- 6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all
- 6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally
- 6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity
- 6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

- 6.6 by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
- 6.a by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- 6.b support and strengthen the participation of local communities for improving water and sanitation management

Developing a Costing Framework

The policy targets for drinking water supply and sanitation are aligned with the proposed SDG targets for drinking water and sanitation and are as follows:

- provision of safely managed drinking water to the entire population by 2026
- entire population has universal access to sustainable and safely managed sanitation by 2026

For the purposes of estimating sectoral investment, the following assumptions have been used

- Align with Sustainable Development Goal 6 of achieving 100% population coverage
- Use a target of 100% coverage for drinking water supply – with improved water supply source
- Use a target of 100% for sanitation system
- Population projections used for 2026
- Status of access to water supply is obtained from PSLM 2014-15[161]
- Status of sewerage system is derived from PSLM 2014-15[162]
- Unit rates for water supply schemes are obtained from PHE&RDD
- Unit rates for sewerage and drainage schemes are obtained from LG&HTPD and PHE&RDD
- Latrine construction is presumed to be the responsibility of the citizens, and therefore sanitation costs refer to sewerage and drainage.

Table 20 presents a detailed sub-sector financial analysis of the ADP 2015-16. It indicates that 52.3% of the ADP allocation is for drinking water supply, 34.1% for sanitation and 13.6% for solid waste management.

Table 21 presents costing for safely managed overall drinking water supply by district with unit costing per UC (excluding indirect costs), per household and per capita at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

Table 22 presents costing for safely managed urban drinking water supply by district at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

[161] Pakistan Social and Living Standards Measurement Survey 2014-15. Pakistan Bureau of Statistics
[162] Pakistan Social and Living Standards Measurement Survey 2014-15. Pakistan Bureau of Statistics

Table 23 presents costing for safely managed rural drinking water supply by district at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

Table 24 presents costing for safely managed overall sewerage and drainage by district with unit costing per UC (excluding indirect costs), per household and per capita at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Table 25 presents costing for safely managed urban sewerage and drainage by district at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Table 26 presents costing for safely managed rural sewerage and drainage by district at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Table 27 presents costing for improved overall drinking water supply by district with unit costing per UC (excluding indirect costs), per household and per capita at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

Table 28 presents costing for improved urban drinking water supply by district at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

Table 29 presents costing for improved rural drinking water supply by district at current rates and at 8% inflation. Improved water here includes piped, hand pump and motorised pump.

Table 30 presents costing for improved overall sewerage and drainage by district with unit costing per UC (excluding indirect costs), per household and per capita at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Table 31 presents costing for improved urban sewerage and drainage by district at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Table 32 presents costing for improved rural sewerage and drainage by district at current rates and at 8% inflation. Improved sanitation (sewerage and drainage) here includes flush to sewer and flush to septic tank. It does not include flush to open sewer.

Tables 33-36 present costing of missing facilities (drinking water and latrines) in public sector primary and middle/secondary schools.

Table 37 presents the costing requirement for water and sanitation at Basic Health Units.

Tables 38-49 present the indirect costs for the sector, while **Tables 50 and 51** present notional costs per district for safely managed and improved water supply and sanitation options respectively. However, **Tables 50 and 51** should not be taken as 'all encompassing' as several activities which have been costed at provincial level would need to be further costed at district

level at the time of operationalization. It does however, provide a useful guideline for programme planning.

Table 52 presents a summary of indirect costs.

Table 53 presents the investment overview for the sector development plan at current rates and at 8% inflation for the safely managed water supply and sanitation option, while **Table 54** presents the investment overview for the sector development plan at current rates and 8% inflation for the improved water supply and sanitation option.

Figure 79 illustrates the additional investment required over and above current investment trends both at current rates and at 8% inflation for the safely managed water supply and sanitation option, while **Fig 80** illustrates the sub-sector investment requirements for the safely managed water supply and sanitation option. **Figure 81** illustrates the additional investment required over and above current investment trends both at current rates and at 8% inflation for the improved water supply and sanitation option, while **Fig 82** illustrates the sub-sector investment requirements for the improved water supply and sanitation option.

The investment plan proposes an additional PKR 214 billion in the short term, PKR 343 billion in the medium term, and PKR 587 billion in the long term, over current investment trends under the safely managed water supply and sanitation option; while an additional PKR 24 billion would be required in the short term, PKR 58 billion in the medium term, and PKR 111 billion in the long term, over current investment trends under the improved water supply and sanitation option.

Table 20 – Detailed sub-sectoral financial analysis of sectoral financing in ADP 2015-16

		Number of ongoing schemes	Estimated Cost ongoing schemes	Actual Expenditure up to June 2015	ADP allocation 2015-16 ongoing schemes	Number of new schemes	Estimated cost new schemes	ADP allocation 2015-16 new schemes	Total number of ongoing plus new schemes 2015-16	Total allocation ongong plus new schemes 2015-16	Percent utilisation ongoing	Percent allocation of new scheme cost
Local Government												
LG Water Supply	Water Supply	15	11143.815	1077.164	3343.336	5	1077.913	269.479	20	3612.815	9.7%	25.0%
LG Sanitation	Drainage	27	4920.006	2560.901	1677.641	16	2683.636	670.908	43	2348.549	52.1%	25.0%
Subtotal LG		**42**	**16063.821**	**3638.065**	**5020.977**	**21**	**3761.549**	**940.387**	**63**	**5961.364**	**22.6%**	**25.0%**
PHED												
PHED Water Supply	Water Supply	66	9286.084	3715.124	963.652	27	1154.694	288.673	93	1252.325	40.0%	25.0%
PHED Drainage	Drainage	73	8884.863	3306.966	1029.931	32	807.943	201.986	105	1231.917	37.2%	25.0%
Rehab non-functional schemes	Water Supply		4590.000	202.617	400.000	0	0	0	0	400.000	4.4%	0.0%
Additional schemes from 2014-15	Water Supply	7	53.127	37.369	15.758	0	0	0	7	15.758	70.3%	0.0%
Subtotal PHED		**146**	**22814.074**	**7262.076**	**2409.341**	**59**	**1962.637**	**490.659**	**205**	**2900.000**	**31.8%**	**25.0%**
RDD												
RDD Water Supply	Water Supply	4	162.992	32.032	63.500	0	0.000	0.000	4	63.500	19.7%	0.0%
RDD Drainage	Drainage	1	15.000	0.000	3.750	1	25.000	6.250	2	10.000	0.0%	25.0%
Subtotal RDD		**5**	**177.992**	**32.032**	**67.250**	**1**	**25.000**	**6.250**	**6**	**73.500**	**18.0%**	**25.0%**
Matching Grants												

S-III GoS	Drainage	1	3991.000	1970.000	1000.000				1	1000.000	49.4%	
S-III GoP ECNEC	Drainage		3991.000	829.000	100.000				0	100.000	0.0%	
STPs Hyderabad Package GoP ECNEC	Drainage	1	915.300	496.150	124.955				1	124.955	54.2%	
K-IV GoS	Water supply	1	12775.500	0.000	2500.000				1	2500.000	0.0%	
K-IV GoP ECNEC	Water supply		12755.000	2080.000	500.000				0	500.000	16.3%	
Water filtration plant Hyderabad Package GoP CDWP	Water supply	1	935.000	665.044	100.000				1	100.000	71.1%	
Urban water supply Benazirabad GoP ECNEC	Water supply	1	783.500	463.710	10.000				1	10.000	59.2%	
Water supply and drainage Tando Jam Hyderabad Package GoP CDWP	Water supply	1	131.820	85.067	46.753				1	46.753	64.5%	
Subtotal Matching grants		**6**	**36278.120**	**6588.971**	**4381.708**	**0**	**0**	**0**	**6**	**4381.708**	**18.2%**	**0.0%**
P&DD												
SCIP	FPA 3876.790	1	7000.000	525.000	969.000				1	969.000	7.5%	
SMSDP	FPA 2250.000	1	926.000	62.250	200.000				1	200.000	6.7%	
Subtotal P&DD		**2**	**7926.000**	**587.250**	**1169.000**	**0**	**0**	**0**	**2**	**1169.000**	**7.4%**	**0.0%**
Special Initiatives												
Sindh DW hubs phase II for 750 units	Water supply	1	4000.000	3841.650	158.350				1	158.350	96.0%	0.0%

Sindh solar power generation water filtration plants Phase I and II	Water supply	1	2135.000	1560.000	575.000				1	575.000	73.1%	0.0%
CDWA O&M	Water supply	1	971.540	276.487	12.000				1	12.000	28.5%	0.0%
PPIU CDWA	Water supply	1	36.614	22.283	8.331				1	8.331	60.9%	0.0%
Tharparkar DW hubs Phase III 750 units	Water supply	1	5254.000	4040.000	1000.000				1	1000.000	76.9%	0.0%
New drainage system Thatta City	Drainage	1	192.000	10.000	99.319				1	99.319	5.2%	0.0%
Sindh DW hubs Phase IV 500 units	Water supply					1	3000.000	750.000	1	750.000		25.0%
PMU DW hubs	Water supply					1	400.000	100.000	1	100.000		25.0%
Subtotal Special Initiatives		**6**	**12589.154**	**9750.420**	**1853.000**	**2**	**3400.000**	**850.000**	**8**	**2703.000**	**77.5%**	**25.0%**
Services General Administration and Coordination												
Karachi	Solid waste					3	3940.000	2327.500	3	2327.500		59.1%
Shaheed Benazirabad	Solid waste					2	692.664	392.664	2	392.664		56.7%
Larkana	Solid waste					2	1186.400	296.600	2	296.600		25.0%
Subtotal Services General Administration and Coordination			**0**	**0**	**0**	**7**	**5819.064**	**3016.764**	**7**	**3016.764**	**0.0%**	**51.8%**
Energy - Thar Coal												

Installation of RO desalination plant 25 villages Tharparkar	Water supply	1	942.000	880.103	61.897				1	61.897	93.4%	
Upgradation 2 RO plants Mithi and Islamkot	Water supply	1	934.820	943.391	1.000				1	1.000	100.9%	
Installation 6 RO desalination plants 6 villages Tharparkar	Water supply	1	314.596	190.604	123.992				1	123.992	60.6%	
Subtotal Thar Coal		**3**	**2191.416**	**2014.098**	**186.889**	**0**	**0**	**0**	**3**	**186.889**	**91.9%**	**0.0%**
Industries and Commerce												
Consultancy Services for Establishment of Four Combined Effluent Treatment Plant (CETP) for Industrial Areas of Karachi including laying of interceptor sewers	Waste water	1	20.000	0.000	20.000	0	0	0	1	20.000	0.0%	
Subtotal Industries and Commerce		**1**	**20.000**	**0.000**	**20.000**	**0**	**0**	**0**	**1**	**20.000**	**0.0%**	
Information Science and Technology												

Barani area water availability study pilot water supply project Malir	Water supply	1	59.000	0.800	58.200				1	58.200	1.4%	
Subtotal Information Science and Technology		**1**	**59.000**	**0.800**	**58.200**				**1**	**58.200**	**1.4%**	
Irrigation												
Water supply Karachi upgrading Kinjhar Lake system	Water supply	1	3422.782	2665.000	68.000	0	0	0	1	68.000	77.9%	
Subtotal Irrigation		**1**	**3422.782**	**2665.000**	**68.000**	**0**	**0**	**0**	**1**	**68.000**	**77.9%**	**0.0%**
Katchi Abadis												
Water supply, sewerage and drainage in different Katchi Abadies in SBA, Khairpur, Larkana, Sukkur, Hyderababd, Mirpurkhas, Thatta & Karachi		1	57.120	0.000	57.120				1	57.120	0.0%	
Subtotal Katchi Abadis		**1**	**57.120**	**0.000**	**57.120**				**1**	**57.120**	**0.0%**	**0.0%**
Community Development Programme for												

SDGs												
CDP SDGs DC-MPAs Water supply	Water Supply					30		177.444	30	177.444		
CDP SDGs DC-MPAs Drainage	Drainage					185		942.197	185	942.197		
Subtotal CDP SDGs DC-MPAs						**215**		**1119.641**	**215**	**1119.641**		
Social Protection Priority Development Programmes												
Social Protection Priority Development Programmes MNAs	Water supply					6		28.890	6	28.890		
Social Protection Priority Development Programmes MNAs	Drainage					115		485.177	115	485.177		
Subtotal Social Protection Priority Development Programmes MNAs						**121**		**514.067**	**121**	**514.067**		
		214	**101599.479**	**32538.712**	**15291.485**	**426**	**14968.250**	**6937.768**	**640.000**	**22229.253**		

Table 21 - Detailed costing for safely managed overall drinking water supply by district

District	% piped water supply on premises	Number of HH 1998	No UCs	Total est pop all UCs 2026	Total est No of HH all UCs 2026	Mean pop per UC 2026	Mean No of HH per UC 2026	Population with access to Piped Water Supply PSLM 2014-15	Access population gap to meet by 2026
	a	A	B	C	D	E	F	G	H
					[C/A]	[C/B]	[D/B]	[C*a]	[C-G]
Badin	0.115	214,348	49	2,075,398	391,584	42,355	7,992	238,671	1,836,727
Sujawal	0.100	109,852	29	996,762	207,117	34,371	7,142	100,075	896,687
Thatta	0.229	110,612	34	1,102,581	208,696	32,429	6,138	252,712	849,869
Dadu	0.156	203,217	55	2,317,005	421,274	42,127	7,660	361,684	1,955,321
Hyderabad	0.603	425,512	116	2,623,925	437,321	22,620	3,770	1,581,964	1,041,961
Jamshoro	0.456	101,402	30	1,218,663	221,575	40,622	7,386	555,954	662,709
Matiari	0.047	74,362	25	902,260	150,377	36,090	6,015	42,587	859,673
Tando Allah Yar	0.046	99,120	30	819,938	136,656	27,331	4,555	37,553	782,385
Tando M Khan	0.058	91,733	31	772,086	128,681	24,906	4,151	44,858	727,228
Karachi Central	0.819	337,122	42	6,119,496	905,653	145,702	21,563	5,011,867	1,107,629
Karachi East	0.819	215,339	26	3,702,357	578,493	142,398	22,250	3,032,230	670,127
Karachi South	0.819	237,165	30	4,218,944	637,126	140,631	21,238	3,455,315	763,629
Karachi West	0.819	225,872	30	4,208,477	608,132	140,283	20,271	3,446,743	761,734
Korangi	0.819	213,437	28	4,122,657	573,384	147,238	20,478	3,376,456	746,201
Malir	0.819	116,573	25	2,054,672	313,165	82,187	12,527	1,682,776	371,896
Jacobabad	0.014	121,127	42	1,305,942	233,204	31,094	5,552	18,414	1,287,528
Kashmore	0.018	131,473	44	1,203,411	214,895	27,350	4,884	21,541	1,181,870
Larkana	0.009	166,450	43	2,383,207	403,933	55,423	9,394	20,496	2,362,711
Q Shahdadkot	0.093	162,483	43	2,196,695	372,321	51,086	8,659	203,634	1,993,061
Shikarpur	0.009	150,108	52	1,686,491	285,846	32,433	5,497	15,853	1,670,638

Mirpur Khas	0.270	148,659	41	1,929,655	316,337	47,065	7,716	520,428	1,409,227
Sanghar	0.066	246,091	69	2,846,978	490,858	41,261	7,114	186,477	2,660,501
Tharparkar	0.054	163,692	46	2,167,030	386,970	47,109	8,412	117,886	2,049,144
Umerkot	0.222	121,572	34	1,641,132	303,913	48,269	8,939	364,003	1,277,129
Ghotki	0.051	153,217	75	2,382,961	471,873	31,773	6,292	122,246	2,260,715
Khairpur	0.032	254,828	76	3,269,872	536,045	43,025	7,053	104,636	3,165,236
Sukkur	0.241	137,632	43	1,996,271	302,465	46,425	7,034	480,502	1,515,769
N Feroze	0.106	187,512	51	1,700,898	293,258	33,351	5,750	180,295	1,520,603
S Benazirabad	0.061	178,589	58	1,733,906	288,984	29,895	4,982	106,115	1,627,791
Sindh	**0.356**	**5,099,099**	**1297**	**65,699,670**	**10,820,136**			**25,683,972**	**40,015,698**
District	**% piped water supply on premises**	**Number of HH 1998**	**No UCs**	**Total est pop all UCs 2026**	**Total est No of HH all UCs 2026**	**Mean pop per UC 2026**	**Mean No of HH per UC 2026**	**Population with access to Piped Water Supply PSLM 2014-15**	**Access population gap to meet by 2026**

Table 21 continued

District	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per UC at current rates	Mean cost per HH at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per UC at 8% inflation	Mean cost per HH at 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	I	J	K	L	M	N	O	P	Q	R	S
	15,000,000	[(H/1000)*I]	[J/B]	[J/(H/A)]	[J/H]	[J/10]	[J*1.08^10]	[O/B]	[O/(H/A)]	[O/H]	[O/10]
Badin	15,000,000	27,550,908,450	562,263,438	3,215,220,000	15,000	2,755,090,845	59,480,344,950	1,213,884,591	6,941,418,830	32,384	5,948,034,495
Sujawal	15,000,000	13,450,306,428	463,803,670	1,647,780,000	15,000	1,345,030,643	29,038,202,768	1,001,317,337	3,557,433,432	32,384	2,903,820,277
Thatta	15,000,000	12,748,041,522	374,942,398	1,659,180,000	15,000	1,274,804,152	27,522,065,508	809,472,515	3,582,045,177	32,384	2,752,206,551
Dadu	15,000,000	29,329,807,793	533,269,233	3,048,255,000	15,000	2,932,980,779	63,320,855,208	1,151,288,277	6,580,953,918	32,384	6,332,085,521
Hyderabad	15,000,000	15,629,409,263	134,736,287	6,382,680,000	15,000	1,562,940,926	33,742,722,349	290,885,537	13,779,727,402	32,384	3,374,272,235
Jamshoro	15,000,000	9,940,634,091	331,354,470	1,521,030,000	15,000	994,063,409	21,461,083,428	715,369,448	3,283,789,689	32,384	2,146,108,343
Matiari	15,000,000	12,895,099,920	515,803,997	1,115,430,000	15,000	1,289,509,992	27,839,553,560	1,113,582,142	2,408,129,710	32,384	2,783,955,356
Tando A Yar	15,000,000	11,735,772,594	391,192,420	1,486,800,000	15,000	1,173,577,259	25,336,652,815	844,555,094	3,209,889,686	32,384	2,533,665,282
Tando M Khan	15,000,000	10,908,417,051	351,884,421	1,375,995,000	15,000	1,090,841,705	23,550,454,252	759,692,073	2,970,670,002	32,384	2,355,045,425
Karachi Central	15,000,000	16,614,431,640	395,581,706	5,056,830,000	15,000	1,661,443,164	35,869,311,783	854,031,233	10,917,316,694	32,384	3,586,931,178
Karachi East	15,000,000	10,051,899,255	386,611,510	3,230,085,000	15,000	1,005,189,926	21,701,296,572	834,665,253	6,973,511,250	32,384	2,170,129,657
Karachi South	15,000,000	11,454,432,960	381,814,432	3,557,475,000	15,000	1,145,443,296	24,729,261,647	824,308,722	7,680,321,705	32,384	2,472,926,165
Karachi West	15,000,000	11,426,015,055	380,867,169	3,388,080,000	15,000	1,142,601,506	24,667,909,521	822,263,651	7,314,610,605	32,384	2,466,790,952
Korangi	15,000,000	11,193,013,755	399,750,491	3,201,555,000	15,000	1,119,301,376	24,164,877,190	863,031,328	6,911,917,120	32,384	2,416,487,719
Malir	15,000,000	5,578,434,480	223,137,379	1,748,595,000	15,000	557,843,448	12,043,421,645	481,736,866	3,775,085,456	32,384	1,204,342,164
Jacobabad	15,000,000	19,312,923,267	459,831,506	1,816,905,000	15,000	1,931,292,327	41,695,152,812	992,741,734	3,922,561,622	32,384	4,169,515,281
Kashmore	15,000,000	17,728,049,147	402,910,208	1,972,095,000	15,000	1,772,804,915	38,273,528,455	869,852,919	4,257,605,192	32,384	3,827,352,846
Larkana	15,000,000	35,440,671,297	824,201,658	2,496,750,000	15,000	3,544,067,130	76,513,751,183	1,779,389,562	5,390,295,987	32,384	7,651,375,118
Q Shahdadkot	15,000,000	29,895,920,603	695,253,968	2,437,245,000	15,000	2,989,592,060	64,543,050,305	1,501,001,170	5,261,829,155	32,384	6,454,305,031
Shikarpur	15,000,000	25,059,569,769	481,914,803	2,251,620,000	15,000	2,505,956,977	54,101,731,595	1,040,417,915	4,861,078,702	32,384	5,410,173,160
Mirpur Khas	15,000,000	21,138,405,698	515,570,871	2,229,885,000	15,000	2,113,840,570	45,636,232,463	1,113,078,841	4,814,154,468	32,384	4,563,623,246

Sanghar	15,000,000	39,907,514,115	578,369,770	3,691,365,000	15,000	3,990,751,412	86,157,329,802	1,248,656,954	7,969,380,173	32,384	8,615,732,980
Tharparkar	15,000,000	30,737,153,520	668,198,990	2,455,380,000	15,000	3,073,715,352	66,359,209,079	1,442,591,502	5,300,981,260	32,384	6,635,920,908
Umerkot	15,000,000	19,156,933,836	563,439,230	1,823,580,000	15,000	1,915,693,384	41,358,383,330	1,216,423,039	3,936,972,447	32,384	4,135,838,333
Ghotki	15,000,000	33,910,726,511	452,143,020	2,298,255,000	15,000	3,391,072,651	73,210,715,139	976,142,869	4,961,760,170	32,384	7,321,071,514
Khairpur	15,000,000	47,478,541,440	624,717,651	3,822,420,000	15,000	4,747,854,144	102,502,609,949	1,348,718,552	8,252,318,088	32,384	10,250,260,995
Sukkur	15,000,000	22,736,528,555	528,756,478	2,064,480,000	15,000	2,273,652,855	49,086,459,848	1,141,545,578	4,457,057,478	32,384	4,908,645,985
N Feroze	15,000,000	22,809,042,180	447,236,121	2,812,680,000	15,000	2,280,904,218	49,243,011,326	965,549,242	6,072,365,161	32,384	4,924,301,133
S Benazirabad	15,000,000	24,416,864,292	420,980,419	2,678,835,000	15,000	2,441,686,429	52,714,178,675	908,865,150	5,783,403,845	32,384	5,271,417,868
Sindh	**15,000,000**	**600,235,468,484**	**465,190,956**	**2,637,465,000**	**15,000**	**60,023,546,848**	**1,295,863,357,159**	**1,004,312,382**	**5,694,089,118**	**32,384**	**129,586,335,716**
District	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per UC at current rates**	**Mean cost per HH at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per UC at 8% inflation**	**Mean cost per HH at 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 22 - Detailed costing for safely managed urban drinking water supply by district

District	% piped water supply urban (fraction)	Total est pop all UCs 2026	% Urban population (fraction)	Total est pop urban	Access to piped Water Supply PSLM 2014-15	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[C*a]	[C-D]	15,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.325	2,075,398	0.164	339,810	110,506	229,304	15,000,000	3,439,555,644	15,000	343,955,564	7,425,742,659	32,384	742,574,266
Sujawal	0.621	996,762	0.112	111,945	69,496	42,450	15,000,000	636,745,536	15,000	63,674,554	1,374,685,855	32,384	137,468,586
Thatta	0.710	1,102,581	0.112	123,830	87,919	35,911	15,000,000	538,659,855	15,000	53,865,986	1,162,926,226	32,384	116,292,623
Dadu	0.484	2,317,005	0.214	495,227	239,442	255,785	15,000,000	3,836,773,026	15,000	383,677,303	8,283,305,196	32,384	828,330,520
Hyderabad	0.707	2,623,925	0.508	1,332,831	941,645	391,186	15,000,000	5,867,786,305	15,000	586,778,631	12,668,110,533	32,384	1,266,811,053
Jamshoro	0.666	1,218,663	0.508	619,023	412,022	207,001	15,000,000	3,105,021,850	15,000	310,502,185	6,703,509,289	32,384	670,350,929
Matiari	0.141	902,260	0.508	458,306	64,529	393,776	15,000,000	5,906,643,218	15,000	590,664,322	12,751,999,694	32,384	1,275,199,969
Tando A Yar	0.139	819,938	0.508	416,490	57,892	358,598	15,000,000	5,378,967,644	15,000	537,896,764	11,612,787,707	32,384	1,161,278,771
Tando M Khan	0.324	772,086	0.508	392,183	126,989	265,194	15,000,000	3,977,916,020	15,000	397,791,602	8,588,022,333	32,384	858,802,233
Karachi Central	0.835	6,119,496	1.000	6,119,496	5,109,167	1,010,329	15,000,000	15,154,931,844	15,000	1,515,493,184	32,718,361,190	32,384	3,271,836,119
Karachi East	0.835	3,702,357	1.000	3,702,357	3,091,098	611,259	15,000,000	9,168,887,111	15,000	916,888,711	19,794,939,580	32,384	1,979,493,958
Karachi South	0.835	4,218,944	1.000	4,218,944	3,522,396	696,548	15,000,000	10,448,214,816	15,000	1,044,821,482	22,556,912,143	32,384	2,255,691,214
Karachi West	0.835	4,208,477	0.907	3,817,089	3,186,887	630,201	15,000,000	9,453,020,014	15,000	945,302,001	20,408,361,209	32,384	2,040,836,121
Korangi	0.835	4,122,657	1.000	4,122,657	3,442,006	680,651	15,000,000	10,209,760,061	15,000	1,020,976,006	22,042,106,211	32,384	2,204,210,621
Malir	0.835	2,054,672	0.907	1,863,588	1,555,909	307,678	15,000,000	4,615,174,454	15,000	461,517,445	9,963,815,495	32,384	996,381,549
Jacobabad	0.033	1,305,942	0.243	317,785	10,487	307,298	15,000,000	4,609,476,145	15,000	460,947,614	9,951,513,273	32,384	995,151,327
Kashmore	0.058	1,203,411	0.243	292,836	16,984	275,851	15,000,000	4,137,767,537	15,000	413,776,754	8,933,129,769	32,384	893,312,977
Larkana	0.014	2,383,207	0.289	688,867	9,437	679,429	15,000,000	10,191,439,684	15,000	1,019,143,968	22,002,553,891	32,384	2,200,255,389
Q Shahdadkot	0.249	2,196,695	0.289	634,955	157,850	477,106	15,000,000	7,156,582,660	15,000	715,658,266	15,450,525,199	32,384	1,545,052,520

Shikarpur	0.023	1,686,491	0.241	406,291	9,345	396,946	15,000,000	5,954,194,805	15,000	595,419,480	12,854,660,003	32,384	1,285,466,000
Mirpur Khas	0.793	1,929,655	0.331	638,959	506,822	132,137	15,000,000	1,982,049,606	15,000	198,204,961	4,279,096,440	32,384	427,909,644
Sanghar	0.149	2,846,978	0.228	648,555	96,894	551,660	15,000,000	8,274,907,125	15,000	827,490,712	17,864,903,841	32,384	1,786,490,384
Tharparkar	0.647	2,167,030	0.044	94,837	61,341	33,496	15,000,000	502,447,481	15,000	50,244,748	1,084,746,426	32,384	108,474,643
Umerkot	0.547	1,641,132	0.169	277,235	151,537	125,698	15,000,000	1,885,475,020	15,000	188,547,502	4,070,599,152	32,384	407,059,915
Ghotki	0.064	2,382,961	0.163	388,152	24,725	363,427	15,000,000	5,451,406,527	15,000	545,140,653	11,769,177,821	32,384	1,176,917,782
Khairpur	0.104	3,269,872	0.236	771,495	80,158	691,337	15,000,000	10,370,054,517	15,000	1,037,005,452	22,388,169,920	32,384	2,238,816,992
Sukkur	0.397	1,996,271	0.509	1,015,724	403,141	612,583	15,000,000	9,188,745,273	15,000	918,874,527	19,837,811,863	32,384	1,983,781,186
N Feroze	0.000	1,700,898	0.177	301,722	-	301,722	15,000,000	4,525,826,939	15,000	452,582,694	9,770,920,913	32,384	977,092,091
S Benazirabad	0.205	1,733,906	0.264	457,738	93,791	363,948	15,000,000	5,459,215,172	15,000	545,921,517	11,786,036,100	32,384	1,178,603,610
Sindh	**0.635**	**65,699,670**	**0.427**	**35,068,927**	**23,640,417**	**11,428,510**	**15,000,000**	**171,427,645,888**	**15,000**	**17,142,764,589**	**370,099,429,931**	**32,384**	**37,009,942,993**
District	**% piped water supply urban (fraction)**	**Total est pop all UCs 2026**	**% Urban population (fraction)**	**Total est pop urban**	**Access to piped Water Supply PSLM 2014-15**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 23 - Detailed costing for safely managed rural drinking water supply by district

District	% piped water supply rural on premises (fraction)	Total est pop all UCs 2026	% Rural population (fraction)	Total est pop rural	Access to piped Water Supply PSLM 2014-15	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[C*a]	[C-D]	15,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.055	2,075,398	0.836	1,735,588	94,937	1,640,651	15,000,000	24,609,771,694	15,000	2,460,977,169	53,130,651,287	32,384	5,313,065,129
Sujawal	0.013	996,762	0.888	884,817	11,591	873,225	15,000,000	13,098,382,275	15,000	1,309,838,227	28,278,424,917	32,384	2,827,842,492
Thatta	0.158	1,102,581	0.888	978,751	154,447	824,304	15,000,000	12,364,563,256	15,000	1,236,456,326	26,694,164,693	32,384	2,669,416,469
Dadu	0.088	2,317,005	0.786	1,821,778	159,952	1,661,826	15,000,000	24,927,385,117	15,000	2,492,738,512	53,816,354,846	32,384	5,381,635,485
Hyderabad	0.106	2,623,925	0.492	1,291,094	136,727	1,154,368	15,000,000	17,315,513,799	15,000	1,731,551,380	37,382,895,581	32,384	3,738,289,558
Jamshoro	0.388	1,218,663	0.492	599,640	232,420	367,219	15,000,000	5,508,288,495	15,000	550,828,849	11,891,981,723	32,384	1,189,198,172
Matiari	0.015	902,260	0.492	443,954	6,793	437,162	15,000,000	6,557,427,726	15,000	655,742,773	14,156,994,635	32,384	1,415,699,463
Tando Allah Yar	0.019	819,938	0.492	403,448	7,666	395,783	15,000,000	5,936,738,124	15,000	593,673,812	12,816,972,338	32,384	1,281,697,234
Tando M Khan	0.005	772,086	0.492	379,903	1,975	377,927	15,000,000	5,668,906,901	15,000	566,890,690	12,238,744,815	32,384	1,223,874,481
Karachi Central	0.000	6,119,496	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi East	0.000	3,702,357	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi South	0.000	4,218,944	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi West	0.575	4,208,477	0.093	391,388	225,048	166,340	15,000,000	2,495,100,801	15,000	249,510,080	5,386,735,491	32,384	538,673,549
Korangi	0.000	4,122,657	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Malir	0.575	2,054,672	0.093	191,084	109,874	81,211	15,000,000	1,218,163,662	15,000	121,816,366	2,629,923,981	32,384	262,992,398
Jacobabad	0.008	1,305,942	0.757	988,157	7,510	980,647	15,000,000	14,709,700,258	15,000	1,470,970,026	31,757,139,590	32,384	3,175,713,959
Kashmore	0.000	1,203,411	0.757	910,575	-	910,575	15,000,000	13,658,630,459	15,000	1,365,863,046	29,487,958,727	32,384	2,948,795,873
Larkana	0.005	2,383,207	0.711	1,694,340	7,794	1,686,546	15,000,000	25,298,193,717	15,000	2,529,819,372	54,616,902,801	32,384	5,461,690,280
Q Shahdadkot	0.047	2,196,695	0.711	1,561,740	72,933	1,488,806	15,000,000	22,332,094,971	15,000	2,233,209,497	48,213,318,074	32,384	4,821,331,807

Shikarpur	0.004	1,686,491	0.759	1,280,200	5,633	1,274,567	15,000,000	19,118,506,596	15,000	1,911,850,660	41,275,421,801	32,384	4,127,542,180
Mirpur Khas	0.057	1,929,655	0.669	1,290,696	73,441	1,217,256	15,000,000	18,258,836,491	15,000	1,825,883,649	39,419,458,522	32,384	3,941,945,852
Sanghar	0.038	2,846,978	0.772	2,198,423	84,419	2,114,004	15,000,000	31,710,060,271	15,000	3,171,006,027	68,459,641,784	32,384	6,845,964,178
Tharparkar	0.012	2,167,030	0.956	2,072,193	24,866	2,047,326	15,000,000	30,709,897,309	15,000	3,070,989,731	66,300,364,964	32,384	6,630,036,496
Umerkot	0.134	1,641,132	0.831	1,363,897	182,217	1,181,680	15,000,000	17,725,205,824	15,000	1,772,520,582	38,267,389,934	32,384	3,826,738,993
Ghotki	0.048	2,382,961	0.837	1,994,809	96,150	1,898,659	15,000,000	28,479,882,235	15,000	2,847,988,224	61,485,929,677	32,384	6,148,592,968
Khairpur	0.001	3,269,872	0.764	2,498,377	3,248	2,495,129	15,000,000	37,426,931,661	15,000	3,742,693,166	80,801,938,335	32,384	8,080,193,834
Sukkur	0.025	1,996,271	0.491	980,547	24,514	956,034	15,000,000	14,340,502,935	15,000	1,434,050,294	30,960,070,260	32,384	3,096,007,026
N Feroze	0.134	1,700,898	0.823	1,399,176	186,790	1,212,386	15,000,000	18,185,792,712	15,000	1,818,579,271	39,261,762,481	32,384	3,926,176,248
S Benazirabad	0.006	1,733,906	0.736	1,276,168	7,402	1,268,766	15,000,000	19,031,489,739	15,000	1,903,148,974	41,087,558,933	32,384	4,108,755,893
Sindh	**0.073**	**65,699,670**	**0.573**	**30,630,743**	**1,918,346**	**28,712,398**	**15,000,000**	**430,685,967,028**	**15,000**	**43,068,596,703**	**929,818,700,192**	**32,384**	**92,981,870,019**
District	**% piped water supply rural on premises (fraction)**	**Total est pop all UCs 2026**	**% Rural population (fraction)**	**Total est pop rural**	**Access to piped Water Supply PSLM 2014-15**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 24 - Detailed costing of safely managed overall sewerage and drainage system by district

District	% pop connected to sewerage and drainage* system (fraction)	HH size 1998	No UCs	Total est pop all UCs 2026	Total est No of HH all UCs 2026	Mean pop per UC 2026	Mean No of HH per UC 2026	Access to sewerage and drainage system PSLM 2014-15	Access pop gap to meet by 2026
	a	A	B	C	D	E	F	G	H
					[C/A]	[C/B]	[D/B]	[C*a]	[C-G]
Badin	0.058	214,348	49	2,075,398	391,584	42,355	7,992	119,335	1,956,063
Sujawal	0.013	109,852	29	996,762	207,117	34,371	7,142	12,759	984,003
Thatta	0.080	110,612	34	1,102,581	208,696	32,429	6,138	88,537	1,014,044
Dadu	0.010	203,217	55	2,317,005	421,274	42,127	7,660	22,012	2,294,993
Hyderabad	0.213	425,512	116	2,623,925	437,321	22,620	3,770	557,584	2,066,341
Jamshoro	0.072	101,402	30	1,218,663	221,575	40,622	7,386	88,231	1,130,432
Matiari	0.024	74,362	25	902,260	150,377	36,090	6,015	21,474	880,786
Tando Allah Yar	0.045	99,120	30	819,938	136,656	27,331	4,555	36,815	783,123
Tando M Khan	0.130	91,733	31	772,086	128,681	24,906	4,151	100,062	672,024
Karachi Central	0.967	337,122	42	6,119,496	905,653	145,702	21,563	5,918,777	200,719
Karachi East	0.967	215,339	26	3,702,357	578,493	142,398	22,250	3,580,920	121,437
Karachi South	0.967	237,165	30	4,218,944	637,126	140,631	21,238	4,080,563	138,381
Karachi West	0.967	225,872	30	4,208,477	608,132	140,283	20,271	4,070,439	138,038
Korangi	0.967	213,437	28	4,122,657	573,384	147,238	20,478	3,987,434	135,223
Malir	0.967	116,573	25	2,054,672	313,165	82,187	12,527	1,987,279	67,393
Jacobabad	0.063	121,127	42	1,305,942	233,204	31,094	5,552	82,405	1,223,537
Kashmore	0.172	131,473	44	1,203,411	214,895	27,350	4,884	206,626	996,785
Larkana	0.018	166,450	43	2,383,207	403,933	55,423	9,394	43,851	2,339,356
Q Shahdadkot	0.110	162,483	43	2,196,695	372,321	51,086	8,659	242,515	1,954,180
Shikarpur	0.028	150,108	52	1,686,491	285,846	32,433	5,497	47,222	1,639,269
Mirpur Khas	0.292	148,659	41	1,929,655	316,337	47,065	7,716	562,494	1,367,161

Sanghar	0.100	246,091	69	2,846,978	490,858	41,261	7,114	285,267	2,561,711
Tharparkar	0.016	163,692	46	2,167,030	386,970	47,109	8,412	34,672	2,132,358
Umerkot	0.051	121,572	34	1,641,132	303,913	48,269	8,939	83,205	1,557,927
Ghotki	0.160	153,217	75	2,382,961	471,873	31,773	6,292	380,797	2,002,164
Khairpur	0.090	254,828	76	3,269,872	536,045	43,025	7,053	294,942	2,974,930
Sukkur	0.112	137,632	43	1,996,271	302,465	46,425	7,034	222,784	1,773,487
N Feroze	0.010	187,512	51	1,700,898	293,258	33,351	5,750	16,669	1,684,229
S Benazirabad	0.074	178,589	58	1,733,906	288,984	29,895	4,982	128,136	1,605,770
Sindh	**0.367**	**5,099,099**	**1297**	**65,699,670**	**10,820,136**			**27,303,806**	**38,395,864**
District	**% pop connected to sewerage and drainage* system (fraction)**	**HH size 1998**	**No UCs**	**Total est pop all UCs 2026**	**Total est No of HH all UCs 2026**	**Mean pop per UC 2026**	**Mean No of HH per UC 2026**	**Access to sewerage and drainage system PSLM 2014-15**	**Access pop gap to meet by 2026**

*Sewerage and Drainage – includes flush to sewer and flush to septic tank (does not include flush to open drain)

Table 24 continued

District	Unit cost of sanitation scheme per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per UC at current rates	Mean cost per HH at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per UC at 8% inflation	Mean cost per HH at 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	I	J	K	L	M	N	O	P	Q	R	S
	15,000,000	[(H/1000)*I]	[J/B]	[J/(H/A)]	[J/H]	[J/10]	[J*1.08^10]	[O/B]	[O/(H/A)]	[O/H]	[O/10]
Badin	15,000,000	29,340,939,225	598,794,678	3,215,220,000	15,000	2,934,093,923	63,344,887,136	1,292,752,799	6,941,418,830	32,384	6,334,488,714
Sujawal	15,000,000	14,760,051,696	508,967,300	1,647,780,000	15,000	1,476,005,170	31,865,844,568	1,098,822,226	3,557,433,432	32,384	3,186,584,457
Thatta	15,000,000	15,210,656,186	447,372,241	1,659,180,000	15,000	1,521,065,619	32,838,665,864	965,843,114	3,582,045,177	32,384	3,283,866,586
Dadu	15,000,000	34,424,901,788	625,907,305	3,048,255,000	15,000	3,442,490,179	74,320,780,998	1,351,286,927	6,580,953,918	32,384	7,432,078,100
Hyderabad	15,000,000	30,995,114,063	267,199,259	6,382,680,000	15,000	3,099,511,406	66,916,126,543	576,863,160	13,779,727,402	32,384	6,691,612,654
Jamshoro	15,000,000	16,956,476,982	565,215,899	1,521,030,000	15,000	1,695,647,698	36,607,762,022	1,220,258,734	3,283,789,689	32,384	3,660,776,202
Matiari	15,000,000	13,211,793,180	528,471,727	1,115,430,000	15,000	1,321,179,318	28,523,270,555	1,140,930,822	2,408,129,710	32,384	2,852,327,056
Tando Allah Yar	15,000,000	11,746,841,757	391,561,392	1,486,800,000	15,000	1,174,684,176	25,360,550,308	845,351,677	3,209,889,686	32,384	2,536,055,031
Tando M Khan	15,000,000	10,080,354,816	325,172,736	1,375,995,000	15,000	1,008,035,482	21,762,729,994	702,023,548	2,970,670,002	32,384	2,176,272,999
Karachi Central	15,000,000	3,010,792,032	71,685,525	5,056,830,000	15,000	301,079,203	6,500,074,179	154,763,671	10,917,316,694	32,384	650,007,418
Karachi East	15,000,000	1,821,559,644	70,059,986	3,230,085,000	15,000	182,155,964	3,932,610,649	151,254,256	6,973,511,250	32,384	393,261,065
Karachi South	15,000,000	2,075,720,448	69,190,682	3,557,475,000	15,000	207,572,045	4,481,324,763	149,377,492	7,680,321,705	32,384	448,132,476
Karachi West	15,000,000	2,070,570,684	69,019,023	3,388,080,000	15,000	207,057,068	4,470,206,808	149,006,894	7,314,610,605	32,384	447,020,681
Korangi	15,000,000	2,028,347,244	72,440,973	3,201,555,000	15,000	202,834,724	4,379,049,568	156,394,627	6,911,917,120	32,384	437,904,957
Malir	15,000,000	1,010,898,624	40,435,945	1,748,595,000	15,000	101,089,862	2,182,454,309	87,298,172	3,775,085,456	32,384	218,245,431
Jacobabad	15,000,000	18,353,055,897	436,977,521	1,816,905,000	15,000	1,835,305,590	39,622,871,152	943,401,694	3,922,561,622	32,384	3,962,287,115
Kashmore	15,000,000	14,951,779,970	339,813,181	1,972,095,000	15,000	1,495,177,997	32,279,771,530	733,631,171	4,257,605,192	32,384	3,227,977,153
Larkana	15,000,000	35,090,339,868	816,054,416	2,496,750,000	15,000	3,509,033,987	75,757,411,904	1,761,800,277	5,390,295,987	32,384	7,575,741,190
Q Shahdadkot	15,000,000	29,312,698,080	681,690,653	2,437,245,000	15,000	2,931,269,808	63,283,916,622	1,471,718,991	5,261,829,155	32,384	6,328,391,662

Shikarpur	15,000,000	24,589,038,780	472,866,130	2,251,620,000	15,000	2,458,903,878	53,085,890,481	1,020,882,509	4,861,078,702	32,384	5,308,589,048
Mirpur Khas	15,000,000	20,507,408,513	500,180,695	2,229,885,000	15,000	2,050,740,851	44,273,956,867	1,079,852,607	4,814,154,468	32,384	4,427,395,687
Sanghar	15,000,000	38,425,662,066	556,893,653	3,691,365,000	15,000	3,842,566,207	82,958,122,371	1,202,291,629	7,969,380,173	32,384	8,295,812,237
Tharparkar	15,000,000	31,985,362,800	695,333,974	2,455,380,000	15,000	3,198,536,280	69,053,999,296	1,501,173,898	5,300,981,260	32,384	6,905,399,930
Umerkot	15,000,000	23,368,899,114	687,320,562	1,823,580,000	15,000	2,336,889,911	50,451,700,456	1,483,873,543	3,936,972,447	32,384	5,045,170,046
Ghotki	15,000,000	30,032,457,483	400,432,766	2,298,255,000	15,000	3,003,245,748	64,837,823,190	864,504,309	4,961,760,170	32,384	6,483,782,319
Khairpur	15,000,000	44,623,943,184	587,157,147	3,822,420,000	15,000	4,462,394,318	96,339,746,417	1,267,628,242	8,252,318,088	32,384	9,633,974,642
Sukkur	15,000,000	26,602,307,346	618,658,310	2,064,480,000	15,000	2,660,230,735	57,432,386,314	1,335,636,891	4,457,057,478	32,384	5,743,238,631
N Feroze	15,000,000	25,263,437,994	495,361,529	2,812,680,000	15,000	2,526,343,799	54,541,867,802	1,069,448,388	6,072,365,161	32,384	5,454,186,780
S Benazirabad	15,000,000	24,086,555,199	415,285,434	2,678,835,000	15,000	2,408,655,520	52,001,066,117	896,570,105	5,783,403,845	32,384	5,200,106,612
Sindh	**15,000,000**	**575,937,964,661**	**426,052,436**	**2,637,465,000**	**15,000**	**57,593,796,466**	**1,243,406,868,784**	**919,815,254**	**5,694,089,118**	**32,384**	**124,340,686,878**
District	**Unit cost of sanitation scheme per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per UC at current rates**	**Mean cost per HH at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per UC at 8% inflation**	**Mean cost per HH at 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Sewerage and Drainage – includes flush to sewer and flush to septic tank (does not include flush to open drain)

Table 25 - Detailed costing of safely managed urban sewerage and drainage system by district

District	% pop connected to sewerage and drainage* system (fraction)	Total est pop all UCs 2026	% Urban population (fraction)	Total est pop urban	Access to sewerage and drainage system PSLM 2014-15 Urban	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[a*C]	[C-D]	15,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.083	2,075,398	0.164	339,810	28,068	311,742	15,000,000	4,676,123,811	15,000	467,612,381	10,095,400,586	32,384	1,009,540,059
Sujawal	0.056	996,762	0.112	111,945	6,258	105,688	15,000,000	1,585,315,034	15,000	158,531,503	3,422,576,256	32,384	342,257,626
Thatta	0.605	1,102,581	0.112	123,830	74,954	48,876	15,000,000	733,134,637	15,000	73,313,464	1,582,782,695	32,384	158,278,269
Dadu	0.011	2,317,005	0.214	495,227	5,398	489,829	15,000,000	7,347,438,917	15,000	734,743,892	15,862,569,543	32,384	1,586,256,954
Hyderabad	0.210	2,623,925	0.508	1,332,831	279,894	1,052,936	15,000,000	15,794,041,503	15,000	1,579,404,150	34,098,151,008	32,384	3,409,815,101
Jamshoro	0.191	1,218,663	0.508	619,023	118,481	500,542	15,000,000	7,508,135,969	15,000	750,813,597	16,209,502,426	32,384	1,620,950,243
Matiari	0.014	902,260	0.508	458,306	6,462	451,844	15,000,000	6,777,653,106	15,000	677,765,311	14,632,444,713	32,384	1,463,244,471
Tando Allah Yar	0.047	819,938	0.508	416,490	19,408	397,082	15,000,000	5,956,222,709	15,000	595,622,271	12,859,038,095	32,384	1,285,903,810
Tando M Khan	0.088	772,086	0.508	392,183	34,316	357,867	15,000,000	5,368,010,009	15,000	536,801,001	11,589,130,994	32,384	1,158,913,099
Karachi Central	0.993	6,119,496	1.000	6,119,496	6,073,600	45,896	15,000,000	688,443,300	15,000	68,844,330	1,486,297,450	32,384	148,629,745
Karachi East	0.993	3,702,357	1.000	3,702,357	3,674,589	27,768	15,000,000	416,515,162	15,000	41,651,516	899,224,996	32,384	89,922,500
Karachi South	0.993	4,218,944	1.000	4,218,944	4,187,302	31,642	15,000,000	474,631,200	15,000	47,463,120	1,024,693,162	32,384	102,469,316
Karachi West	0.993	4,208,477	0.907	3,817,089	3,788,460	28,628	15,000,000	429,422,472	15,000	42,942,247	927,090,909	32,384	92,709,091
Korangi	0.993	4,122,657	1.000	4,122,657	4,091,737	30,920	15,000,000	463,798,912	15,000	46,379,891	1,001,307,066	32,384	100,130,707
Malir	0.993	2,054,672	0.907	1,863,588	1,849,611	13,977	15,000,000	209,653,594	15,000	20,965,359	452,626,385	32,384	45,262,639
Jacobabad	0.058	1,305,942	0.243	317,785	18,400	299,386	15,000,000	4,490,783,326	15,000	449,078,333	9,695,264,379	32,384	969,526,438
Kashmore	0.168	1,203,411	0.243	292,836	49,255	243,581	15,000,000	3,653,710,231	15,000	365,371,023	7,888,086,350	32,384	788,808,635

Larkana	0.024	2,383,207	0.289	688,867	16,533	672,334	15,000,000	10,085,009,765	15,000	1,008,500,977	21,772,779,680	32,384	2,177,277,968
Q Shahdadkot	0.038	2,196,695	0.289	634,955	24,382	610,573	15,000,000	9,158,597,133	15,000	915,859,713	19,772,724,290	32,384	1,977,272,429
Shikarpur	0.062	1,686,491	0.241	406,291	25,190	381,101	15,000,000	5,716,514,562	15,000	571,651,456	12,341,526,185	32,384	1,234,152,618
Mirpur Khas	0.445	1,929,655	0.331	638,959	284,400	354,558	15,000,000	5,318,371,984	15,000	531,837,198	11,481,966,222	32,384	1,148,196,622
Sanghar	0.125	2,846,978	0.228	648,555	81,004	567,550	15,000,000	8,513,250,911	15,000	851,325,091	18,379,470,199	32,384	1,837,947,020
Tharparkar	0.053	2,167,030	0.044	94,837	5,017	89,820	15,000,000	1,347,304,669	15,000	134,730,467	2,908,729,730	32,384	290,872,973
Umerkot	0.101	1,641,132	0.169	277,235	28,112	249,123	15,000,000	3,736,850,138	15,000	373,685,014	8,067,579,174	32,384	806,757,917
Ghotki	0.103	2,382,961	0.163	388,152	40,019	348,134	15,000,000	5,222,008,452	15,000	522,200,845	11,273,924,583	32,384	1,127,392,458
Khairpur	0.081	3,269,872	0.236	771,495	62,105	709,390	15,000,000	10,640,849,379	15,000	1,064,084,938	22,972,795,717	32,384	2,297,279,572
Sukkur	0.066	1,996,271	0.509	1,015,724	67,342	948,381	15,000,000	14,225,719,551	15,000	1,422,571,955	30,712,261,544	32,384	3,071,226,154
N Feroze	0.047	1,700,898	0.177	301,722	14,302	287,420	15,000,000	4,311,302,742	15,000	431,130,274	9,307,779,261	32,384	930,777,926
S Benazirabad	0.254	1,733,906	0.264	457,738	116,266	341,473	15,000,000	5,122,090,955	15,000	512,209,095	11,058,210,201	32,384	1,105,821,020
Sindh	**0.637**	**65,699,670**	**0.427**	**35,068,927**	**25,070,866**	**9,998,060**	**15,000,000**	**149,970,904,134**	**15,000**	**14,997,090,413**	**323,775,933,799**	**32,384**	**32,377,593,380**
District	**% pop connected to sewerage and drainage* system (fraction)**	**Total est pop all UCs 2026**	**% Urban population (fraction)**	**Total est pop urban**	**Access to sewerage and drainage system PSLM 2014-15 Urban**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Sewerage and Drainage – includes flush to sewer and flush to septic tank (does not include flush to open drain)

Table 26 - Detailed costing of safely managed rural sewerage and drainage system by district

District	% pop connected to sewerage and drainage* system (fraction)	Total est pop all UCs 2026	% Rural population (fraction)	Total est pop rural	Access to sewerage and drainage system PSLM 2014-15 Rural	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[a*C]	[C-D]	15,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.050	2,075,398	0.836	1,735,588	87,474	1,648,114	15,000,000	24,721,717,127	15,000	2,472,171,713	53,372,333,081	32,384	5,337,233,308
Sujawal	0.006	996,762	0.888	884,817	4,955	879,862	15,000,000	13,197,924,140	15,000	1,319,792,414	28,493,328,338	32,384	2,849,332,834
Thatta	0.002	1,102,581	0.888	978,751	2,349	976,402	15,000,000	14,646,032,182	15,000	1,464,603,218	31,619,684,989	32,384	3,161,968,499
Dadu	0.009	2,317,005	0.786	1,821,778	16,760	1,805,017	15,000,000	27,075,261,099	15,000	2,707,526,110	58,453,457,994	32,384	5,845,345,799
Hyderabad	0.224	2,623,925	0.492	1,291,094	289,076	1,002,018	15,000,000	15,030,276,545	15,000	1,503,027,655	32,449,239,750	32,384	3,244,923,975
Jamshoro	0.033	1,218,663	0.492	599,640	20,028	579,612	15,000,000	8,694,173,186	15,000	869,417,319	18,770,067,821	32,384	1,877,006,782
Matiari	0.027	902,260	0.492	443,954	12,031	431,923	15,000,000	6,478,847,806	15,000	647,884,781	13,987,346,481	32,384	1,398,734,648
Tando Allah Yar	0.044	819,938	0.492	403,448	17,913	385,535	15,000,000	5,783,024,415	15,000	578,302,442	12,485,115,970	32,384	1,248,511,597
Tando M Khan	0.138	772,086	0.492	379,903	52,427	327,476	15,000,000	4,912,140,881	15,000	491,214,088	10,604,943,738	32,384	1,060,494,374
Karachi Central	0.000	6,119,496	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi East	0.000	3,702,357	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi South	0.000	4,218,944	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi West	0.581	4,208,477	0.093	391,388	227,475	163,913	15,000,000	2,458,701,684	15,000	245,870,168	5,308,152,526	32,384	530,815,253
Korangi	0.000	4,122,657	0.000	-	-	-	15,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Malir	0.581	2,054,672	0.093	191,084	111,058	80,026	15,000,000	1,200,392,804	15,000	120,039,280	2,591,558,031	32,384	259,155,803
Jacobabad	0.065	1,305,942	0.757	988,157	64,033	924,124	15,000,000	13,861,861,831	15,000	1,386,186,183	29,926,720,017	32,384	2,992,672,002
Kashmore	0.173	1,203,411	0.757	910,575	157,803	752,773	15,000,000	11,291,589,801	15,000	1,129,158,980	24,377,695,480	32,384	2,437,769,548

Larkana	0.014	2,383,207	0.711	1,694,340	23,721	1,670,619	15,000,000	25,059,291,747	15,000	2,505,929,175	54,101,131,366	32,384	5,410,113,137
Q Shahdadkot	0.132	2,196,695	0.711	1,561,740	205,525	1,356,215	15,000,000	20,343,219,629	15,000	2,034,321,963	43,919,485,383	32,384	4,391,948,538
Shikarpur	0.015	1,686,491	0.759	1,280,200	19,715	1,260,485	15,000,000	18,907,273,599	15,000	1,890,727,360	40,819,385,602	32,384	4,081,938,560
Mirpur Khas	0.229	1,929,655	0.669	1,290,696	295,569	995,127	15,000,000	14,926,903,759	15,000	1,492,690,376	32,226,065,657	32,384	3,222,606,566
Sanghar	0.092	2,846,978	0.772	2,198,423	202,914	1,995,509	15,000,000	29,932,634,888	15,000	2,993,263,489	64,622,313,694	32,384	6,462,231,369
Tharparkar	0.013	2,167,030	0.956	2,072,193	27,767	2,044,425	15,000,000	30,666,381,260	15,000	3,066,638,126	66,206,417,078	32,384	6,620,641,708
Umerkot	0.037	1,641,132	0.831	1,363,897	50,328	1,313,569	15,000,000	19,703,538,468	15,000	1,970,353,847	42,538,461,733	32,384	4,253,846,173
Ghotki	0.174	2,382,961	0.837	1,994,809	347,296	1,647,512	15,000,000	24,712,686,213	15,000	2,471,268,621	53,352,836,016	32,384	5,335,283,602
Khairpur	0.094	3,269,872	0.764	2,498,377	235,847	2,262,530	15,000,000	33,937,948,646	15,000	3,393,794,865	73,269,485,688	32,384	7,326,948,569
Sukkur	0.174	1,996,271	0.491	980,547	170,615	809,932	15,000,000	12,148,979,923	15,000	1,214,897,992	26,228,736,446	32,384	2,622,873,645
N Feroze	0.000	1,700,898	0.823	1,399,176	-	1,399,176	15,000,000	20,987,643,061	15,000	2,098,764,306	45,310,747,238	32,384	4,531,074,724
S Benazirabad	0.004	1,733,906	0.736	1,276,168	5,615	1,270,553	15,000,000	19,058,289,262	15,000	1,905,828,926	41,145,417,093	32,384	4,114,541,709
Sindh	**0.094**	**65,699,670**	**0.573**	**30,630,743**	**2,648,294**	**27,982,449**	**15,000,000**	**419,736,733,955**	**15,000**	**41,973,673,396**	**906,180,127,210**	**32,384**	**90,618,012,721**
District	**% pop connected to sewerage and drainage* system (fraction)**	**Total est pop all UCs 2026**	**% Rural population (fraction)**	**Total est pop rural**	**Access to sewerage and drainage system PSLM 2014-15 Rural**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Sewerage and Drainage – includes flush to sewer and flush to septic tank (does not include flush to open drain)

Table 27 - Detailed costing for improved overall drinking water supply by district

District	% improved water supply	Number of HH 1998	No UCs	Total est pop all UCs 2026	Total est No of HH all UCs 2026	Mean pop per UC 2026	Mean No of HH per UC 2026	Population with access to Improved Water Supply PSLM 2014-15	Access population gap to meet by 2026
	a	A	B	C	D	E	F	G	H
					[C/A]	[C/B]	[D/B]	[C*a]	[C-G]
Badin	0.913	214,348	49	2,075,398	391,584	42,355	7,992	1,895,669	179,729
Sujawal	0.640	109,852	29	996,762	207,117	34,371	7,142	638,027	358,735
Thatta	0.650	110,612	34	1,102,581	208,696	32,429	6,138	717,008	385,573
Dadu	0.921	203,217	55	2,317,005	421,274	42,127	7,660	2,132,803	184,202
Hyderabad	0.906	425,512	116	2,623,925	437,321	22,620	3,770	2,376,226	247,699
Jamshoro	0.782	101,402	30	1,218,663	221,575	40,622	7,386	952,507	266,156
Matiari	0.988	74,362	25	902,260	150,377	36,090	6,015	891,433	10,827
Tando Allah Yar	0.985	99,120	30	819,938	136,656	27,331	4,555	807,885	12,053
Tando M Khan	0.965	91,733	31	772,086	128,681	24,906	4,151	745,063	27,023
Karachi Central	0.856	337,122	42	6,119,496	905,653	145,702	21,563	5,235,229	884,267
Karachi East	0.856	215,339	26	3,702,357	578,493	142,398	22,250	3,167,366	534,991
Karachi South	0.856	237,165	30	4,218,944	637,126	140,631	21,238	3,609,307	609,637
Karachi West	0.856	225,872	30	4,208,477	608,132	140,283	20,271	3,600,352	608,125
Korangi	0.856	213,437	28	4,122,657	573,384	147,238	20,478	3,526,933	595,724
Malir	0.856	116,573	25	2,054,672	313,165	82,187	12,527	1,757,772	296,900
Jacobabad	0.740	121,127	42	1,305,942	233,204	31,094	5,552	966,658	339,284
Kashmore	0.980	131,473	44	1,203,411	214,895	27,350	4,884	1,179,583	23,828
Larkana	0.996	166,450	43	2,383,207	403,933	55,423	9,394	2,373,912	9,295
Q Shahdadkot	0.835	162,483	43	2,196,695	372,321	51,086	8,659	1,833,142	363,553
Shikarpur	1.000	150,108	52	1,686,491	285,846	32,433	5,497	1,686,491	-

Mirpur Khas	0.772	148,659	41	1,929,655	316,337	47,065	7,716	1,489,501	440,154
Sanghar	0.958	246,091	69	2,846,978	490,858	41,261	7,114	2,728,544	118,434
Tharparkar	0.172	163,692	46	2,167,030	386,970	47,109	8,412	372,946	1,794,084
Umerkot	0.628	121,572	34	1,641,132	303,913	48,269	8,939	1,030,467	610,665
Ghotki	0.995	153,217	75	2,382,961	471,873	31,773	6,292	2,371,523	11,438
Khairpur	0.974	254,828	76	3,269,872	536,045	43,025	7,053	3,184,855	85,017
Sukkur	0.931	137,632	43	1,996,271	302,465	46,425	7,034	1,858,528	137,743
N Feroze	0.986	187,512	51	1,700,898	293,258	33,351	5,750	1,676,745	24,153
S Benazirabad	0.976	178,589	58	1,733,906	288,984	29,895	4,982	1,692,292	41,614
Sindh	**0.866**	**5,099,099**	**1297**	**65,699,670**	**10,820,136**			**56,498,769**	**9,200,901**
District	**% improved water supply**	**Number of HH 1998**	**No UCs**	**Total est pop all UCs 2026**	**Total est No of HH all UCs 2026**	**Mean pop per UC 2026**	**Mean No of HH per UC 2026**	**Population with access to Improved Water Supply PSLM 2014-15**	**Access population gap to meet by 2026**

Table 27 continued

District	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per UC at current rates	Mean cost per HH at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per UC at 8% inflation	Mean cost per HH at 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	I	J	K	L	M	N	O	P	Q	R	S
	10,000,000	[(H/1000)*I]	[J/B]	[J/(H/A)]	[J/H]	[J/10]	[J*1.08^10]	[O/B]	[O/(H/A)]	[O/H]	[O/10]
Badin	10,000,000	1,797,294,668	36,679,483	2,143,480,000	10,000	179,729,467	3,880,224,386	79,188,253	4,627,612,553	21,589	388,022,439
Sujawal	10,000,000	3,587,346,438	123,701,601	1,098,520,000	10,000	358,734,644	7,744,811,899	267,062,479	2,371,622,288	21,589	774,481,190
Thatta	10,000,000	3,855,725,757	113,403,699	1,106,120,000	10,000	385,572,576	8,324,222,719	244,830,080	2,388,030,118	21,589	832,422,272
Dadu	10,000,000	1,842,018,975	33,491,254	2,032,170,000	10,000	184,201,898	3,976,780,811	72,305,106	4,387,302,612	21,589	397,678,081
Hyderabad	10,000,000	2,476,985,200	21,353,321	4,255,120,000	10,000	247,698,520	5,347,625,266	46,100,218	9,186,484,934	21,589	534,762,527
Jamshoro	10,000,000	2,661,559,992	88,718,666	1,014,020,000	10,000	266,155,999	5,746,108,398	191,536,947	2,189,193,126	21,589	574,610,840
Matiari	10,000,000	108,271,200	4,330,848	743,620,000	10,000	10,827,120	233,749,400	9,349,976	1,605,419,806	21,589	23,374,940
Tando A Yar	10,000,000	120,530,886	4,017,696	991,200,000	10,000	12,053,089	260,217,143	8,673,905	2,139,926,457	21,589	26,021,714
Tando M Khan	10,000,000	270,230,100	8,717,100	917,330,000	10,000	27,023,010	583,406,518	18,819,565	1,980,446,668	21,589	58,340,652
Karachi Central	10,000,000	8,842,671,720	210,539,803	3,371,220,000	10,000	884,267,172	19,090,665,019	454,539,643	7,278,211,129	21,589	1,909,066,502
Karachi East	10,000,000	5,349,905,865	205,765,610	2,153,390,000	10,000	534,990,587	11,550,045,505	444,232,519	4,649,007,500	21,589	1,155,004,551
Karachi South	10,000,000	6,096,374,080	203,212,469	2,371,650,000	10,000	609,637,408	13,161,614,394	438,720,480	5,120,214,470	21,589	1,316,161,439
Karachi West	10,000,000	6,081,249,265	202,708,309	2,258,720,000	10,000	608,124,927	13,128,961,053	437,632,035	4,876,407,070	21,589	1,312,896,105
Korangi	10,000,000	5,957,239,365	212,758,549	2,134,370,000	10,000	595,723,937	12,861,232,980	459,329,749	4,607,944,746	21,589	1,286,123,298
Malir	10,000,000	2,969,001,040	118,760,042	1,165,730,000	10,000	296,900,104	6,409,850,562	256,394,022	2,516,723,637	21,589	640,985,056
Jacobabad	10,000,000	3,392,837,316	80,781,841	1,211,270,000	10,000	339,283,732	7,324,881,293	174,401,936	2,615,041,081	21,589	732,488,129
Kashmore	10,000,000	238,275,378	5,415,349	1,314,730,000	10,000	23,827,538	514,418,670	11,691,333	2,838,403,462	21,589	51,441,867
Larkana	10,000,000	92,945,073	2,161,513	1,664,500,000	10,000	9,294,507	200,661,441	4,666,545	3,593,530,658	21,589	20,066,144
Q Shahdadkot	10,000,000	3,635,530,225	84,547,215	1,624,830,000	10,000	363,553,023	7,848,837,081	182,531,095	3,507,886,103	21,589	784,883,708
Shikarpur	10,000,000	-	-	#DIV/0!	#DIV/0!	-	-	-	#DIV/0!	#DIV/0!	-
Mirpur Khas	10,000,000	4,401,543,055	107,354,709	1,486,590,000	10,000	440,154,306	9,502,601,328	231,770,764	3,209,436,312	21,589	950,260,133

Sanghar	10,000,000	1,184,342,848	17,164,389	2,460,910,000	10,000	118,434,285	2,556,907,380	37,056,629	5,312,920,115	21,589	255,690,738
Tharparkar	10,000,000	17,940,841,370	390,018,291	1,636,920,000	10,000	1,794,084,137	38,732,930,906	842,020,237	3,533,987,507	21,589	3,873,293,091
Umerkot	10,000,000	6,106,652,172	179,607,417	1,215,720,000	10,000	610,665,217	13,183,804,024	387,758,942	2,624,648,298	21,589	1,318,380,402
Ghotki	10,000,000	114,382,128	1,525,095	1,532,170,000	10,000	11,438,213	246,942,435	3,292,566	3,307,840,113	21,589	24,694,244
Khairpur	10,000,000	850,166,720	11,186,404	2,548,280,000	10,000	85,016,672	1,835,446,184	24,150,608	5,501,545,392	21,589	183,544,618
Sukkur	10,000,000	1,377,426,990	32,033,186	1,376,320,000	10,000	137,742,699	2,973,761,561	69,157,246	2,971,371,652	21,589	297,376,156
N Feroze	10,000,000	241,527,516	4,735,834	1,875,120,000	10,000	24,152,752	521,439,792	10,224,310	4,048,243,441	21,589	52,143,979
S Benazirabad	10,000,000	416,137,440	7,174,783	1,785,890,000	10,000	41,613,744	898,409,522	15,489,819	3,855,602,563	21,589	89,840,952
Sindh	**10,000,000**	**92,009,012,782**	**86,616,016**	**#DIV/0!**	**10,000**	**9,200,901,278**	**198,640,557,669**	**186,997,483**	**#DIV/0!**	**21,589**	**19,864,055,767**
District	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per UC at current rates**	**Mean cost per HH at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per UC at 8% inflation**	**Mean cost per HH at 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 28 - Detailed costing for improved urban drinking water supply by district

District	% improved water supply urban (fraction)	Total est pop all UCs 2026	% Urban population (fraction)	Total est pop urban	Access to improved Water Supply PSLM 2014-15	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[C*a]	[C-D]	10,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.928	2,075,398	0.164	339,810	315,446	24,364	10,000,000	243,643,687	10,000	24,364,369	526,008,446	21,589	52,600,845
Sujawal	0.738	996,762	0.112	111,945	82,582	29,363	10,000,000	293,632,831	10,000	29,363,283	633,931,259	21,589	63,393,126
Thatta	0.847	1,102,581	0.112	123,830	104,822	19,008	10,000,000	190,078,822	10,000	19,007,882	410,365,921	21,589	41,036,592
Dadu	1.000	2,317,005	0.214	495,227	495,227	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Hyderabad	0.901	2,623,925	0.508	1,332,831	1,200,480	132,350	10,000,000	1,323,500,693	10,000	132,350,069	2,857,338,730	21,589	285,733,873
Jamshoro	0.911	1,218,663	0.508	619,023	563,683	55,341	10,000,000	553,407,004	10,000	55,340,700	1,194,764,215	21,589	119,476,422
Matiari	0.989	902,260	0.508	458,306	453,127	5,179	10,000,000	51,788,538	10,000	5,178,854	111,807,570	21,589	11,180,757
Tando A Yar	0.975	819,938	0.508	416,490	406,119	10,371	10,000,000	103,705,996	10,000	10,370,600	223,893,468	21,589	22,389,347
Tando M Khan	0.934	772,086	0.508	392,183	366,456	25,727	10,000,000	257,272,297	10,000	25,727,230	555,431,593	21,589	55,543,159
Karachi Central	0.863	6,119,496	1.000	6,119,496	5,278,677	840,819	10,000,000	8,408,187,504	10,000	840,818,750	18,152,646,184	21,589	1,815,264,618
Karachi East	0.863	3,702,357	1.000	3,702,357	3,193,653	508,704	10,000,000	5,087,038,518	10,000	508,703,852	10,982,534,619	21,589	1,098,253,462
Karachi South	0.863	4,218,944	1.000	4,218,944	3,639,261	579,683	10,000,000	5,796,829,056	10,000	579,682,906	12,514,919,154	21,589	1,251,491,915
Karachi West	0.863	4,208,477	0.907	3,817,089	3,292,621	524,468	10,000,000	5,244,679,790	10,000	524,467,979	11,322,870,301	21,589	1,132,287,030
Korangi	0.863	4,122,657	1.000	4,122,657	3,556,204	566,453	10,000,000	5,664,530,718	10,000	566,453,072	12,229,296,965	21,589	1,222,929,696
Malir	0.863	2,054,672	0.907	1,863,588	1,607,531	256,057	10,000,000	2,560,569,230	10,000	256,056,923	5,528,076,919	21,589	552,807,692
Jacobabad	0.119	1,305,942	0.243	317,785	37,785	280,001	10,000,000	2,800,006,502	10,000	280,000,650	6,045,004,030	21,589	604,500,403
Kashmore	0.952	1,203,411	0.243	292,836	278,780	14,056	10,000,000	140,561,105	10,000	14,056,111	303,460,884	21,589	30,346,088
Larkana	0.991	2,383,207	0.289	688,867	682,805	6,062	10,000,000	60,620,277	10,000	6,062,028	130,874,632	21,589	13,087,463
Q Shahdadkot	0.719	2,196,695	0.289	634,955	456,215	178,740	10,000,000	1,787,399,537	10,000	178,739,954	3,858,861,542	21,589	385,886,154

Shikarpur	1.000	1,686,491	0.241	406,291	406,332	-41	10,000,000	-406,291	10,000	-40,629	-877,152	21,589	-87,715
Mirpur Khas	0.966	1,929,655	0.331	638,959	617,234	21,725	10,000,000	217,245,927	10,000	21,724,593	469,017,663	21,589	46,901,766
Sanghar	0.971	2,846,978	0.228	648,555	629,617	18,938	10,000,000	189,377,920	10,000	18,937,792	408,852,725	21,589	40,885,273
Tharparkar	0.790	2,167,030	0.044	94,837	74,893	19,944	10,000,000	199,442,630	10,000	19,944,263	430,581,679	21,589	43,058,168
Umerkot	0.989	1,641,132	0.169	277,235	274,102	3,133	10,000,000	31,327,551	10,000	3,132,755	67,633,834	21,589	6,763,383
Ghotki	0.976	2,382,961	0.163	388,152	378,837	9,316	10,000,000	93,156,578	10,000	9,315,658	201,118,066	21,589	20,111,807
Khairpur	1.000	3,269,872	0.236	771,495	771,495	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Sukkur	0.925	1,996,271	0.509	1,015,724	939,240	76,484	10,000,000	764,840,014	10,000	76,484,001	1,651,232,226	21,589	165,123,223
N Feroze	0.931	1,700,898	0.177	301,722	280,903	20,819	10,000,000	208,188,039	10,000	20,818,804	449,462,362	21,589	44,946,236
S Benazirabad	0.942	1,733,906	0.264	457,738	431,006	26,732	10,000,000	267,319,135	10,000	26,731,913	577,121,962	21,589	57,712,196
Sindh	**0.883**	**65,699,670**	**0.427**	**35,068,927**	**30,815,132**	**4,253,794**	**10,000,000**	**42,537,943,612**	**10,000**	**4,253,794,361**	**91,836,229,796**	**21,589**	**9,183,622,980**
District	**% improved water supply urban (fraction)**	**Total est pop all UCs 2026**	**% Urban population (fraction)**	**Total est pop urban**	**Access to improved Water Supply PSLM 2014-15**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 29 - Detailed costing for safely managed rural drinking water supply by district

District	% improved water supply rural on premises (fraction)	Total est pop all UCs 2026	% Rural population (fraction)	Total est pop rural	Access to improved Water Supply PSLM 2014-15	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[C*a]	[C-D]	10,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.909	2,075,398	0.836	1,735,588	1,577,823	157,765	10,000,000	1,577,649,598	10,000	157,764,960	3,406,027,153	21,589	340,602,715
Sujawal	0.624	996,762	0.888	884,817	551,949	332,868	10,000,000	3,328,679,982	10,000	332,867,998	7,186,370,422	21,589	718,637,042
Thatta	0.621	1,102,581	0.888	978,751	608,000	370,751	10,000,000	3,707,509,350	10,000	370,750,935	8,004,234,612	21,589	800,423,461
Dadu	0.904	2,317,005	0.786	1,821,778	1,646,705	175,073	10,000,000	1,750,728,429	10,000	175,072,843	3,779,691,369	21,589	377,969,137
Hyderabad	0.928	2,623,925	0.492	1,291,094	1,198,265	92,830	10,000,000	928,296,941	10,000	92,829,694	2,004,123,470	21,589	200,412,347
Jamshoro	0.739	1,218,663	0.492	599,640	443,313	156,326	10,000,000	1,563,260,190	10,000	156,326,019	3,374,961,501	21,589	337,496,150
Matiari	0.988	902,260	0.492	443,954	438,583	5,372	10,000,000	53,718,476	10,000	5,371,848	115,974,161	21,589	11,597,416
Tando Allah Yar	0.988	819,938	0.492	403,448	398,728	4,720	10,000,000	47,203,422	10,000	4,720,342	101,908,649	21,589	10,190,865
Tando M Khan	0.971	772,086	0.492	379,903	368,923	10,979	10,000,000	109,791,857	10,000	10,979,186	237,032,385	21,589	23,703,239
Karachi Central	0.746	6,119,496	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi East	0.746	3,702,357	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi South	0.746	4,218,944	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi West	0.746	4,208,477	0.093	391,388	292,132	99,256	10,000,000	992,560,883	10,000	99,256,088	2,142,864,503	21,589	214,286,450
Korangi	0.746	4,122,657	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Malir	0.746	2,054,672	0.093	191,084	142,625	48,459	10,000,000	484,590,282	10,000	48,459,028	1,046,194,073	21,589	104,619,407
Jacobabad	0.953	1,305,942	0.757	988,157	941,219	46,937	10,000,000	469,374,420	10,000	46,937,442	1,013,344,169	21,589	101,334,417
Kashmore	0.993	1,203,411	0.757	910,575	904,019	6,556	10,000,000	65,561,426	10,000	6,556,143	141,542,202	21,589	14,154,220
Larkana	1.000	2,383,207	0.711	1,694,340	1,694,340	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Q Shahdadkot	0.869	2,196,695	0.711	1,561,740	1,356,683	205,056	10,000,000	2,050,564,054	10,000	205,056,405	4,427,013,996	21,589	442,701,400

Shikarpur	1.000	1,686,491	0.759	1,280,200	1,280,200	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Mirpur Khas	0.693	1,929,655	0.669	1,290,696	894,453	396,244	10,000,000	3,962,437,920	10,000	396,243,792	8,554,606,275	21,589	855,460,627
Sanghar	0.955	2,846,978	0.772	2,198,423	2,098,395	100,028	10,000,000	1,000,282,683	10,000	100,028,268	2,159,535,289	21,589	215,953,529
Tharparkar	0.128	2,167,030	0.956	2,072,193	264,826	1,807,367	10,000,000	18,073,665,609	10,000	1,807,366,561	39,019,688,476	21,589	3,901,968,848
Umerkot	0.530	1,641,132	0.831	1,363,897	722,729	641,168	10,000,000	6,411,679,946	10,000	641,167,995	13,842,336,110	21,589	1,384,233,611
Ghotki	1.000	2,382,961	0.837	1,994,809	1,994,609	199	10,000,000	1,994,809	10,000	199,481	4,306,642	21,589	430,664
Khairpur	0.963	3,269,872	0.764	2,498,377	2,405,687	92,690	10,000,000	926,897,743	10,000	92,689,774	2,001,102,708	21,589	200,110,271
Sukkur	0.940	1,996,271	0.491	980,547	921,518	59,029	10,000,000	590,289,420	10,000	59,028,942	1,274,390,584	21,589	127,439,058
N Feroze	1.000	1,700,898	0.823	1,399,176	1,399,316	-140	10,000,000	-1,399,176	10,000	-139,918	-3,020,716	21,589	-302,072
S Benazirabad	0.989	1,733,906	0.736	1,276,168	1,262,513	13,655	10,000,000	136,549,950	10,000	13,654,995	294,801,100	21,589	29,480,110
Sindh	**0.849**	**65,699,670**	**0.573**	**30,630,743**	**25,807,555**	**4,823,189**	**10,000,000**	**48,231,888,216**	**10,000**	**4,823,188,822**	**104,129,029,134**	**21,589**	**10,412,902,913**
District	**% improved water supply rural (fraction)**	**Total est pop all UCs 2026**	**% Rural population (fraction)**	**Total est pop rural**	**Access to improved Water Supply PSLM 2014-15**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

Table 30 - Detailed costing of improved overall sanitation system by district

District	% pop connected to improved sanitation* system (fraction)	HH size 1998	No UCs	Total est pop all UCs 2026	Total est No of HH all UCs 2026	Mean pop per UC 2026	Mean No of HH per UC 2026	Access to improved sanitation system PSLM 2014-15	Access pop gap to meet by 2026
	a	A	B	C	D	E	F	G	H
					[C/A]	[C/B]	[D/B]	[C*a]	[C-G]
Badin	0.245	214,348	49	2,075,398	391,584	42,355	7,992	507,435	1,567,963
Sujawal	0.166	109,852	29	996,762	207,117	34,371	7,142	164,964	831,798
Thatta	0.223	110,612	34	1,102,581	208,696	32,429	6,138	245,986	856,595
Dadu	0.480	203,217	55	2,317,005	421,274	42,127	7,660	1,111,004	1,206,001
Hyderabad	0.823	425,512	116	2,623,925	437,321	22,620	3,770	2,159,753	464,172
Jamshoro	0.494	101,402	30	1,218,663	221,575	40,622	7,386	601,654	617,009
Matiari	0.333	74,362	25	902,260	150,377	36,090	6,015	300,813	601,447
Tando Allah Yar	0.355	99,120	30	819,938	136,656	27,331	4,555	290,832	529,106
Tando M Khan	0.370	91,733	31	772,086	128,681	24,906	4,151	285,517	486,569
Karachi Central	0.971	337,122	42	6,119,496	905,653	145,702	21,563	5,938,971	180,525
Karachi East	0.971	215,339	26	3,702,357	578,493	142,398	22,250	3,593,137	109,220
Karachi South	0.971	237,165	30	4,218,944	637,126	140,631	21,238	4,094,485	124,459
Karachi West	0.971	225,872	30	4,208,477	608,132	140,283	20,271	4,084,327	124,150
Korangi	0.971	213,437	28	4,122,657	573,384	147,238	20,478	4,001,039	121,618
Malir	0.971	116,573	25	2,054,672	313,165	82,187	12,527	1,994,059	60,613
Jacobabad	0.426	121,127	42	1,305,942	233,204	31,094	5,552	555,809	750,133
Kashmore	0.474	131,473	44	1,203,411	214,895	27,350	4,884	570,778	632,633
Larkana	0.796	166,450	43	2,383,207	403,933	55,423	9,394	1,897,986	485,221
Q Shahdadkot	0.584	162,483	43	2,196,695	372,321	51,086	8,659	1,283,749	912,946
Shikarpur	0.583	150,108	52	1,686,491	285,846	32,433	5,497	982,887	703,604
Mirpur Khas	0.508	148,659	41	1,929,655	316,337	47,065	7,716	980,651	949,004

Sanghar	0.487	246,091	69	2,846,978	490,858	41,261	7,114	1,387,048	1,459,930
Tharparkar	0.111	163,692	46	2,167,030	386,970	47,109	8,412	240,324	1,926,706
Umerkot	0.267	121,572	34	1,641,132	303,913	48,269	8,939	437,690	1,203,442
Ghotki	0.610	153,217	75	2,382,961	471,873	31,773	6,292	1,453,368	929,593
Khairpur	0.470	254,828	76	3,269,872	536,045	43,025	7,053	1,535,859	1,734,013
Sukkur	0.713	137,632	43	1,996,271	302,465	46,425	7,034	1,422,942	573,329
N Feroze	0.618	187,512	51	1,700,898	293,258	33,351	5,750	1,050,645	650,253
S Benazirabad	0.485	178,589	58	1,733,906	288,984	29,895	4,982	840,771	893,135
Sindh	**0.648**	**5,099,099**	**1297**	**65,699,670**	**10,820,136**			**44,014,481**	**21,685,189**
District	**% pop connected to improved sanitation* system (fraction)**	**HH size 1998**	**No UCs**	**Total est pop all UCs 2026**	**Total est No of HH all UCs 2026**	**Mean pop per UC 2026**	**Mean No of HH per UC 2026**	**Access to improved sanitation system PSLM 2014-15**	**Access pop gap to meet by 2026**

*Improved sanitation – includes flush to sewer, flush to septic tank and flush to open drain

Table 30 continued

District	Unit cost of sanitation scheme per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per UC at current rates	Mean cost per HH at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per UC at 8% inflation	Mean cost per HH at 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	I	J	K	L	M	N	O	P	Q	R	S
	10,000,000	[(H/1000)*I]	[J/B]	[J/(H/A)]	[J/H]	[J/10]	[J*1.08^10]	[O/B]	[O/(H/A)]	[O/H]	[O/10]
Badin	10,000,000	15,679,631,890	319,992,488	2,143,480,000	10,000	1,567,963,189	33,851,149,235	690,839,780	4,627,612,553	21,589	3,385,114,924
Sujawal	10,000,000	8,317,978,890	286,826,858	1,098,520,000	10,000	831,797,889	17,957,892,552	619,237,674	2,371,622,288	21,589	1,795,789,255
Thatta	10,000,000	8,565,951,789	251,939,759	1,106,120,000	10,000	856,595,179	18,493,247,443	543,919,042	2,388,030,118	21,589	1,849,324,744
Dadu	10,000,000	12,060,011,025	219,272,928	2,032,170,000	10,000	1,206,001,103	26,036,659,269	473,393,805	4,387,302,612	21,589	2,603,665,927
Hyderabad	10,000,000	4,641,723,325	40,014,856	4,255,120,000	10,000	464,172,333	10,021,132,517	86,389,073	9,186,484,934	21,589	1,002,113,252
Jamshoro	10,000,000	6,170,090,769	205,669,692	1,014,020,000	10,000	617,009,077	13,320,763,197	444,025,440	2,189,193,126	21,589	1,332,076,320
Matiari	10,000,000	6,014,465,160	240,578,606	743,620,000	10,000	601,446,516	12,984,779,179	519,391,167	1,605,419,806	21,589	1,298,477,918
Tando Allah Yar	10,000,000	5,291,059,914	176,368,664	991,200,000	10,000	529,105,991	11,423,001,510	380,766,717	2,139,926,457	21,589	1,142,300,151
Tando M Khan	10,000,000	4,865,685,972	156,957,612	917,330,000	10,000	486,568,597	10,504,651,074	338,859,712	1,980,446,668	21,589	1,050,465,107
Karachi Central	10,000,000	1,805,251,320	42,982,174	3,371,220,000	10,000	180,525,132	3,897,402,201	92,795,291	7,278,211,129	21,589	389,740,220
Karachi East	10,000,000	1,092,195,315	42,007,512	2,153,390,000	10,000	109,219,532	2,357,967,767	90,691,068	4,649,007,500	21,589	235,796,777
Karachi South	10,000,000	1,244,588,480	41,486,283	2,371,650,000	10,000	124,458,848	2,686,973,181	89,565,773	5,120,214,470	21,589	268,697,318
Karachi West	10,000,000	1,241,500,715	41,383,357	2,258,720,000	10,000	124,150,072	2,680,306,928	89,343,564	4,876,407,070	21,589	268,030,693
Korangi	10,000,000	1,216,183,815	43,435,136	2,134,370,000	10,000	121,618,382	2,625,649,639	93,773,201	4,607,944,746	21,589	262,564,964
Malir	10,000,000	606,128,240	24,245,130	1,165,730,000	10,000	60,612,824	1,308,585,409	52,343,416	2,516,723,637	21,589	130,858,541
Jacobabad	10,000,000	7,501,330,848	178,603,115	1,211,270,000	10,000	750,133,085	16,194,810,681	385,590,730	2,615,041,081	21,589	1,619,481,068
Kashmore	10,000,000	6,326,331,627	143,780,264	1,314,730,000	10,000	632,633,163	13,658,075,491	310,410,807	2,838,403,462	21,589	1,365,807,549
Larkana	10,000,000	4,852,209,452	112,842,080	1,664,500,000	10,000	485,220,945	10,475,556,278	243,617,588	3,593,530,658	21,589	1,047,555,628
Q Shahdadkot	10,000,000	9,129,464,420	212,313,126	1,624,830,000	10,000	912,946,442	19,709,828,948	458,368,115	3,507,886,103	21,589	1,970,982,895
Shikarpur	10,000,000	7,036,040,452	135,308,470	1,501,080,000	10,000	703,604,045	15,190,283,614	292,120,839	3,240,719,135	21,589	1,519,028,361

Mirpur Khas	10,000,000	9,490,043,290	231,464,470	1,486,590,000	10,000	949,004,329	20,488,291,684	499,714,431	3,209,436,312	21,589	2,048,829,168
Sanghar	10,000,000	14,599,303,184	211,584,104	2,460,910,000	10,000	1,459,930,318	31,518,800,587	456,794,211	5,312,920,115	21,589	3,151,880,059
Tharparkar	10,000,000	19,267,063,730	418,849,212	1,636,920,000	10,000	1,926,706,373	41,596,145,511	904,264,033	3,533,987,507	21,589	4,159,614,551
Umerkot	10,000,000	12,034,420,956	353,953,558	1,215,720,000	10,000	1,203,442,096	25,981,412,230	764,159,183	2,624,648,298	21,589	2,598,141,223
Ghotki	10,000,000	9,295,930,861	123,945,745	1,532,170,000	10,000	929,593,086	20,069,217,509	267,589,567	3,307,840,113	21,589	2,006,921,751
Khairpur	10,000,000	17,340,131,216	228,159,621	2,548,280,000	10,000	1,734,013,122	37,436,042,738	492,579,510	5,501,545,392	21,589	3,743,604,274
Sukkur	10,000,000	5,733,290,312	133,332,333	1,376,320,000	10,000	573,329,031	12,377,743,771	287,854,506	2,971,371,652	21,589	1,237,774,377
N Feroze	10,000,000	6,502,533,054	127,500,648	1,875,120,000	10,000	650,253,305	14,038,481,156	275,264,336	4,048,243,441	21,589	1,403,848,116
S Benazirabad	10,000,000	8,931,349,806	153,988,790	1,785,890,000	10,000	893,134,981	19,282,114,356	332,450,248	3,855,602,563	21,589	1,928,211,436
Sindh	**10,000,000**	**216,851,889,827**	**168,923,676**	**1,758,310,000**	**10,000**	**21,685,188,983**	**468,166,965,653**	**364,693,546**	**3,796,059,412**	**21,589**	**46,816,696,565**
District	**Unit cost of sanitation scheme per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per UC at current rates**	**Mean cost per HH at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per UC at 8% inflation**	**Mean cost per HH at 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Improved sanitation – includes flush to sewer, flush to septic tank and flush to drain covered with slab

Table 31 - Detailed costing of improved urban sanitation system by district

District	% pop connected to improved sanitation* system (fraction)	Total est pop all UCs 2026	% Urban population (fraction)	Total est pop urban	Access to improved sanitation system PSLM 2014-15 Urban	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[a*C]	[C-D]	10,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.765	2,075,398	0.164	339,810	259,853	79,957	10,000,000	799,572,657	10,000	79,957,266	1,726,217,395	21,589	172,621,740
Sujawal	1.000	996,762	0.112	111,945	111,945	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Thatta	0.877	1,102,581	0.112	123,830	108,599	15,231	10,000,000	152,310,718	10,000	15,231,072	328,827,416	21,589	32,882,742
Dadu	0.990	2,317,005	0.214	495,227	490,374	4,853	10,000,000	48,532,269	10,000	4,853,227	104,777,529	21,589	10,477,753
Hyderabad	0.915	2,623,925	0.508	1,332,831	1,218,873	113,957	10,000,000	1,139,570,083	10,000	113,957,008	2,460,246,339	21,589	246,024,634
Jamshoro	0.994	1,218,663	0.508	619,023	615,557	3,467	10,000,000	34,665,316	10,000	3,466,532	74,839,817	21,589	7,483,982
Matiari	0.780	902,260	0.508	458,306	357,570	100,736	10,000,000	1,007,355,819	10,000	100,735,582	2,174,805,658	21,589	217,480,566
Tando Allah Yar	0.903	819,938	0.508	416,490	376,174	40,316	10,000,000	403,162,267	10,000	40,316,227	870,397,096	21,589	87,039,710
Tando M Khan	0.971	772,086	0.508	392,183	380,810	11,373	10,000,000	113,733,180	10,000	11,373,318	245,541,406	21,589	24,554,141
Karachi Central	0.993	6,119,496	1.000	6,119,496	6,073,600	45,896	10,000,000	458,962,200	10,000	45,896,220	990,864,966	21,589	99,086,497
Karachi East	0.993	3,702,357	1.000	3,702,357	3,674,589	27,768	10,000,000	277,676,775	10,000	27,767,677	599,483,331	21,589	59,948,333
Karachi South	0.993	4,218,944	1.000	4,218,944	4,187,302	31,642	10,000,000	316,420,800	10,000	31,642,080	683,128,775	21,589	68,312,877
Karachi West	0.993	4,208,477	0.907	3,817,089	3,788,460	28,628	10,000,000	286,281,648	10,000	28,628,165	618,060,606	21,589	61,806,061
Korangi	0.993	4,122,657	1.000	4,122,657	4,091,737	30,920	10,000,000	309,199,275	10,000	30,919,927	667,538,044	21,589	66,753,804
Malir	0.993	2,054,672	0.907	1,863,588	1,849,611	13,977	10,000,000	139,769,063	10,000	13,976,906	301,750,924	21,589	30,175,092
Jacobabad	0.956	1,305,942	0.243	317,785	303,898	13,887	10,000,000	138,872,187	10,000	13,887,219	299,814,636	21,589	29,981,464
Kashmore	0.883	1,203,411	0.243	292,836	258,486	34,350	10,000,000	343,496,201	10,000	34,349,620	741,582,535	21,589	74,158,253

Larkana	0.978	2,383,207	0.289	688,867	673,367	15,500	10,000,000	154,995,027	10,000	15,499,503	334,622,639	21,589	33,462,264
Q Shahdadkot	0.968	2,196,695	0.289	634,955	614,764	20,192	10,000,000	201,915,827	10,000	20,191,583	435,921,126	21,589	43,592,113
Shikarpur	0.912	1,686,491	0.241	406,291	370,537	35,754	10,000,000	357,536,092	10,000	35,753,609	771,893,606	21,589	77,189,361
Mirpur Khas	0.943	1,929,655	0.331	638,959	602,282	36,676	10,000,000	366,762,242	10,000	36,676,224	791,812,172	21,589	79,181,217
Sanghar	0.936	2,846,978	0.228	648,555	607,242	41,313	10,000,000	413,129,229	10,000	41,312,923	891,915,021	21,589	89,191,502
Tharparkar	0.786	2,167,030	0.044	94,837	74,533	20,305	10,000,000	203,046,443	10,000	20,304,644	438,362,042	21,589	43,836,204
Umerkot	0.808	1,641,132	0.169	277,235	224,089	53,146	10,000,000	531,459,434	10,000	53,145,943	1,147,381,058	21,589	114,738,106
Ghotki	0.946	2,382,961	0.163	388,152	367,347	20,805	10,000,000	208,049,692	10,000	20,804,969	449,163,681	21,589	44,916,368
Khairpur	0.775	3,269,872	0.236	771,495	598,063	173,432	10,000,000	1,734,321,508	10,000	173,432,151	3,744,270,058	21,589	374,427,006
Sukkur	0.949	1,996,271	0.509	1,015,724	964,023	51,700	10,000,000	517,003,409	10,000	51,700,341	1,116,171,584	21,589	111,617,158
N Feroze	0.988	1,700,898	0.177	301,722	298,161	3,560	10,000,000	35,603,172	10,000	3,560,317	76,864,578	21,589	7,686,458
S Benazirabad	0.953	1,733,906	0.264	457,738	436,133	21,605	10,000,000	216,052,451	10,000	21,605,245	466,441,038	21,589	46,644,104
Sindh	**0.960**	**65,699,670**	**0.427**	**35,068,927**	**33,977,981**	**1,090,945**	**10,000,000**	**10,909,454,985**	**10,000**	**1,090,945,499**	**23,552,695,075**	**21,589**	**2,355,269,507**
District	**% pop connected to improved sanitation* system (fraction)**	**Total est pop all UCs 2026**	**% Urban population (fraction)**	**Total est pop urban**	**Access to improved sanitation system PSLM 2014-15 Urban**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Improved sanitation – includes flush to sewer, flush to septic tank and flush to drain covered with slab

Table 32 - Detailed costing of improved rural sanitation system by district

District	% pop connected to improved sanitation* system (fraction)	Total est pop all UCs 2026	% Rural population (fraction)	Total est pop rural	Access to improved sanitation system PSLM 2014-15 Rural	Pop gap to meet access by 2026	Unit cost of WSS per 1000 pop at present rates	Total Cost to meet gap at current rates	Mean cost per capita at current rates	Mean Annual Cost to meet gap at current rates	Total Cost to meet gap with 8% inflation	Mean cost per capita at 8% inflation	Mean Annual Cost to meet gap at 8% inflation
	a	A	B	C	D	E	F	G	H	I	J	K	L
				[A*B]	[a*C]	[C-D]	10,000,000	[(E/1000)*F]	[G/E]	[G/10]	[G*1.08^10]	[J/E]	[J/10]
Badin	0.096	2,075,398	0.836	1,735,588	165,922	1,569,666	10,000,000	15,696,658,923	10,000	1,569,665,892	33,887,909,322	21,589	3,388,790,932
Sujawal	0.026	996,762	0.888	884,817	22,651	862,165	10,000,000	8,621,652,777	10,000	862,165,278	18,613,501,698	21,589	1,861,350,170
Thatta	0.126	1,102,581	0.888	978,751	123,323	855,429	10,000,000	8,554,285,036	10,000	855,428,504	18,468,059,797	21,589	1,846,805,980
Dadu	0.373	2,317,005	0.786	1,821,778	679,341	1,142,437	10,000,000	11,424,368,345	10,000	1,142,436,835	24,664,354,399	21,589	2,466,435,440
Hyderabad	0.384	2,623,925	0.492	1,291,094	495,780	795,314	10,000,000	7,953,142,080	10,000	795,314,208	17,170,237,242	21,589	1,717,023,724
Jamshoro	0.330	1,218,663	0.492	599,640	197,701	401,938	10,000,000	4,019,383,603	10,000	401,938,360	8,677,547,735	21,589	867,754,773
Matiari	0.181	902,260	0.492	443,954	80,400	363,554	10,000,000	3,635,542,172	10,000	363,554,217	7,848,862,873	21,589	784,886,287
Tando Allah Yar	0.196	819,938	0.492	403,448	79,197	324,251	10,000,000	3,242,512,015	10,000	324,251,202	7,000,340,243	21,589	700,034,024
Tando M Khan	0.250	772,086	0.492	379,903	94,938	284,965	10,000,000	2,849,649,555	10,000	284,964,956	6,152,179,658	21,589	615,217,966
Karachi Central	0.634	6,119,496	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi East	0.634	3,702,357	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi South	0.634	4,218,944	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Karachi West	0.634	4,208,477	0.093	391,388	248,140	143,248	10,000,000	1,432,481,401	10,000	143,248,140	3,092,619,905	21,589	309,261,991
Korangi	0.634	4,122,657	0.000	-	-	-	10,000,000	-	#DIV/0!	-	-	#DIV/0!	-
Malir	0.634	2,054,672	0.093	191,084	121,148	69,937	10,000,000	699,369,255	10,000	69,936,926	1,509,885,768	21,589	150,988,577
Jacobabad	0.244	1,305,942	0.757	988,157	241,209	746,948	10,000,000	7,469,476,303	10,000	746,947,630	16,126,039,108	21,589	1,612,603,911
Kashmore	0.291	1,203,411	0.757	910,575	265,160	645,416	10,000,000	6,454,158,180	10,000	645,415,818	13,934,043,431	21,589	1,393,404,343

Larkana	0.653	2,383,207	0.711	1,694,340	1,106,065	588,275	10,000,000	5,882,749,219	10,000	588,274,922	12,700,414,341	21,589	1,270,041,434
Q Shahdadkot	0.471	2,196,695	0.711	1,561,740	736,048	825,692	10,000,000	8,256,917,103	10,000	825,691,710	17,826,064,734	21,589	1,782,606,473
Shikarpur	0.460	1,686,491	0.759	1,280,200	589,276	690,924	10,000,000	6,909,239,326	10,000	690,923,933	14,916,529,494	21,589	1,491,652,949
Mirpur Khas	0.332	1,929,655	0.669	1,290,696	427,866	862,831	10,000,000	8,628,305,372	10,000	862,830,537	18,627,864,152	21,589	1,862,786,415
Sanghar	0.342	2,846,978	0.772	2,198,423	752,301	1,446,123	10,000,000	14,461,229,649	10,000	1,446,122,965	31,220,710,181	21,589	3,122,071,018
Tharparkar	0.063	2,167,030	0.956	2,072,193	129,719	1,942,474	10,000,000	19,424,735,315	10,000	1,942,473,532	41,936,546,638	21,589	4,193,654,664
Umerkot	0.120	1,641,132	0.831	1,363,897	163,258	1,200,639	10,000,000	12,006,385,570	10,000	1,200,638,557	25,920,885,934	21,589	2,592,088,593
Ghotki	0.525	2,382,961	0.837	1,994,809	1,047,275	947,534	10,000,000	9,475,340,801	10,000	947,534,080	20,456,550,113	21,589	2,045,655,011
Khairpur	0.339	3,269,872	0.764	2,498,377	847,699	1,650,677	10,000,000	16,506,774,640	10,000	1,650,677,464	35,636,888,394	21,589	3,563,688,839
Sukkur	0.386	1,996,271	0.491	980,547	378,785	601,762	10,000,000	6,017,618,223	10,000	601,761,822	12,991,586,406	21,589	1,299,158,641
N Feroze	0.522	1,700,898	0.823	1,399,176	729,670	669,506	10,000,000	6,695,058,136	10,000	669,505,814	14,454,128,369	21,589	1,445,412,837
S Benazirabad	0.304	1,733,906	0.736	1,276,168	388,465	887,702	10,000,000	8,877,022,908	10,000	887,702,291	19,164,826,657	21,589	1,916,482,666
Sindh	**0.332**	**65,699,670**	**0.573**	**30,630,743**	**10,111,338**	**20,519,406**	**10,000,000**	**205,194,055,908**	**10,000**	**20,519,405,591**	**442,998,576,592**	**21,589**	**44,299,857,659**
District	**% pop connected to improved sanitation* system (fraction)**	**Total est pop all UCs 2026**	**% Rural population (fraction)**	**Total est pop rural**	**Access to improved sanitation system PSLM 2014-15 Rural**	**Pop gap to meet access by 2026**	**Unit cost of WSS per 1000 pop at present rates**	**Total Cost to meet gap at current rates**	**Mean cost per capita at current rates**	**Mean Annual Cost to meet gap at current rates**	**Total Cost to meet gap with 8% inflation**	**Mean cost per capita at 8% inflation**	**Mean Annual Cost to meet gap at 8% inflation**

*Improved sanitation – includes flush to sewer, flush to septic tank and flush to drain covered with slab

Table 33 - Missing facilities (drinking water) in public sector primary schools

District	Total schools	Schools with DW	%	Gap	Cost @ 150,000 per school
Badin	2886	1762	61%	1124	168,600,000
Sujawal	1610	225	14%	1385	207,750,000
Thatta	1441	259	18%	1182	177,300,000
Dadu	1965	751	38%	1214	182,100,000
Hyderabad	779	464	60%	315	47,250,000
Jamshoro	745	249	33%	496	74,400,000
Matiari	1976	572	29%	1404	210,600,000
Tando A Yar	747	357	48%	390	58,500,000
Tando M Khan	976	454	47%	522	78,300,000
Karachi Central	390	275	71%	115	17,250,000
Karachi East	219	166	76%	53	7,950,000
Karachi South	393	222	56%	171	25,650,000
Karachi West	324	204	63%	120	18,000,000
Korangi	470	322	69%	148	22,200,000
Malir	512	216	42%	296	44,400,000
Jacobabad	1368	466	34%	902	135,300,000
Kashmore	1393	568	41%	825	123,750,000
Larkana	1048	840	80%	208	31,200,000
Q Shahdadkot	1519	529	35%	990	148,500,000
Shikarpur	1199	675	56%	524	78,600,000
Mirpur Khas	857	538	63%	319	47,850,000
Sanghar	2471	1776	72%	695	104,250,000
Tharparkar	3751	663	18%	3088	463,200,000

Umerkot	2150	476	22%	1674	251,100,000
Ghotki	1875	1284	68%	591	88,650,000
Khairpur	3140	2497	80%	643	96,450,000
Sukkur	1123	813	72%	310	46,500,000
N Feroze	2178	1765	81%	413	61,950,000
S Benazirabad	2837	1172	41%	1665	249,750,000
Sindh	**42342**	**20560**	**49%**	**21782**	**3,267,300,000**
District	**Total schools**	**Schools with DW**	**%**	**Gap**	**Cost @ 150,000 per school**

Computed from the following source:

- Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan

Table 34 - Missing facilities (latrines) in public sector primary schools

District	Total schools	Schools with Latrines	%	Gap	Cost @ 150,000 per school
Badin	2886	1743	60%	1143	171,450,000
Sujawal	1610	444	28%	1166	174,900,000
Thatta	1441	451	31%	990	148,500,000
Dadu	1965	979	50%	986	147,900,000
Hyderabad	779	603	77%	176	26,400,000
Jamshoro	745	418	56%	327	49,050,000
Matiari	1976	856	43%	1120	168,000,000
Tando A Yar	747	500	67%	247	37,050,000
Tando M Khan	976	475	49%	501	75,150,000
Karachi Central	390	335	86%	55	8,250,000
Karachi East	219	202	92%	17	2,550,000
Karachi South	393	333	85%	60	9,000,000
Karachi West	324	269	83%	55	8,250,000
Korangi	470	423	90%	47	7,050,000
Malir	512	390	76%	122	18,300,000
Jacobabad	1368	582	43%	786	117,900,000
Kashmore	1393	345	25%	1048	157,200,000
Larkana	1048	797	76%	251	37,650,000
Q Shahdadkot	1519	709	47%	810	121,500,000
Shikarpur	1199	652	54%	547	82,050,000
Mirpur Khas	857	658	77%	199	29,850,000
Sanghar	2471	1680	68%	791	118,650,000

Tharparkar	3751	1386	37%	2365	354,750,000
Umerkot	2150	1276	59%	874	131,100,000
Ghotki	1875	843	45%	1032	154,800,000
Khairpur	3140	2113	67%	1027	154,050,000
Sukkur	1123	793	71%	330	49,500,000
N Feroze	2178	1257	58%	921	138,150,000
S Benazirabad	2837	1421	50%	1416	212,400,000
Sindh	**42342**	**22933**	**54%**	**19409**	**2,911,350,000**
District	**Total schools**	**Schools with Latrines**	**%**	**Gap**	**Cost @ 150,000 per school**

Computed from the following source:

- Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan

Table 35 - Missing facilities (drinking water) in public sector middle and secondary schools

District	Total schools	Schools with DW	%	Gap	Cost @ 150,000 per school
Badin	178	141	79%	37	5,550,000
Sujawal	56	18	32%	38	5,700,000
Thatta	97	43	44%	54	8,100,000
Dadu	140	96	69%	44	6,600,000
Hyderabad	164	146	89%	18	2,700,000
Jamshoro	74	47	64%	27	4,050,000
Matiari	191	119	62%	72	10,800,000
Tando A Yar	89	53	60%	36	5,400,000
Tando M Khan	67	44	66%	23	3,450,000
Karachi Central	254	209	82%	45	6,750,000
Karachi East	119	100	84%	19	2,850,000
Karachi South	180	138	77%	42	6,300,000
Karachi West	98	77	79%	21	3,150,000
Korangi	207	145	70%	62	9,300,000
Malir	135	91	67%	44	6,600,000
Jacobabad	101	41	41%	60	9,000,000
Kashmore	102	70	69%	32	4,800,000
Larkana	142	125	88%	17	2,550,000
Q Shahdadkot	112	61	54%	51	7,650,000
Shikarpur	128	96	75%	32	4,800,000
Mirpur Khas	69	59	86%	10	1,500,000
Sanghar	206	177	86%	29	4,350,000
Tharparkar	294	81	28%	213	31,950,000

Umerkot	150	70	47%	80	12,000,000
Ghotki	123	104	85%	19	2,850,000
Khairpur	330	305	92%	25	3,750,000
Sukkur	153	141	92%	12	1,800,000
N Feroze	238	202	85%	36	5,400,000
S Benazirabad	185	118	64%	67	10,050,000
Sindh	**4382**	**3117**	**71%**	**1265**	**189,750,000**
District	**Total schools**	**Schools with DW**	**%**	**Gap**	**Cost @ 150,000 per school**

Computed from the following source:

- Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan

Table 36 - Missing facilities (latrines) in public sector middle and secondary schools

District	Total schools	Schools with Latrines	%	Gap	Cost @ 150,000 per school
Badin	178	161	90%	17	2,550,000
Sujawal	56	35	63%	21	3,150,000
Thatta	97	58	60%	39	5,850,000
Dadu	140	112	80%	28	4,200,000
Hyderabad	164	154	94%	10	1,500,000
Jamshoro	74	59	80%	15	2,250,000
Matiari	191	136	71%	55	8,250,000
Tando A Yar	89	69	78%	20	3,000,000
Tando M Khan	67	54	81%	13	1,950,000
Karachi Central	254	235	93%	19	2,850,000
Karachi East	119	115	97%	4	600,000
Karachi South	180	171	95%	9	1,350,000
Karachi West	98	95	97%	3	450,000
Korangi	207	198	96%	9	1,350,000
Malir	135	131	97%	4	600,000
Jacobabad	101	56	55%	45	6,750,000
Kashmore	102	64	63%	38	5,700,000
Larkana	142	122	86%	20	3,000,000
Q Shahdadkot	112	78	70%	34	5,100,000
Shikarpur	128	91	71%	37	5,550,000
Mirpur Khas	69	61	88%	8	1,200,000
Sanghar	206	186	90%	20	3,000,000

Tharparkar	294	158	54%	136	20,400,000
Umerkot	150	120	80%	30	4,500,000
Ghotki	123	93	76%	30	4,500,000
Khairpur	330	294	89%	36	5,400,000
Sukkur	153	144	94%	9	1,350,000
N Feroze	238	184	77%	54	8,100,000
S Benazirabad	185	145	78%	40	6,000,000
Sindh	**4382**	**3579**	**82%**	**803**	**120,450,000**
District	**Total schools**	**Schools with Latrines**	**%**	**Gap**	**Cost @ 150,000 per school**

Computed from the following source:

- Pakistan Education Atlas 2015. National Education Management Information System (NEMIS), Academy of Educational Planning and Management (AEPAM), Government of Pakistan and Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme (WFP) Pakistan

Table 37 - Missing facilities (water and sanitation) at Basic Health Units

	Number of BHUs requiring Water Supply and Tank (20% of BHUs)	Cost @ PKR 150,000 per BHU for Water Supply and Tank	Number of BHUs requiring Sanitation Facilities (20% of BHUs)	Cost @ PKR 150,000 per BHU for Sanitation Facilities	Total cost
Badin	7	1,050,000	7	1,050,000	2,100,000
Sujawal	6	900,000	6	900,000	1,800,000
Thatta	4	600,000	4	600,000	1,200,000
Dadu	9	1,350,000	9	1,350,000	2,700,000
Hyderabad	4	600,000	4	600,000	1,200,000
Jamshoro	4	600,000	4	600,000	1,200,000
Matiari	4	600,000	4	600,000	1,200,000
Tando A Yar	3	450,000	3	450,000	900,000
Tando M Khan	3	450,000	3	450,000	900,000
Karachi	7	1,050,000	7	1,050,000	2,100,000
Jacobabad	5	750,000	5	750,000	1,500,000
Kashmore	4	600,000	4	600,000	1,200,000
Larkana	6	900,000	6	900,000	1,800,000
Q Shahdadkot	6	900,000	6	900,000	1,800,000
Shikarpur	7	1,050,000	7	1,050,000	2,100,000
Mirpur Khas	8	1,200,000	8	1,200,000	2,400,000
Sanghar	12	1,800,000	12	1,800,000	3,600,000
Tharparkar	7	1,050,000	7	1,050,000	2,100,000
Umerkot	6	900,000	6	900,000	1,800,000
Ghotki	7	1,050,000	7	1,050,000	2,100,000
Khairpur	16	2,400,000	16	2,400,000	4,800,000
Sukkur	5	750,000	5	750,000	1,500,000

N Feroze	9	1,350,000	9	1,350,000	2,700,000
S Benazirabad	7	1,050,000	7	1,050,000	2,100,000
Sindh	**156**	**23,400,000**	**156**	**23,400,000**	**46,800,000**
	Number of BHUs requiring Water Supply and Tank (20% of BHUs)	**Cost @ PKR 150,000 per BHU for Water Supply and Tank**	**Number of BHUs requiring Sanitation Facilities (20% of BHUs)**	**Cost @ PKR 150,000 per BHU for Sanitation Facilities**	**Total cost**

Computed from the following source:

- Health Profile of Sindh 2015. (District-wise). Bureau of Statistics, Planning and Development Department, Government of Sindh
- PPHI Sindh data

Table 38 - Indirect Cost Legislation and Policies

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Legislation and Policies							
	Conduct a review of the SLGA and develop Rules of Business for LG&HTPD and PHE&RDD	5,000,000		5,000,000			5,000,000
	Legislative review of drinking water acts, policies, regulations and development of harmonised new acts, regulations and guidelines	10,000,000		10,000,000			10,000,000
	Legislative review of sanitation, sewerage and drainage acts, policies, regulations and development of harmonised new acts, regulations and guidelines	10,000,000		10,000,000			10,000,000
	Development Standard Operating Procedures for water planning, management and O&M for PHE&RDD	5,000,000		5,000,000			5,000,000
	Development of Standard Operating Procedures for wastewater and solid waste planning, management and O&M for LG&HTPD	5,000,000		5,000,000			5,000,000
	Development of guidelines for CBOs for project management and O&M of water supply schemes	1,000,000		1,000,000			1,000,000
	Development of guidelines for CBOs for project management and O&M for	1,000,000		1,000,000			1,000,000

	sanitation, sewerage and drainage schemes						
	Orientation and capacity building programme of 2 big cities, 119 town and 1297 union council officials on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive	20,000,000		5,000,000	5,000,000	10,000,000	20,000,000
Subtotal Legislation and Policies				**42,000,000**	**5,000,000**	**10,000,000**	**57,000,000**

Table 39 - Indirect Costs Water Resources

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Water Resources							
	Conduct a study on water resource management and development in each district (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	5,000,000	29	25,000,000	50,000,000	70000000	145,000,000
	Water safety planning at district level including disaster risk reduction (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	2,000,000	29	10,000,000	20,000,000	26000000	56,000,000
	Sub-sector climate change adaptation and mitigation strategies developed with piloting in selected districts			10,000,000	15,000,000	25000000	50,000,000
	Need assessment and capacity building programme of city, town and union council officials in pilot areas on climate change mitigation strategies	20,000,000		5,000,000	5,000,000	10,000,000	20,000,000
	Pilot rainwater harvesting	To be determined					
Subtotal Water Resources				**50,000,000**	**90,000,000**	**131,000,000**	**271,000,000**

Table 40 - Indirect Costs Water Supply

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Water Supply							
	Rehabilitate 74 non-functional water supply schemes per year (total 538 schemes plus additional 200 schemes in long term)	1,000,000	740	222,000,000	222,000,000	296,000,000	740,000,000
	Replace ageing water supply schemes (50 schemes per year)	5,000,000	500	750,000,000	750,000,000	1,000,000,000	2,500,000,000
	Upgrade 119 township schemes (12 per year)	100,000,000	119	3,600,000,000	3,600,000,000	4,800,000,000	12,000,000,000
	Water supply schemes converted to solar energy (60 units per year)	5,000,000	600	900,000,000	900,000,000	1,200,000,000	3,000,000,000
	Community awareness, leaflets, billboards for water use	1,000,000	29	87,000,000	87,000,000	116,000,000	290,000,000
	Recruitment of 2594 Social Mobilisers – 2 per UC	600,000	2594	4,669,200,000	4,669,200,000	6,225,600,000	15,564,000,000
	Travel cost of Social Mobilisers	120,000	2594	933,840,000	933,840,000	1,245,120,000	3,112,800,000
Subtotal Water Supply				**11,162,040,000**	**11,162,040,000**	**14,882,720,000**	**37,206,800,000**

Table 41 - Indirect Costs Water Quality

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Water Quality							
	District level water testing laboratory facilities (5 in short term, 10 in medium term, 14 in long term)	20,000,000	29	100,000,000	200,000,000	280,000,000	580,000,000
	Study to determine status of ground and overhead reservoirs in cities and towns	20,000,000		10,000,000	10,000,000		20,000,000
Subtotal Water Quality				**110,000,000**	**210,000,000**	**280,000,000**	**600,000,000**

Table 42 - Indirect Costs Sanitation

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Sanitation							
	Establish wastewater treatment plants in 119 towns (12 per year)	15,000,000	119	540,000,000	540,000,000	705,000,000	1,785,000,000
	Community awareness, leaflets, billboards for safe sanitation and hygiene (1297 Ucs in 29 districts)	1,000,000	29	87,000,000	87,000,000	116,000,000	290,000,000
	Recruitment of 2594 Social Mobilisers – 2 per UC	600,000	2594	4,669,200,000	4,669,200,000	6,225,600,000	15,564,000,000
	Travel cost of Social Mobilisers	120,000	2594	933,840,000	933,840,000	1,245,120,000	3,112,800,000
Subtotal Sanitation				**6,230,040,000**	**6,230,040,000**	**8,291,720,000**	**20,751,800,000**

Table 43 - Indirect Costs Solid Waste

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Solid Waste							
	Study to develop profile on wastewater and solid waste in 119 towns and 1297 Ucs (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	5,000,000	29	25,000,000	50,000,000	70,000,000	145,000,000
	Study on status of slaughterhouses and slaughter waste	5,000,000		5,000,000			5,000,000
	Develop slaughterhouse safety and hygiene practice guidelines and orient 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater	10,000,000		10,000,000	5,000,000	5,000,000	20,000,000
	Study on status of industrial solid waste	10,000,000			10,000,000		10,000,000
Subtotal Solid Waste				**40,000,000**	**65,000,000**	**75,000,000**	**180,000,000**

Table 44 - Indirect Costs Health and Hygiene

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Health and Hygiene							
	Conduct a situation analysis of WASH services in all health facilities	10,000,000		10,000,000			10,000,000
	Address missing facilities for water supply in Basic Health Units (extension of water distribution pipe from water supply scheme, water tank per BHU) - missing WASH facilities in other health facilities to be costed after situation analysis and development of JAP	150,000	156	23,400,000			23,400,000
	Address missing facilities for sanitation in Basic Health Units (2 latrines per BHU) - missing WASH facilities in other health facilities to be costed after situation analysis and development of JAP	150,000	156	23,400,000			23,400,000
	Implement Hospital Waste Management Rules in 88 hospitals (9 hospitals per year)	20,000,000	88	540,000,000	540,000,000	680,000,000	1,760,000,000
	Develop WASH health education module and add to curriculum of LHWs/CMWs/LHVs with supporting training material	2,000,000		2,000,000			2,000,000
	Develop WASH IEC and health promotion and hygiene education material for health facilities, health campaigns, advocacy and BCC campaigns, and media	5,000,000		5,000,000	1,000,000	1,000,000	7,000,000

Subtotal Health and Hygiene				**603,800,000**	**541,000,000**	**681,000,000**	**1,825,800,000**

Table 45 - Indirect Costs Education

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Education							
Supplement to WinS strategic plan 2017-2022	Address missing facilities for water supply in primary schools (30% in short term, 30% in medium term, 40% in long term) extension of water distribution pipe from water supply scheme, water tank)	150,000	21,782	980,190,000	980,190,000	1,306,920,000	3,267,300,000
Supplement to WinS strategic plan 2017-2022	Address missing facilities for water supply in middle and high schools (30% in short term, 30% in medium term, 40% in long term) extension of water distribution pipe from water supply scheme, water tank)	150,000	1,265	56,925,000	56,925,000	75,900,000	189,750,000
Supplement to WinS strategic plan 2017-2022	Address missing facilities for sanitation in primary schools (30% in short term, 30% in medium term, 40% in long term) (2 latrines per school)	150,000	19,409	873,405,000	873,405,000	1,164,540,000	2,911,350,000
Supplement to WinS strategic plan 2017-2022	Address missing facilities for sanitation in middle and high schools (30% in short term, 30% in medium term, 40% in long term) (2 latrines per school)	150,000	843	37,935,000	37,935,000	50,580,000	126,450,000
Subtotal Education				**1,948,455,000**	**1,948,455,000**	**2,597,940,000**	**6,494,850,000**

Table 46 - Indirect Costs Sector Efficiency and Capacity

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Sector Efficiency and Capacity							
	Conduct a human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors and develop a human resource development plan			10,000,000			10,000,000
	Local Government Technical training /workshops for each LG staff - O&M, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year (29 districts)	5,000,000	29	435,000,000	435,000,000	580,000,000	1,450,000,000
	Capacity development of CBOs and civil society in O&M of sanitation schemes (LG) 2 workshops per town per year (29 districts)	5,000,000	29	435,000,000	435,000,000	580,000,000	1,450,000,000
	PHED Technical training /workshops for each district PHED staff - O&M, DRR, Record – 5 training workshops per district per year	5,000,000	29	435,000,000	435,000,000	580,000,000	1,450,000,000
	Capacity development of CBOs and civil society in O&M of water supply schemes (PHED) (5 workshops per district per year)	5,000,000	29	435,000,000	435,000,000	580,000,000	1,450,000,000

Subtotal Sector Efficiency and Capacity				**1,750,000,000**	**1,740,000,000**	**2,320,000,000**	**5,810,000,000**

Table 47 - Indirect Costs Sector Financing

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Sector Financing							
	Conduct a financial budgeting and expenditure review of sectoral budgets and expenditures	10,000,000		10,000,000			10,000,000
Subtotal Sector Financing				**10,000,000**			**10,000,000**

Table 48 - Indirect Costs Sector Coordination

Thematic Area	Strategic Actions	Unit cost	Units	Short Term	Medium Term	Long Term	Total
				2016-19	2019-22	2022-26	
Sector Coordination							
	Establish a Programme Management Unit			116,000,000	114,000,000	157,000,000	387,000,000
Subtotal Sector Coordination				**116,000,000**	**114,000,000**	**157,000,000**	**387,000,000**

Table 49 - Indirect Costs Sector Monitoring

Thematic Area	Strategic Actions	Unit cost	Units	Short Term 2016-19	Medium Term 2019-22	Long Term 2022-26	Total
Sector Monitoring							
	Establish district monitoring unit - office costs - 1 office per district based at DC Office	2,400,000	29	208,800,000	208,800,000	278,400,000	696,000,000
	Procure computers and accessories for MIS – 5 sets per district for water supply schemes	375,000	29	10,875,000			10,875,000
	Computerised MIS for water supply schemes – 29 districts	250,000	29	7,250,000			7,250,000
	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes	375,000	29	10,875,000			10,875,000
	Computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	250,000	29	7,250,000			7,250,000
	District M&E Manager	1,200,000	29	104,400,000	104,400,000	139,200,000	348,000,000
	Water and Sanitation Reporting Officers – 2 per district	1,440,000	29	125,280,000	125,280,000	167,040,000	417,600,000

	Drivers - 1 per district	240,000	29	20,880,000	20,880,000	27,840,000	69,600,000
	Travel and maintenance of vehicles for Water and Sanitation Reporting Officers	600,000	29	52,200,000	52,200,000	69,600,000	174,000,000
	Vehicles for Water and Sanitation Reporting Officers (1 per district)	2,500,000	29	72,500,000			72,500,000
Subtotal Sector Monitoring				**620,310,000**	**511,560,000**	**682,080,000**	**1,813,950,000**

Table 50 - District notional estimates (safely managed water supply and sanitation)

District		Urban Water and Sanitation Costs		O&M Costs Urban Water and Sanitation	Rural Water and Sanitation Costs		O&M Costs Rural Water and Sanitation	Primary Schools Water and Sanitation Costs	
	Number of UCs	Urban safely managed Water	Urban safely managed Sanitation	O&M 10% Urban	Rural safely managed Water	Rural safely managed Sanitation	O&M 10% Rural	Primary Schools Water	Primary Schools Sanitation
Badin	49	3,439,555,644	4,676,123,811	811,567,945	24,609,771,694	24,721,717,127	4,933,148,882	168,600,000	171,450,000
Sujawal	29	636,745,536	1,585,315,034	222,206,057	13,098,382,275	13,197,924,140	2,629,630,641	207,750,000	174,900,000
Thatta	34	538,659,855	733,134,637	127,179,449	12,364,563,256	14,646,032,182	2,701,059,544	177,300,000	148,500,000
Dadu	55	3,836,773,026	7,347,438,917	1,118,421,194	24,927,385,117	27,075,261,099	5,200,264,622	182,100,000	147,900,000
Hyderabad	116	5,867,786,305	15,794,041,503	2,166,182,781	17,315,513,799	15,030,276,545	3,234,579,034	47,250,000	26,400,000
Jamshoro	30	3,105,021,850	7,508,135,969	1,061,315,782	5,508,288,495	8,694,173,186	1,420,246,168	74,400,000	49,050,000
Matiari	25	5,906,643,218	6,777,653,106	1,268,429,632	6,557,427,726	6,478,847,806	1,303,627,553	210,600,000	168,000,000
Tando Allah Yar	30	5,378,967,644	5,956,222,709	1,133,519,035	5,936,738,124	5,783,024,415	1,171,976,254	58,500,000	37,050,000
Tando M Khan	31	3,977,916,020	5,368,010,009	934,592,603	5,668,906,901	4,912,140,881	1,058,104,778	78,300,000	75,150,000
Karachi Central	42	15,154,931,844	688,443,300	1,584,337,514	-	-	-	17,250,000	8,250,000
Karachi East	26	9,168,887,111	416,515,162	958,540,227	-	-	-	7,950,000	2,550,000
Karachi South	30	10,448,214,816	474,631,200	1,092,284,602	-	-	-	25,650,000	9,000,000
Karachi West	30	9,453,020,014	429,422,472	988,244,249	2,495,100,801	2,458,701,684	495,380,249	18,000,000	8,250,000
Korangi	28	10,209,760,061	463,798,912	1,067,355,897	-	-	-	22,200,000	7,050,000
Malir	25	4,615,174,454	209,653,594	482,482,805	1,218,163,662	1,200,392,804	241,855,647	44,400,000	18,300,000
Jacobabad	42	4,609,476,145	4,490,783,326	910,025,947	14,709,700,258	13,861,861,831	2,857,156,209	135,300,000	117,900,000
Kashmore	44	4,137,767,537	3,653,710,231	779,147,777	13,658,630,459	11,291,589,801	2,495,022,026	123,750,000	157,200,000
Larkana	43	10,191,439,684	10,085,009,765	2,027,644,945	25,298,193,717	25,059,291,747	5,035,748,546	31,200,000	37,650,000
Q Shahdadkot	43	7,156,582,660	9,158,597,133	1,631,517,979	22,332,094,971	20,343,219,629	4,267,531,460	148,500,000	121,500,000

Shikarpur	52	5,954,194,805	5,716,514,562	1,167,070,937	19,118,506,596	18,907,273,599	3,802,578,019	78,600,000	82,050,000
Mirpur Khas	41	1,982,049,606	5,318,371,984	730,042,159	18,258,836,491	14,926,903,759	3,318,574,025	47,850,000	29,850,000
Sanghar	69	8,274,907,125	8,513,250,911	1,678,815,804	31,710,060,271	29,932,634,888	6,164,269,516	104,250,000	118,650,000
Tharparkar	46	502,447,481	1,347,304,669	184,975,215	30,709,897,309	30,666,381,260	6,137,627,857	463,200,000	354,750,000
Umerkot	34	1,885,475,020	3,736,850,138	562,232,516	17,725,205,824	19,703,538,468	3,742,874,429	251,100,000	131,100,000
Ghotki	75	5,451,406,527	5,222,008,452	1,067,341,498	28,479,882,235	24,712,686,213	5,319,256,845	88,650,000	154,800,000
Khairpur	76	10,370,054,517	10,640,849,379	2,101,090,390	37,426,931,661	33,937,948,646	7,136,488,031	96,450,000	154,050,000
Sukkur	43	9,188,745,273	14,225,719,551	2,341,446,482	14,340,502,935	12,148,979,923	2,648,948,286	46,500,000	49,500,000
N Feroze	51	4,525,826,939	4,311,302,742	883,712,968	18,185,792,712	20,987,643,061	3,917,343,577	61,950,000	138,150,000
S Benazirabad	58	5,459,215,172	5,122,090,955	1,058,130,613	19,031,489,739	19,058,289,262	3,808,977,900	249,750,000	212,400,000
Sindh	**1297**	**171,427,645,888**	**149,970,904,134**	**32,139,855,002**	**430,685,967,028**	**419,736,733,955**	**85,042,270,098**	**3,267,300,000**	**2,911,350,000**
	Number of UCs	**Urban safely managed Water**	**Urban safely managed Sanitation**	**O&M 10% Urban**	**Rural safely managed Water**	**Rural safely managed Sanitation**	**O&M 10% Rural**	**Primary Schools Water**	**Primary Schools Sanitation**

Table 50 continued

District	Middle and High Schools Water and Sanitation Costs		BHUs Water and Sanitation Costs	Social Mobilisation Costs Water Supply	Community Mobilisation Costs Sanitation	Community awareness and communication	CBOs Capacity Development Costs Water Supply	CBOs Capacity Development Costs Sanitation
	Middle and High Schools Water	Middle and High Schools Sanitation	Missing Facilities WASH in BHUs	Social Mobilisation Water	Community Mobilisation Sanitation	Community awareness for water and sanitation	Capacity development CBOs in water supply	Capacity development of CBOs in sanitation
Badin	5,550,000	2,550,000	2,100,000	705,600,000	705,600,000	20,000,000	50,000,000	50,000,000
Sujawal	5,700,000	3,150,000	1,800,000	417,600,000	417,600,000	20,000,000	50,000,000	50,000,000
Thatta	8,100,000	5,850,000	1,200,000	489,600,000	489,600,000	20,000,000	50,000,000	50,000,000
Dadu	6,600,000	4,200,000	2,700,000	792,000,000	792,000,000	20,000,000	50,000,000	50,000,000
Hyderabad	2,700,000	1,500,000	1,200,000	1,670,400,000	1,670,400,000	20,000,000	50,000,000	50,000,000
Jamshoro	4,050,000	2,250,000	1,200,000	432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Matiari	10,800,000	8,250,000	1,200,000	360,000,000	360,000,000	20,000,000	50,000,000	50,000,000
Tando Allah Yar	5,400,000	3,000,000	900,000	432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Tando M Khan	3,450,000	1,950,000	900,000	446,400,000	446,400,000	20,000,000	50,000,000	50,000,000
Karachi Central	6,750,000	2,850,000	2,100,000	604,800,000	604,800,000	20,000,000	50,000,000	50,000,000
Karachi East	2,850,000	600,000		374,400,000	374,400,000	20,000,000	50,000,000	50,000,000
Karachi South	6,300,000	1,350,000		432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Karachi West	3,150,000	450,000		432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Korangi	9,300,000	1,350,000		403,200,000	403,200,000	20,000,000	50,000,000	50,000,000
Malir	6,600,000	600,000		360,000,000	360,000,000	20,000,000	50,000,000	50,000,000
Jacobabad	9,000,000	6,750,000	1,500,000	604,800,000	604,800,000	20,000,000	50,000,000	50,000,000
Kashmore	4,800,000	5,700,000	1,200,000	633,600,000	633,600,000	20,000,000	50,000,000	50,000,000

Larkana	2,550,000	3,000,000	1,800,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
Q Shahdadkot	7,650,000	5,100,000	1,800,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
Shikarpur	4,800,000	5,550,000	2,100,000	748,800,000	748,800,000	20,000,000	50,000,000	50,000,000
Mirpur Khas	1,500,000	1,200,000	2,400,000	590,400,000	590,400,000	20,000,000	50,000,000	50,000,000
Sanghar	4,350,000	3,000,000	3,600,000	993,600,000	993,600,000	20,000,000	50,000,000	50,000,000
Tharparkar	31,950,000	20,400,000	2,100,000	662,400,000	662,400,000	20,000,000	50,000,000	50,000,000
Umerkot	12,000,000	4,500,000	1,800,000	489,600,000	489,600,000	20,000,000	50,000,000	50,000,000
Ghotki	2,850,000	4,500,000	2,100,000	1,080,000,000	1,080,000,000	20,000,000	50,000,000	50,000,000
Khairpur	3,750,000	5,400,000	4,800,000	1,094,400,000	1,094,400,000	20,000,000	50,000,000	50,000,000
Sukkur	1,800,000	1,350,000	1,500,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
N Feroze	5,400,000	8,100,000	2,700,000	734,400,000	734,400,000	20,000,000	50,000,000	50,000,000
S Benazirabad	10,050,000	6,000,000	2,100,000	835,200,000	835,200,000	20,000,000	50,000,000	50,000,000
Sindh	**189,750,000**	**120,450,000**	**46,800,000**	**18,676,800,000**	**18,676,800,000**	**580,000,000**	**1,450,000,000**	**1,450,000,000**
	Middle and High Schools Water	**Middle and High Schools Sanitation**	**Missing Facilities WASH in BHUs**	**Social Mobilisation Water**	**Community Mobilisation Sanitation**	**Community awareness for water and sanitation**	**Capacity development CBOs in water supply**	**Capacity development of CBOs in sanitation**

Table 50 continued

District	LG staff capacity building	PHED staff capacity building	Water and sanitation MIS	Monitoring and Evaluation Costs			Total Notional Costs for District	Estimated Short Term Costs	Estimated Medium Term Costs	Estimated Long Term Costs	Average Total Cost Per UC
	Capacity develop LG staff	Capacity develop PHED staff	MIS	District M&E Manager	District M&E staff, office costs and travel	District level vehicles	Total notional costs for district	Estimated Short Term Costs	Estimated Medium Term Costs	Estimated Long Term Costs	Average Total Cost Per UC
Badin	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	65,235,885,103	19,570,765,531	19,570,765,531	26,094,354,041
Sujawal	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	32,881,253,684	9,864,376,105	9,864,376,105	13,152,501,474
Thatta	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	32,713,328,924	9,813,998,677	9,813,998,677	13,085,331,569
Dadu	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	71,715,593,975	21,514,678,193	21,514,678,193	28,686,237,590
Hyderabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	63,110,779,967	18,933,233,990	18,933,233,990	25,244,311,987
Jamshoro	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	28,574,681,449	8,572,404,435	8,572,404,435	11,429,872,580
Matiari	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	29,694,029,041	8,908,208,712	8,908,208,712	11,877,611,616
Tando Allah Yar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	26,611,848,181	7,983,554,454	7,983,554,454	10,644,739,273
Tando M Khan	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	23,254,771,192	6,976,431,358	6,976,431,358	9,301,908,477
Karachi Central	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	18,957,062,658	5,687,118,798	5,687,118,798	7,582,825,063
Karachi East	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	11,589,242,500	3,476,772,750	3,476,772,750	4,635,697,000
Karachi South	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	13,203,980,618	3,961,194,185	3,961,194,185	5,281,592,247
Karachi West	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	17,496,269,469	5,248,880,841	5,248,880,841	6,998,507,787
Korangi	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	12,869,764,870	3,860,929,461	3,860,929,461	5,147,905,948
Malir	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	9,040,172,965	2,712,051,890	2,712,051,890	3,616,069,186
Jacobabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	43,201,603,716	12,960,481,115	12,960,481,115	17,280,641,486
Kashmore	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	37,858,267,831	11,357,480,349	11,357,480,349	15,143,307,132
Larkana	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	79,294,478,404	23,788,343,521	23,788,343,521	31,717,791,361
Q Shahdadkot	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	66,695,043,832	20,008,513,150	20,008,513,150	26,678,017,533

Shikarpur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	56,619,388,518	16,985,816,555	16,985,816,555	22,647,755,407
Mirpur Khas	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	46,080,928,024	13,824,278,407	13,824,278,407	18,432,371,210
Sanghar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	88,777,538,514	26,633,261,554	26,633,261,554	35,511,015,405
Tharparkar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	72,028,383,791	21,608,515,137	21,608,515,137	28,811,353,517
Umerkot	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	49,018,426,394	14,705,527,918	14,705,527,918	19,607,370,558
Ghotki	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	72,948,031,770	21,884,409,531	21,884,409,531	29,179,212,708
Khairpur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	104,349,162,624	31,304,748,787	31,304,748,787	41,739,665,050
Sukkur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	56,515,942,450	16,954,782,735	16,954,782,735	22,606,376,980
N Feroze	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	54,779,272,000	16,433,781,600	16,433,781,600	21,911,708,800
S Benazirabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	55,971,443,641	16,791,433,092	16,791,433,092	22,388,577,456
Sindh	**1,450,000,000**	**1,450,000,000**	**18,125,000**	**18,125,000**	**348,000,000**	**1,357,200,000**	**72,500,000**	**1,341,086,576,106**	**402,325,972,832**	**402,325,972,832**	**536,434,630,442**
	Capacity develop LG staff	**Capacity develop PHED staff**	**MIS**	**District M&E Manager**	**District M&E staff, office costs and travel**	**District level vehicles**	**Total notional costs for district**	**Estimated Short Term Costs**	**Estimated Medium Term Costs**	**Estimated Long Term Costs**	**Average Total Cost Per UC**

Table 51 - District notional estimates (improved water supply and sanitation)

District		Urban Water and Sanitation Costs		O&M Costs Urban Water and Sanitation	Rural Water and Sanitation Costs		O&M Costs Rural Water and Sanitation	Primary Schools Water and Sanitation Costs	
	Number of UCs	Urban Improved Water	Urban Improved Sanitation	O&M 10% Urban	Rural Improved Water	Rural Improved Sanitation	O&M 10% Rural	Primary Schools Water	Primary Schools Sanitation
Badin	49	243,643,687	799,572,657	104,321,634	1,577,649,598	15,696,658,923	1,727,430,852	168,600,000	171,450,000
Sujawal	29	293,632,831	-	29,363,283	3,328,679,982	8,621,652,777	1,195,033,276	207,750,000	174,900,000
Thatta	34	190,078,822	152,310,718	34,238,954	3,707,509,350	8,554,285,036	1,226,179,439	177,300,000	148,500,000
Dadu	55	-	48,532,269	4,853,227	1,750,728,429	11,424,368,345	1,317,509,677	182,100,000	147,900,000
Hyderabad	116	1,323,500,693	1,139,570,083	246,307,078	928,296,941	7,953,142,080	888,143,902	47,250,000	26,400,000
Jamshoro	30	553,407,004	34,665,316	58,807,232	1,563,260,190	4,019,383,603	558,264,379	74,400,000	49,050,000
Matiari	25	51,788,538	1,007,355,819	105,914,436	53,718,476	3,635,542,172	368,926,065	210,600,000	168,000,000
Tando Allah Yar	30	103,705,996	403,162,267	50,686,826	47,203,422	3,242,512,015	328,971,544	58,500,000	37,050,000
Tando M Khan	31	257,272,297	113,733,180	37,100,548	109,791,857	2,849,649,555	295,944,141	78,300,000	75,150,000
Karachi Central	42	8,408,187,504	458,962,200	886,714,970	-	-	-	17,250,000	8,250,000
Karachi East	26	5,087,038,518	277,676,775	536,471,529	-	-	-	7,950,000	2,550,000
Karachi South	30	5,796,829,056	316,420,800	611,324,986	-	-	-	25,650,000	9,000,000
Karachi West	30	5,244,679,790	286,281,648	553,096,144	992,560,883	1,432,481,401	242,504,228	18,000,000	8,250,000
Korangi	28	5,664,530,718	309,199,275	597,372,999	-	-	-	22,200,000	7,050,000
Malir	25	2,560,569,230	139,769,063	270,033,829	484,590,282	699,369,255	118,395,954	44,400,000	18,300,000
Jacobabad	42	2,800,006,502	138,872,187	293,887,869	469,374,420	7,469,476,303	793,885,072	135,300,000	117,900,000
Kashmore	44	140,561,105	343,496,201	48,405,731	65,561,426	6,454,158,180	651,971,961	123,750,000	157,200,000
Larkana	43	60,620,277	154,995,027	21,561,530	-	5,882,749,219	588,274,922	31,200,000	37,650,000
Q Shahdadkot	43	1,787,399,537	201,915,827	198,931,536	2,050,564,054	8,256,917,103	1,030,748,116	148,500,000	121,500,000

Shikarpur	52	-406,291	357,536,092	35,712,980	-	6,909,239,326	690,923,933	78,600,000	82,050,000
Mirpur Khas	41	217,245,927	366,762,242	58,400,817	3,962,437,920	8,628,305,372	1,259,074,329	47,850,000	29,850,000
Sanghar	69	189,377,920	413,129,229	60,250,715	1,000,282,683	14,461,229,649	1,546,151,233	104,250,000	118,650,000
Tharparkar	46	199,442,630	203,046,443	40,248,907	18,073,665,609	19,424,735,315	3,749,840,092	463,200,000	354,750,000
Umerkot	34	31,327,551	531,459,434	56,278,699	6,411,679,946	12,006,385,570	1,841,806,552	251,100,000	131,100,000
Ghotki	75	93,156,578	208,049,692	30,120,627	1,994,809	9,475,340,801	947,733,561	88,650,000	154,800,000
Khairpur	76	-	1,734,321,508	173,432,151	926,897,743	16,506,774,640	1,743,367,238	96,450,000	154,050,000
Sukkur	43	764,840,014	517,003,409	128,184,342	590,289,420	6,017,618,223	660,790,764	46,500,000	49,500,000
N Feroze	51	208,188,039	35,603,172	24,379,121	-1,399,176	6,695,058,136	669,365,896	61,950,000	138,150,000
S Benazirabad	58	267,319,135	216,052,451	48,337,159	136,549,950	8,877,022,908	901,357,286	249,750,000	212,400,000
Sindh	**1297**	**42,537,943,612**	**10,909,454,985**	**5,344,739,860**	**48,231,888,216**	**205,194,055,908**	**25,342,594,412**	**3,267,300,000**	**2,911,350,000**
	Number of UCs	**Urban Improved Water**	**Urban Improved Sanitation**	**O&M 10% Urban**	**Rural Improved Water**	**Rural Improved Sanitation**	**O&M 10% Rural**	**Primary Schools Water**	**Primary Schools Sanitation**

Table 51 continued

District	Middle and High Schools Water and Sanitation Costs		BHUs Water and Sanitation Costs	Social Mobilisation Costs Water Supply	Community Mobilisation Costs Sanitation	Community awareness and communication	CBOs Capacity Development Costs Water Supply	CBOs Capacity Development Costs Sanitation
	Middle and High Schools Water	Middle and High Schools Sanitation	Missing Facilities WASH in BHUs	Social Mobilisation Water	Community Mobilisation Sanitation	Community awareness for water and sanitation	Capacity development CBOs in water supply	Capacity development of CBOs in sanitation
Badin	5,550,000	2,550,000	2,100,000	705,600,000	705,600,000	20,000,000	50,000,000	50,000,000
Sujawal	5,700,000	3,150,000	1,800,000	417,600,000	417,600,000	20,000,000	50,000,000	50,000,000
Thatta	8,100,000	5,850,000	1,200,000	489,600,000	489,600,000	20,000,000	50,000,000	50,000,000
Dadu	6,600,000	4,200,000	2,700,000	792,000,000	792,000,000	20,000,000	50,000,000	50,000,000
Hyderabad	2,700,000	1,500,000	1,200,000	1,670,400,000	1,670,400,000	20,000,000	50,000,000	50,000,000
Jamshoro	4,050,000	2,250,000	1,200,000	432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Matiari	10,800,000	8,250,000	1,200,000	360,000,000	360,000,000	20,000,000	50,000,000	50,000,000
Tando Allah Yar	5,400,000	3,000,000	900,000	432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Tando M Khan	3,450,000	1,950,000	900,000	446,400,000	446,400,000	20,000,000	50,000,000	50,000,000
Karachi Central	6,750,000	2,850,000	2,100,000	604,800,000	604,800,000	20,000,000	50,000,000	50,000,000
Karachi East	2,850,000	600,000		374,400,000	374,400,000	20,000,000	50,000,000	50,000,000
Karachi South	6,300,000	1,350,000		432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Karachi West	3,150,000	450,000		432,000,000	432,000,000	20,000,000	50,000,000	50,000,000
Korangi	9,300,000	1,350,000		403,200,000	403,200,000	20,000,000	50,000,000	50,000,000
Malir	6,600,000	600,000		360,000,000	360,000,000	20,000,000	50,000,000	50,000,000
Jacobabad	9,000,000	6,750,000	1,500,000	604,800,000	604,800,000	20,000,000	50,000,000	50,000,000
Kashmore	4,800,000	5,700,000	1,200,000	633,600,000	633,600,000	20,000,000	50,000,000	50,000,000

Larkana	2,550,000	3,000,000	1,800,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
Q Shahdadkot	7,650,000	5,100,000	1,800,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
Shikarpur	4,800,000	5,550,000	2,100,000	748,800,000	748,800,000	20,000,000	50,000,000	50,000,000
Mirpur Khas	1,500,000	1,200,000	2,400,000	590,400,000	590,400,000	20,000,000	50,000,000	50,000,000
Sanghar	4,350,000	3,000,000	3,600,000	993,600,000	993,600,000	20,000,000	50,000,000	50,000,000
Tharparkar	31,950,000	20,400,000	2,100,000	662,400,000	662,400,000	20,000,000	50,000,000	50,000,000
Umerkot	12,000,000	4,500,000	1,800,000	489,600,000	489,600,000	20,000,000	50,000,000	50,000,000
Ghotki	2,850,000	4,500,000	2,100,000	1,080,000,000	1,080,000,000	20,000,000	50,000,000	50,000,000
Khairpur	3,750,000	5,400,000	4,800,000	1,094,400,000	1,094,400,000	20,000,000	50,000,000	50,000,000
Sukkur	1,800,000	1,350,000	1,500,000	619,200,000	619,200,000	20,000,000	50,000,000	50,000,000
N Feroze	5,400,000	8,100,000	2,700,000	734,400,000	734,400,000	20,000,000	50,000,000	50,000,000
S Benazirabad	10,050,000	6,000,000	2,100,000	835,200,000	835,200,000	20,000,000	50,000,000	50,000,000
Sindh	**189,750,000**	**120,450,000**	**46,800,000**	**18,676,800,000**	**18,676,800,000**	**580,000,000**	**1,450,000,000**	**1,450,000,000**
	Middle and High Schools Water	**Middle and High Schools Sanitation**	**Missing Facilities WASH in BHUs**	**Social Mobilisation Water**	**Community Mobilisation Sanitation**	**Community awareness for water and sanitation**	**Capacity development CBOs in water supply**	**Capacity development of CBOs in sanitation**

Table 51 continued

District	LG staff capacity building	PHED staff capacity building	Water and sanitation MIS	Monitoring and Evaluation Costs			Total Notional Costs for District	Estimated Short Term Costs	Estimated Medium Term Costs	Estimated Long Term Costs	Average Total Cost Per UC
	Capacity develop LG staff	Capacity develop PHED staff	MIS	District M&E Manager	District M&E staff, office costs and travel	District level vehicles	Total notional costs for district	Estimated Short Term Costs	Estimated Medium Term Costs	Estimated Long Term Costs	Average Total Cost Per UC
Badin	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	22,193,277,350	6,657,983,205	6,657,983,205	8,877,310,940
Sujawal	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	14,979,412,149	4,493,823,645	4,493,823,645	5,991,764,860
Thatta	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	15,467,302,318	4,640,190,695	4,640,190,695	6,186,920,927
Dadu	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	16,756,041,948	5,026,812,585	5,026,812,585	6,702,416,779
Hyderabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	16,181,360,776	4,854,408,233	4,854,408,233	6,472,544,310
Jamshoro	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	8,065,287,725	2,419,586,317	2,419,586,317	3,226,115,090
Matiari	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	6,624,645,506	1,987,393,652	1,987,393,652	2,649,858,202
Tando Allah Yar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	5,427,642,071	1,628,292,621	1,628,292,621	2,171,056,828
Tando M Khan	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	4,998,591,579	1,499,577,474	1,499,577,474	1,999,436,631
Karachi Central	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	11,283,214,674	3,384,964,402	3,384,964,402	4,513,285,870
Karachi East	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	6,946,486,822	2,083,946,047	2,083,946,047	2,778,594,729
Karachi South	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	7,913,424,842	2,374,027,452	2,374,027,452	3,165,369,937
Karachi West	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	9,928,004,095	2,978,401,228	2,978,401,228	3,971,201,638
Korangi	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	7,699,952,992	2,309,985,898	2,309,985,898	3,079,981,197
Malir	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	5,345,177,614	1,603,553,284	1,603,553,284	2,138,071,045
Jacobabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	13,728,102,354	4,118,430,706	4,118,430,706	5,491,240,942
Kashmore	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	9,546,554,604	2,863,966,381	2,863,966,381	3,818,621,841
Larkana	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	8,305,350,975	2,491,605,293	2,491,605,293	3,322,140,390
Q Shahdadkot	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	15,331,976,174	4,599,592,852	4,599,592,852	6,132,790,470

Shikarpur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	9,946,256,040	2,983,876,812	2,983,876,812	3,978,502,416
Mirpur Khas	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	16,038,376,606	4,811,512,982	4,811,512,982	6,415,350,643
Sanghar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	20,174,021,430	6,052,206,429	6,052,206,429	8,069,608,572
Tharparkar	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	44,170,728,997	13,251,218,699	13,251,218,699	17,668,291,599
Umerkot	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	22,541,187,752	6,762,356,325	6,762,356,325	9,016,475,101
Ghotki	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	13,451,846,068	4,035,553,820	4,035,553,820	5,380,738,427
Khairpur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	23,820,593,281	7,146,177,984	7,146,177,984	9,528,237,312
Sukkur	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	10,300,326,174	3,090,097,852	3,090,097,852	4,120,130,470
N Feroze	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	9,598,845,188	2,879,653,557	2,879,653,557	3,839,538,075
S Benazirabad	50,000,000	50,000,000	625,000	625,000	12,000,000	46,800,000	2,500,000	12,879,888,888	3,863,966,666	3,863,966,666	5,151,955,555
Sindh	**1,450,000,000**	**1,450,000,000**	**18,125,000**	**18,125,000**	**348,000,000**	**1,357,200,000**	**72,500,000**	**389,643,876,993**	**116,893,163,098**	**116,893,163,098**	**155,857,550,797**
	Capacity develop LG staff	**Capacity develop PHED staff**	**MIS**	**District M&E Manager**	**District M&E staff, office costs and travel**	**District level vehicles**	**Total notional costs for district**	**Estimated Short Term Costs**	**Estimated Medium Term Costs**	**Estimated Long Term Costs**	**Average Total Cost Per UC**

Table 52 - Summary Indirect Costs

Theme	Short term	Medium Term	Long Term	Total
Legislation and Policies	42,000,000	5,000,000	10,000,000	57,000,000
Water Resources	50,000,000	90,000,000	131,000,000	271,000,000
Water Supply	11,162,040,000	11,162,040,000	14,882,720,000	37,206,800,000
Water Quality	110,000,000	210,000,000	280,000,000	600,000,000
Sanitation	6,230,040,000	6,230,040,000	8,291,720,000	20,751,800,000
Solid Waste	40,000,000	65,000,000	75,000,000	180,000,000
Health and Hygiene	603,800,000	541,000,000	681,000,000	1,825,800,000
Education	1,948,455,000	1,948,455,000	2,597,940,000	6,494,850,000
Sector Efficiency and Capacity	1,750,000,000	1,740,000,000	2,320,000,000	5,810,000,000
Sector Financing	10,000,000	0	0	10,000,000
Sector Coordination	116,000,000	114,000,000	157,000,000	387,000,000
Sector Monitoring	620,310,000	511,560,000	682,080,000	1,813,950,000
Total	**22,682,645,000**	**22,617,095,000**	**30,108,460,000**	**75,408,200,000**

Table 53 - Investment Overview of Sector Plan in Billion Rupees (safely managed water supply and sanitation)

Theme	Short Term	Medium Term	Long Term	Total
	2016-2019	2019-2022	2022-2026	
Direct costs safely managed urban water supply	34.286	51.428	85.714	171.428
Direct costs safely managed rural water supply	86.137	129.206	215.343	430.686
Direct costs Water Supply	**120.423**	**180.634**	**301.057**	**602.114**
10% water supply O&M cost	**12.042**	**18.063**	**30.106**	**60.211**
Direct costs safely managed urban sanitation	29.994	44.991	74.985	149.971
Direct costs safely managed rural sanitation	83.947	125.921	209.868	419.737
Total Direct costs safely managed Sanitation	**113.942**	**170.912**	**284.854**	**569.708**
10% sanitation O&M cost	**11.394**	**17.091**	**28.485**	**56.971**
Total Direct costs safely managed water supply and sanitation	**257.801**	**386.701**	**644.502**	**1289.003**
Total Indirect costs	**22.683**	**22.617**	**30.108**	**75.408**
Total Direct and Indirect costs at current rates	**280.483**	**409.318**	**674.610**	**1364.412**
Total Direct and Indirect costs at 8% Inflation	**327.802**	**412.936**	**722.028**	**1462.766**

Table 54 - Investment Overview of Sector Plan in Billion Rupees (improved water supply and sanitation)

Theme	Short Term	Medium Term	Long Term	Total
	2016-2019	2019-2022	2022-2026	
Direct costs urban improved water supply	8.508	12.761	21.269	42.538
Direct costs rural improved water supply	9.646	14.470	24.116	48.232
Total Direct costs improved Water Supply	**18.154**	**27.231**	**45.385**	**90.770**
10% water supply O&M cost	**1.815**	**2.723**	**4.538**	**9.077**
Direct costs urban improved sanitation	2.182	3.273	5.455	10.909
Direct costs rural improved sanitation	41.039	61.558	102.597	205.194
Total Direct costs improved Sanitation	**43.221**	**64.831**	**108.052**	**216.104**
10% sanitation O&M cost	**4.322**	**6.483**	**10.805**	**21.610**
Total Direct costs improved water supply and sanitation	**67.512**	**101.268**	**168.780**	**337.561**
Total Indirect costs	**22.683**	**22.617**	**30.108**	**75.408**
Total Direct and Indirect costs at current rates	**90.195**	**123.885**	**198.889**	**412.969**
Total Direct and Indirect costs at 8% Inflation	**105.411**	**132.788**	**232.182**	**470.380**

Figure 79 - Sector investment scenario at current rates and with 8% inflation (safely managed water supply and sanitation)

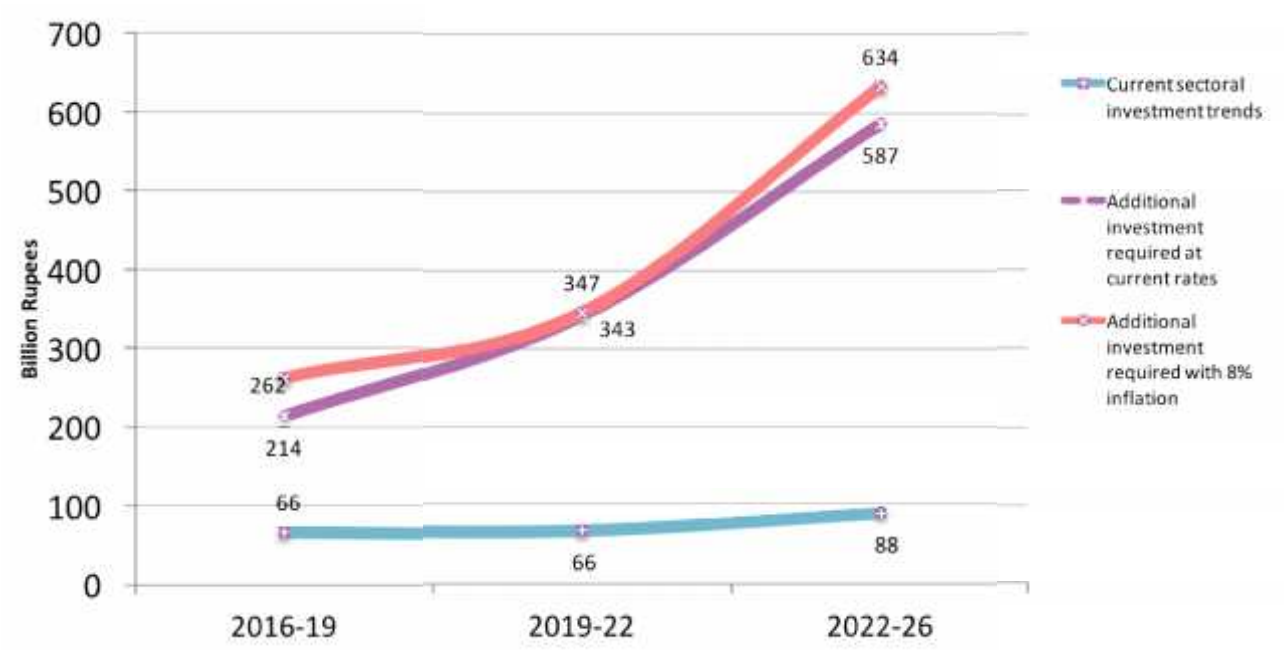


Figure 80 – Sub-sector investment at current rates (safely managed water supply and sanitation)

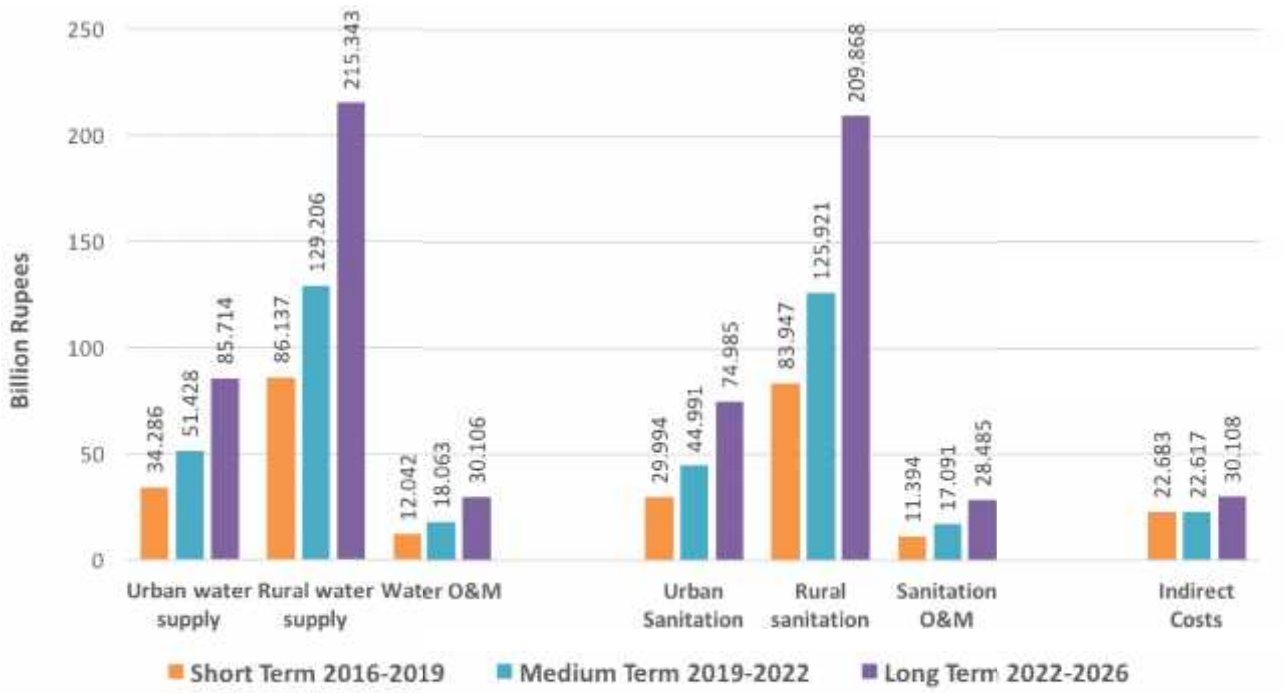


Figure 81 - Sector investment scenario at current rates and with 8% inflation (improved water supply and sanitation)

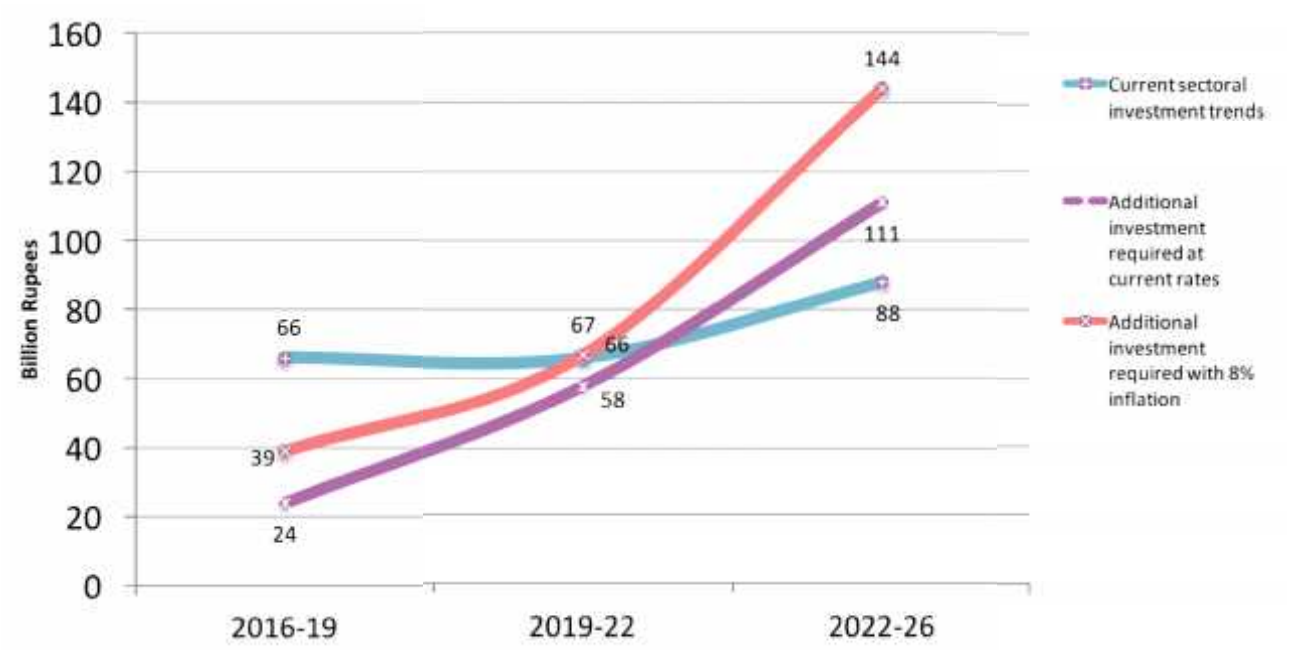
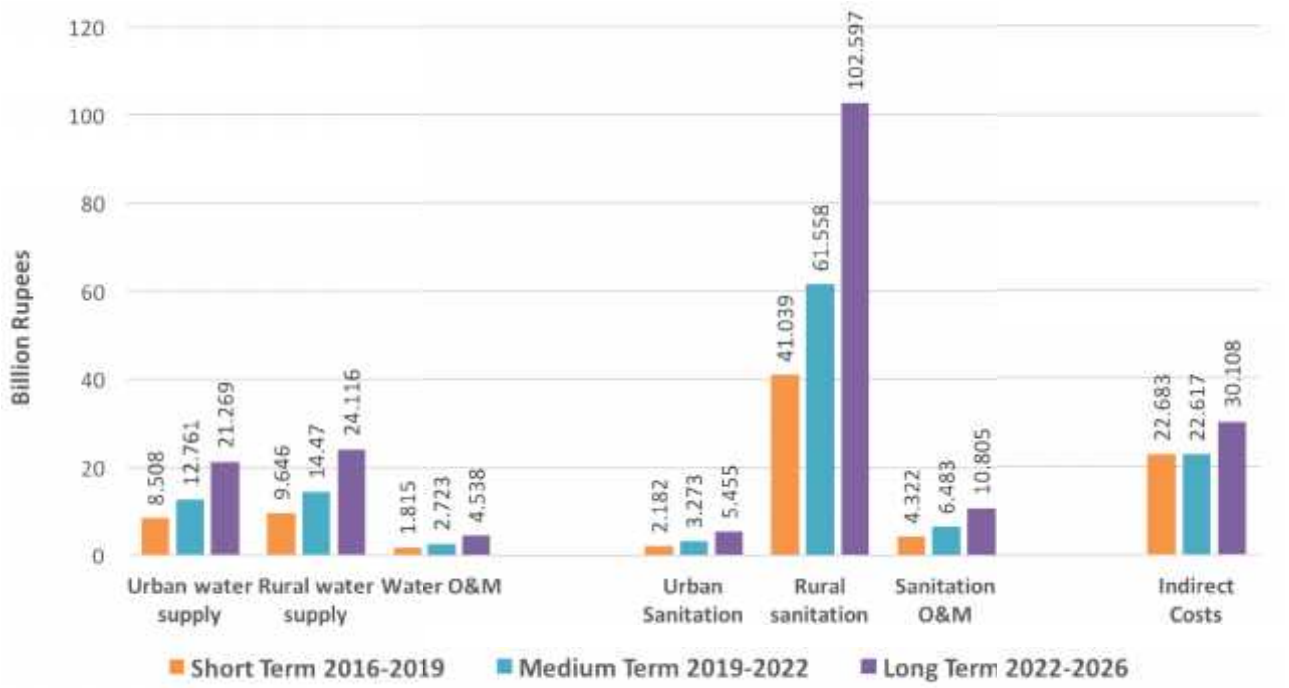


Figure 82 – Sub-sector investment at current rates (improved water supply and sanitation)



Resource Mobilisation

One of the critical areas for the sector development plan will be to mobilise sufficient resources to finance the ten year plan.

Various financing options exist and these would need to be explored and developed over time. Some of the potential areas include the following:

Own Source Revenue (OSR)

Under the SLGA, Local Governments can raise revenue through various bye-laws, schedules, taxation and tariffs for water and sanitation services. Presently, there is a very low tariff structure for services and revenue generated from water and sanitation is not necessarily used for sector and sub-sector services. This process needs to be streamlined and OSR increased incrementally at respective local government tiers.

Local Revenue Generation by Consumer Organisations

As part of planning, design and execution of schemes, CBO involvement is paramount. Where feasible, a CBO or similar community organisation should be empowered during the scheme development process to generate community resources through a community based system of billing and collection, especially to ensure O&M once the scheme is complete and handed over to the community.

Innovation

One of the major impediments in revenue generation is inefficient billing and collection for sub-sector services. The Government of Sindh may consider outsourcing functions like billing and collection to private sector companies to improve revenue generation.

Several corporates are already involved in promoting health and hygiene related to WASH through their Corporate Social Responsibility e.g. Reckitt and Coleman Company who advertise their soap brand 'Safeguard' and Unilever with their soap brand 'Lifebuoy'. These companies can be engaged on a wider scale to health and hygiene promotion in WASH.

Strengthening Local Government

The WASH sector is fortunate that it is already devolved through the SLGA. At present, prioritisation and planning takes place at the provincial level. The SLGA can be used as an opportunity to strengthen local government tiers in prioritisation and planning of WASH services by allocating a proportion of development funding at their disposal. It would be mandatory to specify that this development funding be utilised for sector and sub-sector activities and for the local governments to develop their own priorities and plans for these.

Sub-National Governance Programme

The Department for International Development (DfID) has initiated a Sub-National Governance (SNG) programme in Punjab and Khyber Pakhtunkhwa. The Government of Sindh may approach DfID to support a similar programme in Sindh with specific emphasis on sector and sub-sector governance development.

USAID and Nutrition Support Initiative

USAID has developed a programme policy for support to nutrition specific programmes. These programmes may incorporate nutrition-sensitive components like water and sanitation that contribute towards improving nutritional status in affected communities. The Government of Sindh may enhance WASH programming as nutrition-sensitive components in nutrition-specific projects.

World Bank Drought Emergency Programme

For drought stricken areas of Sindh, the Government of Sindh may explore World Bank funding to set up an emergency programme that incorporates accelerated development of WASH services in affected communities.

Small Dams and Water Reservoirs

Funding from ADB may be explored for development of multiple small dams to act as water reservoirs with outlets to drinking water supply schemes. Such reservoirs would also benefit the irrigation sector.

Sustainable Development Goal for Water and Sanitation

The launch of the SDGs provides a unique opportunity to seek development financing from international partners as the SDG indicators require massive new investment to achieve the SDG targets. The Government of Sindh may use the sector plan to mobilise new investment from international development partners.

Climate change

Climate change is recognised to have a major impact on water and sanitation services, and therefore provides an opportunity to the Government of Sindh for high level engagement for developing pilot projects to mitigate risks of climate change on sector and sub-sector services before scaling up.

Achieving Equity and Universal Coverage

Government of Sindh may consider accessing concessional loans or other new resources or by improving value for money to support equitable and viable service delivery models for closing coverage gaps, and removing bottlenecks.

Sanitation Marketing

Government of Sindh may incentivise the private sector through rebate and subsidies for investment in the WASH sector especially provision of sanitation materials. The provincial government may also engage the private sector, international partners and NGOs in developing the capacities of local entrepreneurs, masons and suppliers in sanitation marketing and supply side interventions.

Strategy

Sector Financing			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Sectoral budgeting and expenditure reporting stratified separately for each sub-sector (environment, water supply, sewerage and drainage)	Conduct a financial budgeting and expenditure review of sectoral budgets and expenditures and stratify actual sub-sector spends against sub-sector budgets for last five years Introduce sub-sector expenditure reporting separately for environment, water supply, sewerage and drainage, and solid waste	At least 70% of districts and talukas report sub-sectoral spending by stratified reporting procedure	At least 90% of districts and talukas report sub-sectoral spending by stratified reporting procedure
Increased Own Source Revenue (OSR) in sub-sectors by Town Councils	Incentivise by providing matching grants to Town Councils related to sub-sector OSR At least 30% of Town Councils increase their baseline sub-sector OSR by 100% or more	At least 60% of Town Councils increase their baseline sub-sector OSR by 200% or more	At least 75% of Town Councils increase their baseline sub-sector OSR by 300% or more
Increased regulated private sector participation in sub-sectors	Incentivise private sector with subsidies to provide water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment in selected areas and city and town zones Determine type of contract arrangement and ensure regulatory mechanism in place	At least 30% or more of coverage of municipal services in mega cities provided by private sector At least 20% or more of coverage of municipal services in intermediate cities provided by private sector At least 10% or more of coverage of municipal services in Towns provided by private sector	At least 50% or more of coverage of municipal services in mega cities provided by private sector At least 30% or more of coverage of municipal services in intermediate cities provided by private sector At least 20% or more of coverage of municipal services in Towns provided by private sector
Increased development expenditure allocation to and spending by sub-sectors and prioritised by equity and need	Allocate 8% of ADP allocation to the sector and prioritise by equity and need Increase proportionate ADP allocation for ongoing schemes from 69% to 75% and correspondingly reduce ADP allocation to	Allocate 9% of ADP allocation to the sector and prioritise by equity and need Increase proportionate ADP allocation for ongoing schemes from 75% to 80% and correspondingly reduce ADP allocation to	Allocate 10% of ADP allocation to the sector and prioritise by equity and need Maintain proportionate ADP allocation for ongoing schemes at 80% and corresponding ADP allocation to new schemes

	new schemes from 31% to 25% 40% of sector development allocation requirement and release achieved	new schemes from 25% to 20% 50% of sector development allocation requirement and release achieved	at 20% 60% of sector development allocation requirement and release achieved

SECTOR COORDINATION AND IMPLEMENTATION ARRANGEMENTS

Coordination

The subjects of drinking water supply, sanitation, and solid waste, rural and urban development have been designated to the provincial government under the Constitution of Pakistan. The Local Government Act 2001 created the structure of Tehsil Municipal Administration (TMA) with the responsibility of municipal services including water supply, sanitation and solid waste management. The Government of Sindh approved a new Local Government Act in 2014. The Sindh Local Government Act restored the formal mayoral system for towns/cities to serve the urban population with Chairman led district councils mainly responsible for the rural areas.

In rural areas, the union councils and zila (district) councils will be responsible for services, while in urban areas and the metropolis, Metropolitan Corporation, Municipal Corporation, Municipal and Town Committees will be restored. Presently, TMAs are functional under a transition period though local bodies election were held in 2015 at the community level and new mayors and chairmen have been elected in 2015. The new administrative structure is expected to be fully functional in 2016-2017 financial year. Urban water and sanitation authorities called KW&SB for Karachi, H-WASA for Hyderabad, and NSUSC are entrusted to deliver municipal services under supervision of the local governments. In addition, other agencies like Karachi Development Authority, Karachi Metropolitan Corporation, Hyderabad Development Authority, Cantonment Boards, Defence Housing Authorities, private housing companies, etc. are also implementing water supply and drainage schemes.

In Sindh, the provision of drinking water supply to the rural communities' rests with PHE&RDD while in big and intermediate cities and towns, it rests with LG&HTPD, which is also responsible for sanitation and solid waste. Both provincial departments are responsible for planning, funding, regulation, monitoring and service delivery of water and sanitation respectively at the district and sub district levels. In addition to these two departments, there are other departments who are directly and indirectly involved in WASH like Urban Planning and Development, Health, Education and Planning and Development Departments with some special initiatives. For water supply in schools, PHE&RDD provides technical support in designing and implementing the scheme, the budget being catered from the Education Department. The Health department is responsible for creating awareness and sensitisation among the communities about hygiene behaviours and pre-cautions for water borne diseases.

Presently, there are two ways of managing the water supply schemes in Sindh. Generally, in urban areas, LG&HTPD manages the schemes through its staff but has poor revenue collection from the users or community based organisations (CBOs). Whereas in rural areas, the schemes are designed and executed by PHE&RDD, but on completion require to be handed over to LG&HTPD or entrusted to the local CBOs that includes operation and maintenance of the schemes. Nearly one-fifth of water supply schemes in the province are non-functional because of either lack of interest on the part of CBOs or poor money collection mechanisms. There is lack of appropriate legislation for handing over of the schemes to the communities and clarity about the expected role from the

stakeholders in O&M of the schemes. PHE&RDD does not have sufficient community mobilisation capacity, and requires additional capacity development support followed by policy reforms for appropriate well-defined community sharing and mobilisation mechanisms, and for O&M.

The function of sanitation falls under the purview of LG&HTPD, which is also involved in implementing the large drainage and sanitation schemes. It is also involved in street payment and road construction in the villages. LG&HTPD has just initiated the Saaf Suthro Sindh programme through which it shall implement the Pakistan Approaches to Total Sanitation (PATS) in selected districts in association with local community organisations in collaboration with national and international partners. It is noted that many initiatives/pilot taken by the civil society partner organisations for scaling up of PATS and WASH programmes are not well embedded within Government, LG&HTPD and PHE&RDD programmes and initiatives. Resultantly, these pilot initiatives are not scaled up, as there are gaps in the understanding of the stakeholders about government operational mechanisms.

It is also recognised that government priorities are often driven by the political party manifestos, and advocacy of the international and national partners based on research and evidence. There is lack of sufficient research and evidence on the local water and sanitation innovative and cost effective solutions in the province. There is a strong need for identifying a water and sanitation research agenda that feeds into the development of new programmes and initiatives of the government of Sindh.

There is lack of coordination mechanism between PHE&RDD and Local Government about handing over of water supply and sanitation schemes in addition to future O&M of WASH projects. Both departments are implementing the schemes on the will of elected representatives but a joined up approach is missing where resources should be shared from planning, execution and monitoring of the project. The new SLGA 2014 shifts the onus of water supply, sanitation and solid waste to the local councils. It indicates the formation of guidelines for management of water supply and sanitation schemes but presently these do not exist. A similar challenge of coordination exists among the multiple departments responsible for WASH directly or indirectly. There is no single coordinating focal point that holds different sub sector strands together.

Further, there is lack of clarity about the roles and responsibilities among the stakeholders that has emerged as a result of SLGA 2014 and 18th Constitutional Amendment. There is need for a formal coordination mechanism for WASH under Assistant Chief Secretary for Development at P&D by creating a Project Planning and Implementation Unit. This unit should be responsible for identifying the synergies or determine any overlapping.

Improving Sector Coordination

The following are the critical areas for improving sector coordination.

- There is need for a regulatory body especially for urban areas – an integrated approach should be adopted for metropolitan areas where the Mayor should provide leadership
- Cantonment Board – Station Command should also be involved in the regulatory body as they provide service especially for Karachi

- ACS Development can issue notification to set up a regulatory board – and have representation of Mayor, Operators and Cantonment Board
- PHE&RDD and Provincial Water Board will not approve any scheme without consent of the above body regulating water supply in cities and towns – every scheme would require a No Objection Certificate from the Mayor
- Establish a Project Planning and Implementation Unit for WASH under the governance of the Assistant Chief Secretary for Development at P&DD

Sector coordination with education for missing WASH facilities can be improved at three levels:

- Provincial level – quarterly review of data on missing WASH facilities by Directorate of Education Schools, Reform Support Unit, SEMIS and PHE&RDD to prioritise community water supply schemes and ensure these are also linked with local schools
- District Authority level – local PHE&RDD and LG&HTPD officials can be part of this to promote coordination
- District Education Group - local PHE&RDD and LG&HTPD officials can be part of this to promote coordination for WASH

Sector coordination with health can be improved at three levels:

- Provincial – joint meeting six monthly between PHE&RDD and PPHI and Health to ensure water supply to health facilities in all new schemes where feasible
- District Health – district-wise status of health facilities with regards to water and sanitation and joint planning with PHE&RDD to address the gaps. Health Department and PHE&RDD develop a Joint Action Plan (JAP) to address these
- District Education – district-wise planning with Education to incorporate health and hygiene in schools and local communities

Implementation Mechanism

Implementation Arrangements

This section provides the framework and guidelines for implementing the Sindh Sector Development Plan for WASH – to be implemented by governmental departments and agencies, rural and urban communities throughout province, and supported and facilitated by civil society organisations, the private sector and international donors.

The implementation framework is premised on harmonisation and integration and outlines how delivery of WASH would need to be structured and coordinated, proposes funding arrangements (covered in further detail under 'Resource Mobilisation'), and provides a structural platform for NGOs to be integrated in planning and execution of the sector plan. It is expected that as the programme evolves, the framework would ned to be revised to address issues not apparent at this time.

A significant component of the proposed framework is a joint commitment by six leading departments (LG&HTPD, PHE&RDD, Health, Education, P&DD and Finance) through a **Memorandum of Understanding** to support and facilitate an **integrated WASH programme** in the province to address the needs of urban and rural communities more holistically and limit compartmentalisation that may impede progress towards the sector plan's objectives.

The framework further seeks to provide **coherence** to sector and sub-sector planning, design and execution, and to **harmonise** donor inputs in terms of programming and financial assistance. This would facilitate donors to support components of the sector plan that contribute a unified whole rather than disparate projects in isolation of each other.

Foundation

The foundation of the new WASH sector development plan is a formal Memorandum of Understanding (MoU) between the following departments:

- LG&HTPD
- PHE&RDD
- Health
- Education
- P&DD
- Finance

The intent of the MoU would be to establish a harmonious working modality between the six departments, donors and other sector partners active in the implementation of WASH activities to realise the full benefits of the WASH sector plan.

Features of the Implementation Framework

Four of the significant features of the new WASH sector plan are:

- Integration
- Harmonisation
- Alignment
- Partnership

Integration

The sector plan is designed to **integrate**:

- Water Supply (urban and rural)
- Hygiene and Sanitation
- WASH in Schools and Health Facilities

The primary objective is to foster integrated behaviour among community members in which:

- safe use of water,
- healthy hygiene practices
- regular use of improved sanitation facilities

are naturally and instinctively combined into the pattern of daily living. Further, it seeks to provide an institutional arrangement that would achieve greater efficiency and effectiveness.

Integrating Structure

The structural arrangements recommended for WASH, shown in the matrix below, are designed to build **synergy** among the sectors through coordinated and collaborative planning, implementation, monitoring, reporting and evaluation of programme results.

The recommended WASH organisational structures are intended to provide for effective:

- Governance
- Management
- Implementation
- Coordination

It is recognised that the recommended structures may not be appropriate in all situations and local adaptations may be necessary.

The MoU presupposes:

- provincial WASH structures for policy guidance, technical overview and approval
- a structure for programme coordination to ensure intersectoral convergence

Implementation Matrix

Level	Governance and Guidance	Oversight and Management	Programme Implementation	Programme Coordination
Provincial	Provincial Nutrition and WASH Committee	Multi-sectoral steering committee under P&DD for policy guidance and sectoral collaboration	Higher level multi-sector planning	Higher level multi-sector coordination
	Technical Committee	Departmental level technical committee to review ongoing and new schemes for ADP	Technical overview and sector partner engagement	Coordination and alignment of sector schemes with department plans
	Steering WASH Technical Working Group	Departmental level structure with a focus on the sector plan	Multi-sector engagement at planning and execution levels	Multi-sector coordination for planning and execution
	Sector Coordination and Monitoring Unit (SCMU)	Provincial monitoring and evaluation structure as part of Nutrition Unit in P&DD	Monitoring frameworks, reporting to provincial and district structures	Inter-departmental liaison and coordination with donors for reporting requirements
District	District WASH Committee) under the DC Office	District level coordination	Multi-sector engagement at planning, coordination and execution at district level	Multi-sector coordination for planning and execution at district level
	District Coordination and Monitoring Unit (DCMU)	District level monitoring and reporting	Monitoring information reporting to SCMU and district structures	Inter-departmental liaison and coordination at district level for reporting requirements
Union Council Committee	UC WASH Committee under the UC Secretary Office	UC level WASH programming	CBO/VDC engagement at planning and execution at UC level	CBO/VDC coordination for planning and execution at UC level

Harmonisation

The second feature of the sector plan is harmonisation.

Historically, much of the work in WASH in the province has been departmental led on the basis of discrete, time-framed projects that have been largely been financed by the Provincial and Federal governments, while some projects have been donor-designed and donor-driven.

While there have been certain advantages in pursuing this approach, it has worked against comprehensive and strategic planning and effective programme execution. It has made difficult:

- assembly and analysis of essential planning data
- definition of expected outcomes
- mobilisation and allocation of resources
- establishment of management systems
- coordinated capacity development
- measurement of progress and of results
- communication and accountability.

At the provincial and district level, the management of diverse projects has placed an inordinate burden on generally under-capacitated implementing agencies and, at the community level, it has resulted in segmentation, gaps and overlaps in service delivery.

There is therefore a pressing need to move from a fragmented project approach to a more coherent and integrated programme approach, so that there is one WASH programme in the province to which donors and NGOs can align and contribute to its overall achievement.

Alignment

The third new feature of the WASH sector plan, closely related to harmonisation, is alignment. It is imperative that the sector plan is aligned with

- the policies, priorities and strategies of the pertinent departments as outlined in their respective Sector Development Plans
- the administrative systems, standards and procedures of the Government of Sindh

This means that the goals, objectives and development indicators of WASH are directly linked and contribute to those of the partner departments. It also means that, to the extent possible, WASH management systems and procedures follow and tie into the established government systems, standards and procedures for:

- Planning
- Financial Management
- Procurement
- Reporting
- Monitoring & Evaluation

Other than conformity and efficiency, and internal vertical and horizontal alignment for complementarity and mutual reinforcement, the overall purpose is to ensure that WASH is recognised and affirmed as an integral, ongoing component of the provincial government's broader developmental programme. WASH responsibilities are incorporated in the established process streams and the job descriptions of the four sector agencies' staff at all levels. This signals to WASH implementers within the government structures that their WASH activities are not "added on" responsibility in support of donor projects - but a core responsibility in government service.

Partnership

The fourth feature of the sector plan is partnership. Partnership is not a new feature – but it is an evolving feature in terms of scope and level of commitment. The scope has been enlarged to include the six departments and the commitment has been increased to engage with Civil Society Organisations and the Private Sector as significant partners. The new sector plan recognizes that each of these partners has an essential part to play in successfully scaling-up WASH, improving performance and ensuring the sustainability of programme results.

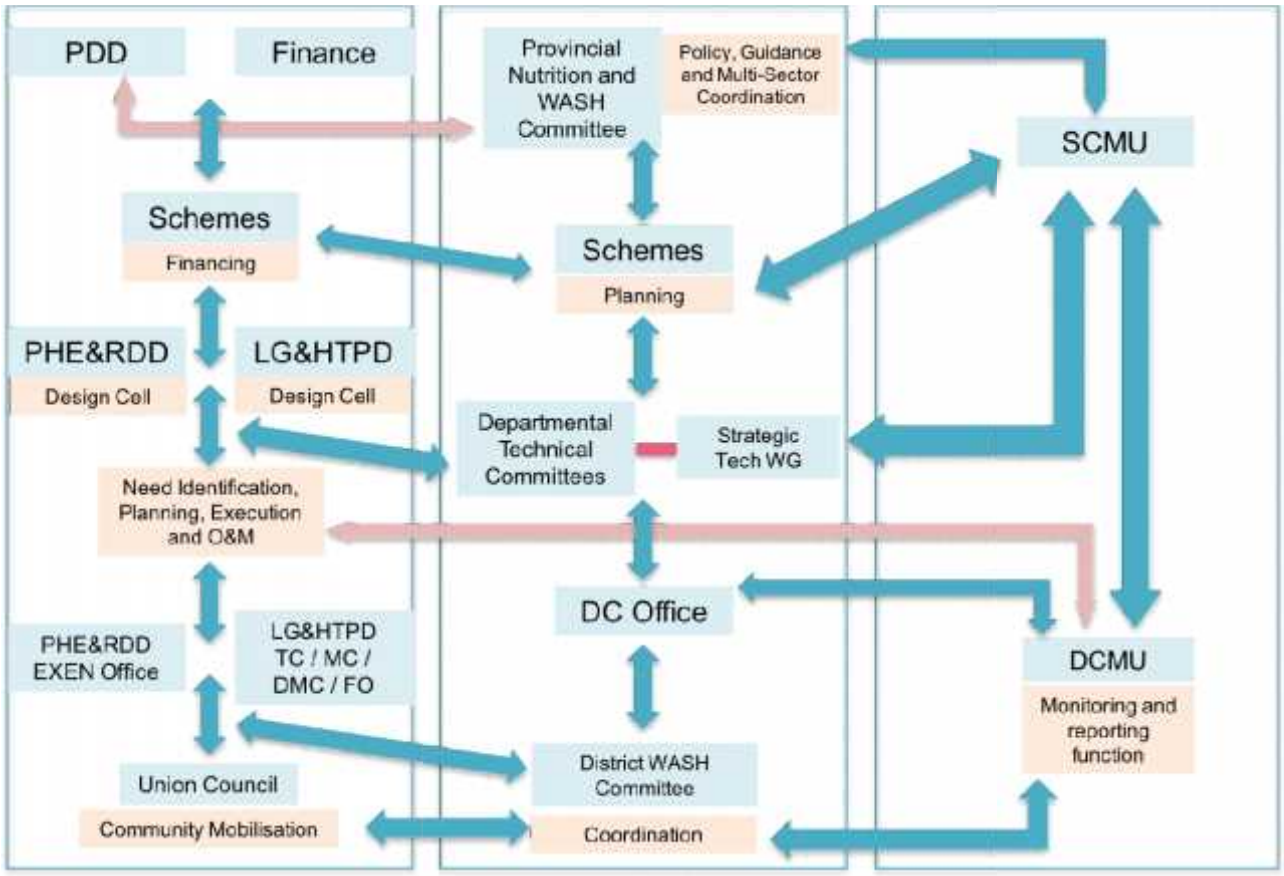
Civil Society Organisations/NGOs are major WASH actors throughout the province. Furthermore, they have exceptional motivation, expertise and flexibility that enables them to effectively implement WASH in remote areas where governmental agencies may not have the required capacity. Not least, CSO/NGOs bring additional and alternative experience to WASH and can contribute substantially to lessons learned and the achievement of best practices.

The role of the CSO's/NGOs as Partners in the sector plan focuses on common approaches to local capacity building, empowerment and planning, common standards relating to WASH infrastructure, the harmonisation of reporting results – not least in relation to the WASH Inventory- and ensuring that the financial contributions to the Programme are recognised and recorded in WASH financial reporting.

Private sector involvement in WASH is essential to the sustainability of the community-led and community-managed development that is promoted by WASH. When communities do not have ongoing access to reliable maintenance and capacity building services, their good initiatives frequently falter and fail. The new sector plan encourages the private sector to assume this role and offers opportunity for public-private partnerships in the delivery of goods and services and in the building of stakeholders' capacity.

The proposed implementation mechanism is presented diagrammatically in Fig 83.

Figure 83 – Implementation Mechanism



Need Identification and Scheme Design

The need identification process would commence at the UC level with community participation. Communities need to be involved at the outset to identify a suitable location, participate in the planning, design and execution of the scheme, and to ensure that the mobilisation process has obtained the necessary commitment by the local communities to bear the costs of operation and maintenance.

Design Cell

A Design cell would be established in LG&HTPD to assist Town Committees (TC), Municipal Committees/Municipal Corporations (MC), District Municipal Corporations (DMC) and Field Offices (FO), while the existing Design Cell in PHE&RDD would be strengthened to assist the EXEN Office in the designing of new schemes and review designs of existing schemes where required, and to ensure that all new schemes meet the technical and quality specifications.

Multi-Sectoral Nutrition Steering Committee

The P&DD has established a Multi-Sectoral Nutrition Steering Committee represented by most sectors. It is suggested that this committee incorporate WASH and be renamed Multi-Sectoral Nutrition and WASH Committee. For projects that require collaboration with other sectors, LG&HTPD and PHE&RDD can utilise the Steering Committee for improved coordination and high level planning. The Steering Committee provides policy guidance and coordination to the different sectors.

Departmental Technical Committees

The Departmental Technical Committees would be operationalised and review ongoing and proposed new schemes for technical and financial oversight and guidance in relation to the ADP.

Strategic WASH Technical Working Group

A Strategic WASH Technical Working Group would monitor overall progress and facilitate implementation of the Sector Development Plan, provide a forum for inter-departmental coordination for the implementation of the plan, promote alignment of sector partner projects with the Sector Plan, and facilitate donor engagement and reporting.

Sector Coordination and Monitoring Unit (SCMU)

Presently, there is no mechanism that can manage the implementation of sector development plan. Therefore, a SCMU would be established under the auspices of P&DD as part of the Nutrition Unit to facilitate implementation of the sector development plan. The SCMU shall liaise with the Multi-Sectoral Steering Committee, Departmental Technical Committees, Strategic WASH Technical Working Group, Monitoring and Evaluation cell in P&DD, and the District Coordination and Monitoring Unit (DCMU).

Aim

Monitor the progress and timely implementation of the Sindh Water, Sanitation and Hygiene Sector Plan 2016-2026

Key Objectives

1. Report on progress and provide periodic updates to the Multi-Sectoral Steering Committee, Departmental Technical Committees, and Strategic WASH Technical Working Group
2. Act as a mechanism for donor, NGOs and private sector coordination and reporting in Water, Sanitation and Hygiene - institutionalize the bottleneck analysis and joint sector review mechanism so that partners can see linkages between policy commitments and budgeting/ spending at all levels of government
3. Develop and implement sectoral and sub-sectoral implementation and monitoring frameworks for the sector plan
4. Liaise with the Monitoring and Evaluation Cell, P&DD, Government of Sindh
5. Develop and maintain a Sanitation and Water Information System (SWIS) with District Scorecards

6. Produce a Sindh Annual State of Water, Sanitation and Hygiene Report (SAWSH Report)
7. Act as a provincial observatory for water, sanitation and hygiene, evidence generation and collation, and warehouse of sectoral and sub-sectoral information
8. Monitor and report sectoral and sub-sectoral financing by state and non-state actors in Water, Sanitation and Hygiene – and generate Annual WASH budget briefs for better and more relevant budget and expenditure data information
9. Maintain an updated database for Water, Sanitation and Hygiene for reporting to JMP and GLAAS

District WASH Committees

A District WASH Committee shall be set up and operationalised under the DC Office.

Representation of relevant district staff of LG&HTPD, PHE&RDD, Health and Education on to this committee would be required. Other sector representation can be co-opted as required. The District WASH Committee shall perform the role of sector coordination, planning, and multi-sectoral collaboration. An important role for the District WASH committee would be to improve budget transparency and accountability based on communities' budget monitoring and feedback at the district level and ensuring that funds reach the intended programmes and beneficiaries.

District Coordination and Monitoring Unit

A District Coordination and Monitoring Unit (DCMU) shall be set up and operationalised under the DC Office. Each DCMU would be staffed by a District M&E Manager and supported by two Water and Sanitation Reporting Officers. The DCMU shall have reporting arrangements to the SCMU and shall liaise with the EXEN Office and LG tiers for information regarding schemes, and also with other sectors like health and education for issues related to the sector. The DCMU shall compile physical and financial progress data on ongoing and completed schemes, make monitoring visits to scheme sites, determine the status of O&M of schemes visited, and provide monthly reporting to the SCMU. DCMU data shall be used to develop district scorecards for water, sanitation and hygiene. The organogram for DCMU is shown in Fig 84.

Figure 84 - Organogram for DCMU

Rural Water Supply Schemes

For Rural Water Supply Schemes, the following implementation arrangements shall be adopted:

1. The Drinking Water Policy goals and objectives can only be achieved through strong community mobilisation. It is envisaged that the Communities shall be involved in the planning, implementation, monitoring and O&M of the water supply schemes (WSS). The O&M of the schemes especially in the remote areas/villages shall be handed over to the Drinking Water User Associations (DWUAs), which can generate ample revenue by collection of water charges to maintain the water supply schemes. Local governments shall hold public consultations at the conceptual design of the development plan, schemes and projects, while PHE&RDD provides technical assistance to DWUAs. PHE&RDD shall not be involved in the collection of revenue. Modifications in the designs shall be carried out to accommodate the concerns of the stakeholders. The PC-1s shall be prepared only after such a process has been carried out. Local Council Monitoring Committees shall oversee the programme/project/scheme.

2. For effective and sustainable rural water supply schemes (RWSS) management in Sindh:

   a) PHED shall appoint Social Mobilisation/Community Development Officers with proper qualifications to interact with communities
   b) Local government (LG) department in coordination with Social Mobilisation/Community Development Officers of PHED shall constitute the Local Council Monitoring Committee (LCMC) and hold public consultations at the conceptual design of the RWSS development plan, schemes and projects.
   c) The site selection of the RWSS shall require recommendation of the LCMC following which PHED will be responsible for Engineering Design, Procurement of Materials, Construction, Installation and Commissioning.
   d) Upon completion of the RWSS, the scheme shall be handed over to the respective Drinking Water User Association (DWUA) for operation and maintenance (O&M) of the RWSS. DWUAs shall be able to generate ample revenue by collection of water charges to maintain the water supply schemes. The water tariff shall be set as per recommendations of the DWUA in consultation with the community.
   e) The minor repair requirement of the RWSS shall be met within the revenue generated by the DWUA and major repairs of the RWSS shall be met from the budget of O&M Wing of the PHED. Moreover, technical support for minor/major repair shall also be provided by O&M Wing of PHED. O&M and minor repair manual shall be prepared by PHED and handed over to the DWUA for smooth functioning of the RWSS.
   f) DWUA shall sign a memorandum of agreement (MoA) with PHED to give their (DWUA) commitment to undertake regular monitoring and reporting to O&M Wing of PHED, and for carrying out O&M by the DWUA from the revenues generated from the scheme. The disbursement of revenues shall be the sole responsibility of the DWUA.
   g) Monitoring of RWSS shall be the sole responsibility of PHED and develop/maintain web based GIS/MIS of all RWSS and report the level of functionality of RWSS.
   h) PHED shall be designated as the lead agency for RWSS working in close coordination with LG department in Union and District Councils and its Rules of Business (ROB) shall be revised including design, construction, installation, commissioning, and monitoring (O&M, minor/major repair) of the rural water supply schemes).

i) The Annual Development Plan (ADP) of PHED shall reflect the following:

- New and ongoing rural WSS (RWSS)
- Rehabilitation of non-functional RWSS
- Upgrading/extension of existing RWSS
- Major repair of existing RWSS
- Behavioural Change Communication Campaigns/activities, IEC production and dissemination, trainings (PHED staff & DWUAs)

Strategy

Sector Coordination			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Provincial level coordination and programme management for WASH streamlined and enhanced	ACS Development P&DD notifies broadened scope of Multi-Sectoral Nutrition Steering Committee to encompass WASH ACS Development P&DD notifies Sector Coordination and Monitoring Unit for WASH as part of Nutrition Unit Establish a Sector Coordination and Monitoring Unit in Nutrition Unit Equip and furnish the SCMU Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee Establish a Design Cell in LG&HTPD and PHE&RDD	Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee	Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee
District level coordination and programme management for WASH streamlined and enhanced	DC Offices notify District WASH Committees Quarterly review of WASH schemes and activities in meetings of District WASH Committees ACS Development P&DD notifies District Coordination and Monitoring Unit for WASH under DC Office Establish and operationalise DCMU	Quarterly review of WASH schemes and activities in meetings of District WASH Committees	Quarterly review of WASH schemes and activities in meetings of District WASH Committees

SECTOR MONITORING

Monitoring and Evaluation

Monitoring and reporting activities in the sector and sub-sector take place at various levels but are fragmented.

At the federal level, the Poverty Reduction Strategy Paper (PRSP) progress report involves an annual review process led by the Ministry of Finance. Coverage is tracked through national household surveys and sector investments obtained through provincial submissions. Financial budget and expenditure data is fed into financial management systems at TMA, district and provincial levels using specific entry codes. The data available against these codes are then grouped for reporting and summarised in the PRSP Progress Reports. Data on water and sanitation coverage are usually obtained from PSLM surveys.

At the provincial level several mechanisms exist for providing overviews. For instance, the provincial PRSP Report, Medium Term Development Framework (MTDF), Medium Term Budgetary Framework (MTBF) and Public Sector Development Plans (PSDP). Generally, the PSDP provides the basis for planning, but current arrangements do not support a comprehensive assessment or access to capital expenditure on sanitation and hygiene. In absence of a template for a Sector/sub-sector Performance Report, it is difficult to consolidate the input and output data to have an overall picture of the sector i.e. investments, operational costs, output/outcome data, etc. While each project/scheme does in theory have a project cycle, based on a series of documents from PC-I to PC-V, the end of project evaluation stage (PC-V) is undertaken infrequently, bypassing yet another institutional monitoring mechanism.

Furthermore, there are challenges of coordination for monitoring and reporting due to complexities in the roles and responsibilities of different stakeholders in the government, cantonment boards and defence housing authorities, non-government and private sectors.

Presently, there are four reports/sources that provide information about access to water and improved sanitation. These are as follows:

Pakistan Poverty Reduction Strategy Paper Progress Report (PRSP)

The Ministry of Finance publishes periodic PRSP progress reports and budgetary expenditure reports that include sectoral pro-poor expenditure as part of Pakistan's obligations to achieve the MDGs. These reports obtain data from the provincial finance departments and collate them to present a country and provincial progress report. Water and sanitation coverage statistics is usually obtained from the recent Pakistan Bureau of Statistics publications like PSLM. These reports provide useful information about trends in sectoral spending and projected planned expenditure.

Pakistan Social and Living Standards Measurement Survey (PSLM)

The PSLM is conducted annually by the Pakistan Bureau of Statistics. It provides disaggregated data by province and district, urban and rural, and by quintiles. While essential statistics are covered every year, additional data is obtained every 3-4 years together with a Household Integrated and Economic Survey (HIES) that is conducted with the same periodicity. Additionally, PSLM also collects data on sewerage systems and solid waste collection. However, it does not provide any significant information on hygiene. In addition, PSLM also has statistics on health (e.g. diarrhoea), education, housing etc. The type of WASH related indicators collected in PSLM are shown in **Table 55**.

Multiple Indicator Cluster Survey (MICS) Balochistan

The MICS is a province specific survey that is usually conducted every 5-6 years and it has a bias towards child, nutritional and reproductive health. It is conducted by the Provincial Bureau of Statistics in close collaboration with UNICEF. In Sindh, the two recent MICS were done in 2004 and 2014. MICS provides useful and more comprehensive data on sources of water and type of toilet. In addition, it is also rich in hygiene indicators. It disaggregates data by district, education profile and by quintiles. It does not collect any data on sewerage systems or solid waste. The type of WASH related indicators collected in MICS are shown in **Table 55**.

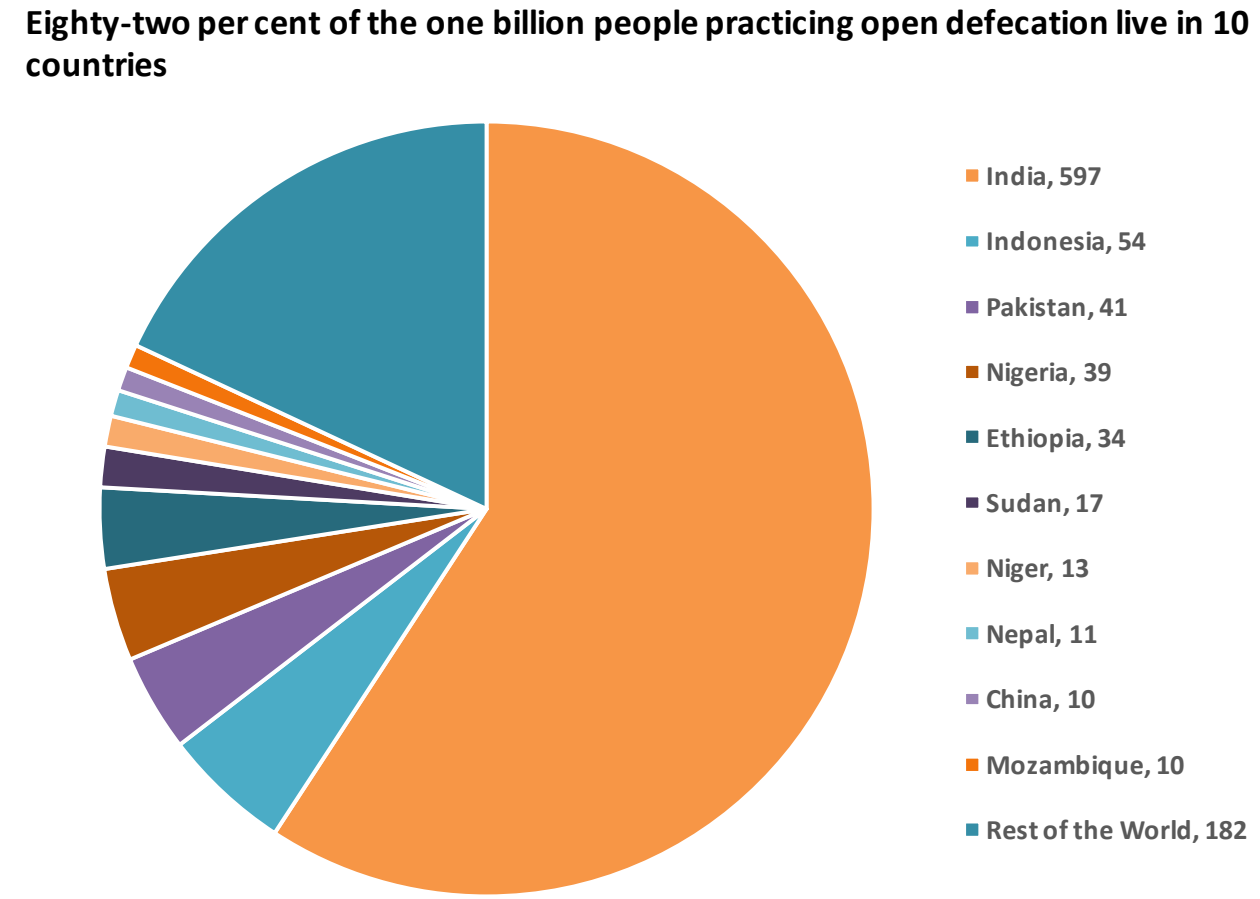
Pakistan Demographic and Health Survey (PDHS)

The PDHS is also a periodic survey conducted every 7-8 years and its main focus is on health and population. It is supported by USAID with contributions from UN agencies like UNICEF, UNFPA, WHO and UNAIDS. It is conducted by the National Institute of Population Studies in collaboration with international partners. It has close similarity to MICS. It does not collect any data on sewerage systems or solid waste. The type of WASH related indicators collected in PDHS are shown in **Table 55**.

Joint Monitoring Programme (JMP) of WHO and UNICEF

The JMP is an official UN mechanism to monitor the progress and achievement of the Millennium Development Goals on water and sanitation. It is conducted every two years and involves review of existing survey data usually about 2-3 years old. The surveys commonly referred to are PSLM and PDHS. JMP utilises regression analysis using population estimates obtained from United Nations Population Division (UNPD). This mechanism provides country trends and an overall picture in water and sanitation for urban and rural. It does not differentiate sub-nationally.

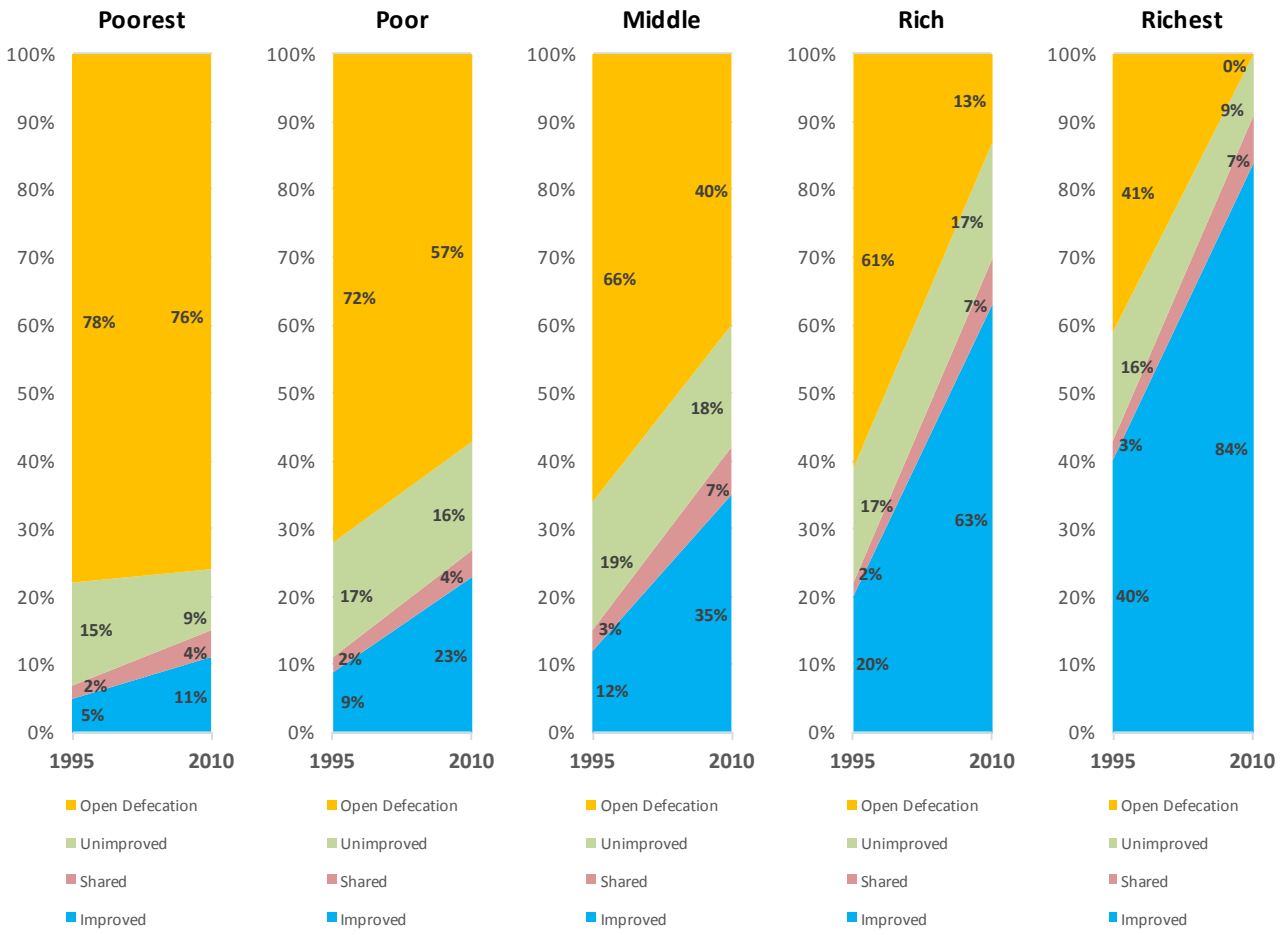
Figure 85 - Top 10 countries with the highest numbers of people (in millions) practicing open defecation



(Source: JMP Report 2014)

Figure 85 shows that Pakistan has the third highest number of people practicing open defecation in the world. Evidence shows that most of these reside in Punjab. This is further evident from **Fig 86**, which shows that 76% of the poorest quintile still lacks access to improved sanitation.

Figure 86 - Disparities in rural improved sanitation coverage



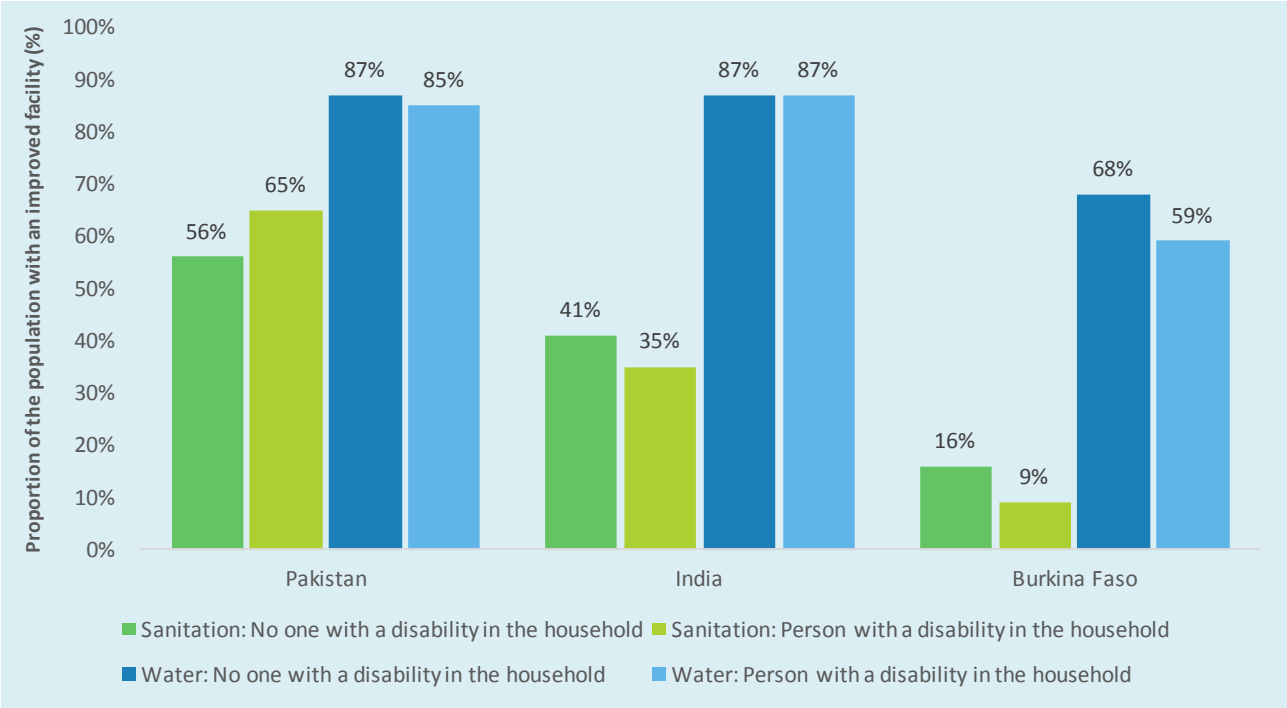
(Source: JMP Report 2014)

Disability

Figure 87 presents an interesting perspective of households that have a person with disability in the household. About two-thirds (65%) indicated that the population had access to improved sanitation, while over four-fifths (85%) said that the population had access to improved drinking water sources.

These trends are important as all countries that have ratified the UN Convention on Rights of Persons with Disabilities, of which Pakistan is one of them, are now obliged to ensure that the rights of persons with disability for access to improved and safe drinking water and improved sanitation are implemented in social sector and development initiatives. It also requires development of disability sensitive indicators for water and sanitation services.

Figure 87 - Access to improved drinking water sources and sanitation facilities – disability perspectives



(Source: JMP Report 2014)

Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS)

The GLAAS report is a biennial reporting mechanism implemented by WHO and supported by the World Bank. Every two years, a Sanitation and Water For All (SWA) High Level Meeting (HLM) is held in which countries present their progress and outline their commitments. The biennial meetings are jointly hosted by the World Bank and UNICEF at the World Bank/IMF spring meetings. The GLAAS report provides country level data on government investment in WASH; budgeting and expenditure in WASH; WASH coverage of schools and health facilities; the existence of policies and strategies for WASH; the effectiveness of planning, monitoring and evaluation mechanisms; participation and equity, sustainability of water and sanitation initiatives; human resources capacity for WASH; and hygiene promotion especially in schools and primary health care.

Completion of a GLAAS questionnaire is coordinated and facilitated by the Climate Change Division and receives inputs from all provinces. The last report was published in 2014.

Pakistan Water Operators Network

As part of a collaborative project with Water and Sanitation Program (World Bank), the Pakistan Water Operators Network (P-WON) was formed and consists of all the WASAs in Pakistan. P-WON monitoring reports provide information on service coverage, consumption and production, non

revenue water, metering practices, network performance, cost and staffing, quality of service, billing and collection, and financial performance. These reports are available online. Some WASAs are particularly efficient and their quarterly reports are up to date, while some may lag behind in the quarterly reporting. Proposed monitoring indicators for WASA are shown in **Table 56**.

School Education Management Information System (SEMIS)

The SEMIS collects quarterly information regarding missing facilities (electricity, usable drinking water, usable latrine, school cleanliness, boundary wall etc.) in all government schools of Sindh. These are published in periodic progress reports (School Education Profile) of the Reform Support Unit, Education and Literacy department, Government of Sindh. They provide an invaluable update on the status of school WASH.

Annual State of Education Report (ASER)

The ASER report is published annually and is a survey of a representative sample of primary, middle and high schools in the government and private sectors. Apart from enrolment and school participation data, it also provides information on the status of school drinking water and sanitation facilities.

Pakistan Council of Research in Water Resources (PCRWR)

PCRWR monitor groundwater quality as part of the national water quality monitoring programme (NWQMP). It has surveyed 24 major cities and 23 surface water bodies in Pakistan. Its reports for Sindh have been alluded to earlier in the chapter on water quality.

PCRWR monitors the quality of bottled/mineral water regularly and publishes a quarterly report. The reports show that on average, 25%-30% brands are overall unsafe, 20% are chemically unsafe, 10% are microbiologically unsafe, 60% brands are consistent, 30%-80% brands disappear from the market, and 35%-40% new brands appear.

Public Health Engineering Water Testing Laboratories

PHED utilises PCRWR water testing laboratories at district headquarter level in Sindh. It is expected that these will provide monthly water quality monitoring data.

Monitoring and Evaluation Cell - Planning and Development Department

The P&DD is mandated to monitor identification of schemes, monitoring of schemes during implementation, and evaluation after completion of projects. It is mandated to conduct evaluations of projects that are completed as indicated in the PC-1. It is the responsibility of executing departments to complete the PC-IV and PC-V and ensure that evaluations are done. The

P&DD has established a Monitoring and Evaluation Cell to monitor and evaluate development schemes.

Surveys and Evaluations by State and Non State Actors

Project surveys, research and evaluations are also undertaken by other councils (e.g. Pakistan Council for Scientific and Industrial Research), government departments (e.g. Irrigation, Agriculture, Fisheries etc.), university departments, bilateral and multi-lateral donors, UN agencies, national and international non-governmental organisations.

Collation, Synthesis and Dissemination

Despite the mass of information available from disparate sources, monitoring reports, evaluation studies, surveys, research studies etc., there is no mechanism to collate and synthesise this information and disseminate to policy, management and operational level stakeholders.

The development of a Management Information System (MIS) for Drinking Water and Sanitation has been started a few years back and is still in the piloting stage in different parts of the country. The new MIS shall be based on GPS data creating decision-making and analytical scenarios for the government to develop effective sanitation programmes.

Under public sector development programme financed by Government of Pakistan, the Climate Change Division has started development of a national MIS for WASH from July 2013 and this is likely to be completed over a period of three years.

Furthermore, there are efforts from various actors to set up different monitoring systems and reporting formats. While these may be useful for project specific interventions, they do not bear any semblance to existing institutional monitoring and reporting systems, with the result that monitoring and evaluation information flows remain fragmented, uptake by executing agencies and institutional partners is low, and the sector and sub-sectors remain under-reported. Synergies between government initiatives in the subsectors of water supply, sewerage and solid waste management and those of national and international non-governmental organisations are sometimes hard to achieve.

Presently, there is no systematic approach for the monitoring and evaluation of sanitation projects. The concept of PC-2 is even missing which provides the basis for need identification.

Sector tracking is mainly based on the data of MICS and PSLM conducted by provincial and federal Bureau of Statistics with the support of UN and other international development agencies.

There is need for developing a MIS for water and sanitation with defined capacity development of Local Government Units up to Union Council level to provide information on quarterly or six monthly basis to update the status about coverage, access and need of the respective areas.

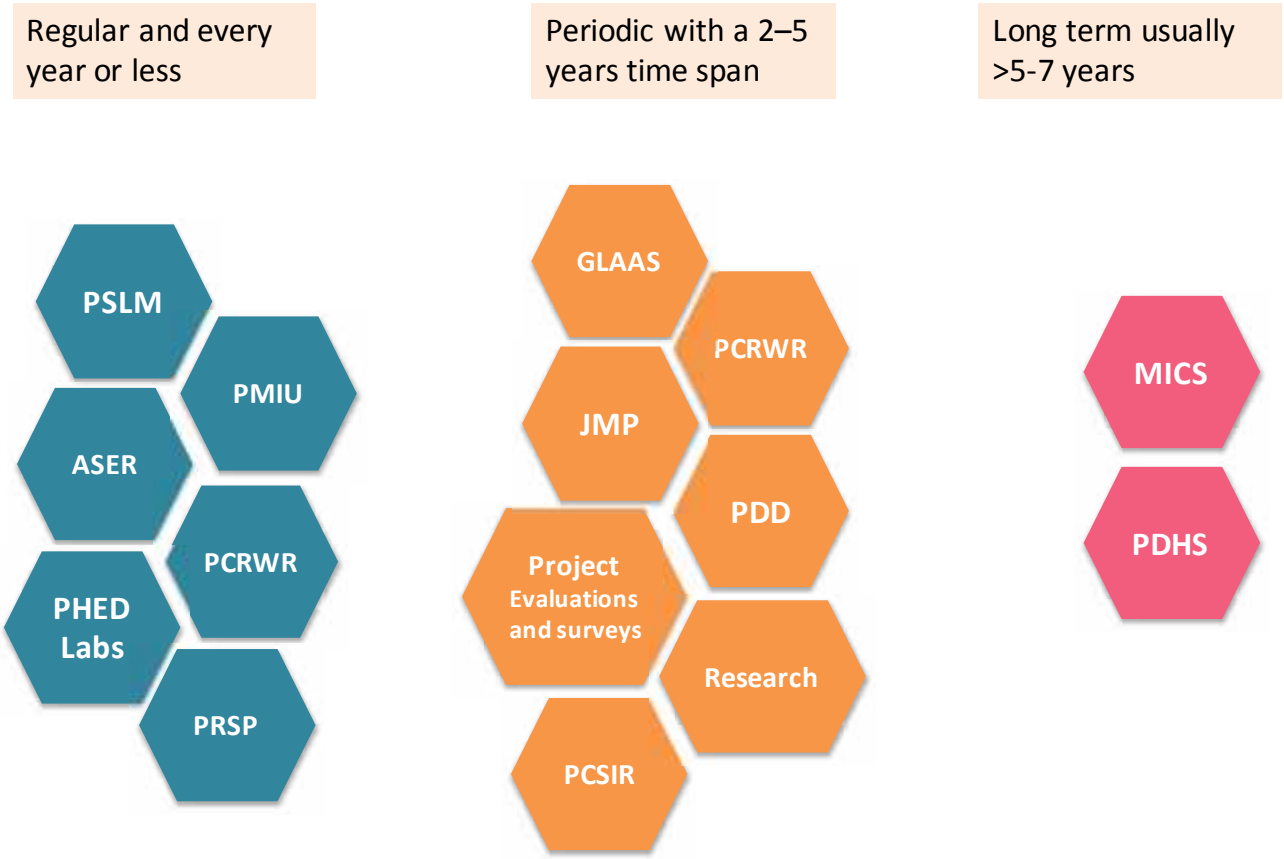
During development of PC-1, data collection should also be included so that accurate data is used instead of inaccurate or anecdotal estimations. There is need to estimate population served by water supply pipe for drinking water, and take into consideration the population and resources available. It should be made mandatory for the Irrigation Department, LG&HTPD and PHE&RDD to upload GPS for every project.

For monitoring of drinking water and sanitation indicators to be institutionalised, it is essential that monitoring of the sector is contextualised within the broader monitoring framework of the province and that key stakeholders like the Bureau of Statistics, P&DD, and those involved with management information systems facilitate information management for drinking water and sanitation. At district level, the monitoring unit should be placed under the Deputy Commissioner.

Monitoring and Reporting Information Systems

The monitoring and reporting systems appear to cluster into three groups (Fig 88). The first group is where there are regular annual or more frequent reports. The second group includes those that have a periodicity of between 2-5 years, provide some mid-term trends, are isolated activities and may not be performance related. The third group provides a long term perspective and is useful to see broader societal impact of social sector investments and behaviour change.

Figure 88 - Existing monitoring and reporting systems



However, it is interesting to note that several institutional monitoring and reporting systems already exist, but the potential to distil information for policy, planning and execution has not been adequately harnessed.

Proposed monitoring indicators for district municipal services are shown in **Table 57**.

Performance Measurement Framework

The key performance indicators for the Sindh WASH sector plan are presented below.

Result Statements	Performance Indicators	Targets for 2026	Collection Methods	Collection Frequency
Outcome Results				
Access to improved water supply	Proportion of Population with Access to Improved Water Sources (%) that is: - Accessible - Available - Safe	% Rural % Urban	MICS PDHS	4 years
Access to improved sanitation	Proportion of latrines at Household/Population levels connected with sewerage and drainage (%)	% Rural % Urban	MICS PDHS PSLM	4 years
	Proportion of households using improved sanitation (latrines) (%) that is: - Not shared - Disposed safely to a closed sewerage system	% Rural % Urban	PSLM MICS PDHS	Annually 4 years
Reduced Child Mortality	Proportion of Children Under 5 Who Suffered from Diarrhoea in the last 15 days (MICS); last 30 days (PSLM) (%)	%	MICS PSLM	4 years Annual
	Diarrhoea in those <5 years and >5 years – seen as outpatients at health facilities (%)	%	DHIS	Annual
	Diarrhoea in those <5 years and >5 years – admitted as inpatients at health facilities (%)	%	DHIS	Annual
	Children <5 years who are underweight (%) - Moderate and severe - Severe	%	MICS	4 years
	Children <5 years who are stunted (%) - Moderate and severe - Severe	%	MICS	4 years
	Children <5 years who are wasted (%) - Moderate and severe - Severe	%	MICS	4 years
Outputs				
Implementation of water supply schemes	Number of water supply schemes implemented		PHE&RDD LG&HTPD	Quarterly
	Rehabilitation of Dysfunctional schemes		PHE&RDD LG&HTPD	Quarterly
	Number of households having water supply connections		KW&SB NSUSC H-WASA PHE&RDD LG&HTPD	Annually
Water filtration Plants	Number of filtration plants installed and operational		PHE&RDD	Monthly

established	Number of beneficiaries getting clean drinking water		PHE&RDD	Quarterly
Water quality	Number of water quality testing services in operation		PHE&RDD PCRWR	Quarterly
	Number of water samples examined		PHE&RDD	Monthly
	Proportion of households practicing home water treatment (%)	%	MICS PCRWR	4 years Annually
Water resources effectively managed	Number of locations with rain water harvesting schemes initiated		PHE&RDD LG&HTPD	Annually
Implementation of sanitation schemes	Number of sanitation schemes implemented		LG&HTPD and PHE&RDD	Monthly
Implementation of ODF in villages	Number of villages ODF certified		LG&HTPD	Monthly
Environment friendly disposal of sewage water	Number of pilot decentralised sewage water treatment system constructed		LG&HTPD PHE&RDD H-WASA NSUSC	Annually
Public Toilets for the communities	Number of the public toilets established		LG&HTPD	Quarterly
Solid Waste Management in Cities	Number and level of coverage of solid waste in towns/cities		LG&HTPD	Six monthly
Enhanced solid waste collection	Percentage of garbage/waste collected against the estimate/amount of garbage produced		LG&HTPD	Monthly
	Number of cities where secondary collection points established for small and medium cities		LG&HTPD	Monthly
	Number of approved/recognised slaughterhouses practicing hygienic disposal of slaughter waste as per guidelines		LG&HTPD	Monthly
Improved Hospital waste management	Health facilities whose staff have been trained in hospital waste management		Health Department	Annually
	Health facilities that have adopted and are practising hospital waste management guidelines		Health Department	Annually
	Health facilities (hospitals) that have an infection control committee		Health Department	Annually
School WASH	Number of schools with functional water supply at primary, middle and secondary levels		Education Department SEMIS	Quarterly / Annually

	Number of schools with functional latrines at primary, middle and secondary levels		Education Department SEMIS	Quarterly / Annually
	Number of water supply schemes with water supply extensions to local schools		Education Department SEMIS PHE&RDD	Annually
Health Surveillance for Water Borne Diseases	Pattern of Water borne diseases on district and sub district basis – No of health alerts issued		Health Department	Quarterly
Health Units with WASH	Health facilities with functional water supply		Health Department	Quarterly
	Health facilities with functional latrine facilities		Health Department	Quarterly
Improved sectoral governance	Multi-sectoral Steering Committee meetings for policy guidance, and improved planning and coordination		P&DD	Quarterly / Six monthly
	Coordination Meeting of WASH partners in Technical Committee at Departmental level		LG&HTPD PHE&RDD	Quarterly / Six monthly
	Quarterly Progress Report of WASH Sector Plan		LG&HTPD PHE&RDD P&DD	Quarterly
	Number of cities with Master Plans for water supply and sewerage and drainage up to 2026		LG&HTPD PHE&RDD Urban Unit P&DD	Annually
	Consumer water meters installed for accurate billing for small and medium cities (water supplies) and big cities (through service connection fee/ government support)		KW&SB H-WASA NSUSC LG&HTPD PHE&RDD	Annually
	Number of cities with Master plans for solid waste management		LG&HTPD	Annually
	Joint Sector Reviews		LG&HTPD PHE&RDD	Annually
	Sector Expenditure Review		LG&HTPD PHE&RDD	Annually

Table 55 - Comparative WASH indicators in PSLM, PDHS and MICS

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
DRINKING WATER		**DRINKING WATER**		**DRINKING WATER**	
Water delivery system	Urban, rural and overall Tap Water Hand Pump Motor Pump Dug Well Others	Improved source of drinking water	Piped into dwelling/yard/plot Public tap/standpipe Tube well or borehole/hand pump Protected well Protected spring/rain water Bottled water Filtration plant	Main source of drinking water - improved	Piped into dwelling Piped into compound, yard or plot Pipe d to neighbour Public tap / standpipe Tube well Hand pump (tap) Motorised pump (donkey / turbine) Protected well Protected spring Bottled water (mineral)
		Unimproved source of drinking water	Unprotected well Unprotected spring Tanker truck/cart with drum Surface water Other source	Main source of drinking water - unimproved	Unprotected well Unprotected spring Tanker-truck Cart with small tank / drum Surface water (Toba, river, stream, dam, lake, pond, canal) Bottled water (mineral) Other/ Missing
Main source of drinking water by income group	1st, 2nd, 3rd, 4th and 5th quintiles Source of drinking water Province, urban, rural and overall	Water treatment prior to drinking	Boiled Bleach/chlorine added Strained through cloth Ceramic, sand, or other filter Solar disinfection Other No treatment Percentage using an appropriate treatment method	Water treatment method used in the household	Boil Add bleach/chlorine Strain through a cloth Use water filter Solar disinfection Let it stand and settle Other None Percentage of household members in households using unimproved drinking water sources and using an appropriate water treatment method using an appropriate treatment method

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
DRINKING WATER		**DRINKING WATER**		**DRINKING WATER**	
Percentage households paying for water by region and water source	Households getting water from source Households paying for water Average amount paid per month Urban, rural and overall Source of water – tap water, hand pump, motorised pump, dug well, river/canal/stream, other				
Percentage of households paying for piped water by region and quintile	Urban, rural and overall 1st, 2nd, 3rd, 4th and 5th quintiles				
Who installed the water delivery system by province	Water delivery system – piped water, hand pump, motor pump, open well, closed well Local government Non-government Household itself Don't know Total				
Distance to water source by province	Water source – tap water, hand pump, motorised pump, dug well, river/canal/stream, other Inside the house, 0-0.5 Km, 0.5-1 Km, 1-2 Km, 2-5 Km, Over 5 Km	Time to obtain drinking water (round trip)	Water on premises Less than 30 minutes 30 minutes or longer Don't know/missing	Time to source of drinking water	Users of improved or unimproved drinking water sources Water on premises < 30 minutes 30 + minutes Missing/Don't know
				Percentage of households without drinking water on premises Person usually collecting water	Adult woman (age 15+ years) Adults man (age 15+ years) Female child (under 15 years) Male child (under 15 years) Don't know or missing

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
SANITATION		**SANITATION**		**SANITATION**	
Type of toilet	Urban, rural and overall Flush Non-Flush No Toilet	Improved, not shared facility	Flush/pour flush to piped sewer system Flush/pour flush to septic tank Flush/pour flush to pit latrine Ventilated improved pit (VIP) latrine Pit latrine with slab	Improved sanitation facility	Flush to piped sewer system Flush to septic tank Flush to pit latrine Flush to unknown place/not sure/don't know where Ventilated improved pit (VIP) latrine Pit latrine with slab Composting toilet
Type of toilet used by the household by province	Flush, non-flush and no toilet Province, urban, rural and overall	Non-improved facility	Flush/pour flush not to sewer/septic tank/pit latrine Pit latrine without slab/open pit Bucket Hanging toilet/hanging latrine No facility/bush/field Other Missing	Unimproved sanitation facility	Flush to somewhere else Pit latrine without slab/open pit Bucket Other Missing Open defecation (no facility, bush, field)
Type of toilet used by the household by quintile	Flush, non-flush and no toilet Urban, rural and overall 1st, 2nd, 3rd, 4th and 5th quintiles	Shared facility	Flush/pour flush to piped sewer system Flush/pour flush to septic tank Flush/pour flush to pit latrine Ventilated improved pit (VIP) latrine Pit latrine with slab	Users of improved or unimproved sanitation facilities	Not shared Public facility Shared by 5 households or less Shared by more than 5 households Missing/don't know Open defecation (no facility, bush, field)
Type of sanitation system used by province	Underground drains Covered drains Open drains No system Urban, rural and overall				
Type of sanitation system used by quintiles	Underground drains Covered drains Open drains No system Urban, rural and overall 1st, 2nd, 3rd, 4th and 5th quintiles				

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
HYGIENE					
		Hand washing	Percentage of households where place for washing hands was observed Soap and water Water and cleansing agent other than soap only Water only Soap but no water Cleansing agent other than soap only No water, soap, or other cleansing agent	Hand washing	Water and soap are available Water in available, soap is not available Water is not available, soap is available Water and soap are not available Missing
				Place of disposal of child's faeces (children aged 0-2 years)	Child used toilet/latrine Put/rinsed into toilet or latrine Put/rinsed into drain or ditch Thrown into garbage (solid waste) Buried Left in the open Other, don't know or missing Percentage of children whose stools were disposed of safely

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
SOLID WASTE		**SOLID WASTE**		**SOLID WASTE**	
Garbage collection systems from the household by province	Province, urban, rural and overall Municipality Privately No system				

PSLM	Indicators	PDHS	Indicators	MICS	Indicators
HEALTH		**HEALTH**		**HEALTH**	
Diarrhoea in children under 5 years in the past 30 days	Children under five (5) suffering from diarrhoea in past 30 days – by region and province Diarrhoea cases: duration of episode Diarrhoea cases: severity of illness Diarrhoea cases in past 30 days - by province and quintiles Treatment of diarrhoea in children under 5 years– by region and province	Diarrhoea in children under 5 years in the two weeks preceding the survey	All diarrhoea Diarrhoea with blood Also related with source of drinking water and type of toilet facility (improved, not improved etc.)	Percentage of children age 0-59 months with diarrhoea in the last two weeks, and treatment with oral rehydration solutions and recommended homemade fluids	Had diarrhoea in last two weeks Children with diarrhoea who received: ORS (Fluid from ORS packet or pre-packaged ORS fluid) Any recommended homemade fluid (Boil water, Sugar, Salt etc.,) ORS or any recommended homemade fluid

Table 56 - Proposed KW&SB, H-WASA and NSUSC Monitoring Indicators

Monitoring area	Indicators
Service Coverage	Water Coverage % Sewerage Coverage %
Consumption and Production	Water Production L/capita/day Water Consumption L/capita/day
Non Revenue Water	Non Revenue Water % Unaccounted For Water %
Metering Practices	Metering Level % Metered Water Sold %
Network Performance	Pipe Breaks-Burst/Km Sewer System Blockages/Km Pipe Leakages/Km Replacement of Manhole Covers % Cleaning/Desiltation of Manholes % Cleaning/Desiltation of Sewers % Storm Water Drain Used as Sullage Carrier % Sewer Collapse/Crown Failure %
Cost and Staffing	Unit Operating Cost – Water Consumption Rs/m^3 water consumed Unit Operating Cost – Water Production Rs/m^3 water produced W&WW Staff Per 1000 W&WW Connections Water Staff Per 1000 Water Connections Waste Water Staff Per 1000 Waste Water Connection Salary Cost as % of Total Operating Cost Electricity Cost as % of Total Operating Cost Maintenance Cost as % of Total Operating Cost Contracted Out Cost as % of Total Operating Cost

Monitoring area	Indicators
Quality of Service	Continuity of Service per day Chemical Unfit Source(s) % Biologically Unfit Source(s) % Chemically Unfit at Taps % Biologically Unfit at Taps % Water Quality – % of Required Residual Chlorine Test Water Quality – Samples Passing On Residual Chlorine % Complaints About W&WW Services % of total connections Waste Water Treatment – Primary Level % Waste Water Treatment – Secondary Level %
Billing and Collection	Average Revenue Water and Waste Water Rs/m^3 water sold Collection Period days Billing Efficiency % Collection Efficiency (Physical) % Collection Efficiency (Financial) %
Financial Performance	Operational Cost Coverage (ratio) Working Ratio Debt Servicing %

Table 57 - Proposed Monitoring Indicators for District Municipal Services

Water Supply (six monthly)	Sewerage (annual)	Solid Waste (daily and monthly)	Slaughterhouse (annual)
Source of water supply Water Taste Ground water table depth in feet Number of Tube wells Number of Tube Wells with bad status Overhead reservoir Ground storage tanks Coverage % Consumer connections Served Households Water Tariff residential Water Tariff commercial	Coverage % Disposal station Open drains	City coverage % House to House primary collection Number of collection points Dumping Average Solid Waste collection % Average Solid Waste collection Tons/day	Number of slaughterhouses Disposal of Slaughterhouse solid waste
		Walled waste dumps Metaled tray Wheel barrows Hand carts Tractors Steel containers open Covered containers Tractor trolleys Tractor with blade Tractor with bucket loader Mechanised loader Dumper trucks Arm roll truck Mechanical Sweeper Container carrier Water tanker Rickshaws Litter bins	

Water Supply	Sewerage	Solid Waste	Slaughterhouse
Tehsil Officer TO (I&S) Assistant Tehsil Officer ATO (I&S) Supervisor Sub-Engineer Operators Head tube well operator Plumbers Water Checker Valve man Beldar Chowkidar		Chief Sanitary Officer Supervisory Officers Sanitation Inspector Sanitary Inspectors Supervisors Sanitary Workers Vehicle drivers Water carriers Sanitary Mate Spray man Auto mechanics Auto electricians Helpers	Veterinary doctor

Strategy

Sector Monitoring			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Monitoring and reporting mechanism developed for water and sanitation schemes	Reporting templates for water supply and sanitation schemes developed and tested; Reporting pathway established from UC to district to provincial level District LG&HTPD and PHE&RDD staff trained in its use	Annual WASH progress reports produced	Annual WASH progress reports produced
Improved infrastructure for monitoring and reporting established for water supply schemes	Establish 29 district monitoring units based at DC Office – 1 per district Procure computers and accessories for MIS – 5 sets per district for water supply schemes Develop computerised MIS for water supply schemes – 29 districts	Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application	Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application
Improved infrastructure for monitoring and reporting established for sanitation, sewerage and drainage schemes	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes Develop computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application	Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application
Monitoring and reporting capacity enhanced for water and sanitation	Recruit and deploy a 29 District M&E Managers based at DC Office – 1 District M&E Manager per district Recruit and deploy 58 Water and Sanitation Reporting Officers – 2 per district based at DC Office Recruit and deploy 29 drivers – 1 driver per district based at DC Office	Maintain District M&E Managers, Water and Sanitation Reporting Officers and Drivers	Maintain District M&E Managers, Water and Sanitation Reporting Officers and Drivers
Travel for monitoring and reporting facilitated	Procure 29 vehicles for monitoring and reporting – 1 vehicle per district based at DC Office	Maintain vehicles	Maintain vehicles

CONSOLIDATED SECTOR DEVELOPMENT PLAN

Vision and Strategic Priorities

Vision

A Clean and Healthy Sindh by 2026 whose population enjoys good health as a result of a sustainable supply of safely managed clean drinking water, universal access to safe and improved sanitation, good nutrition and a safe and hygienic environment.

Strategic Priorities

Legislation

- Introduce legislative measures and regulations to create an enabling framework for nutrition-sensitive safely managed drinking water supply and sanitation and promote integrated water resource management

Water Resources

- Ensure that all drinking water resources and supply systems are safely managed and protected with community involvement
- Develop district level drinking water availability plans for urban and rural areas to ensure improved planning for equitable access

Drinking Water Supply

- Enhance the coverage of safely managed drinking water supply in the province to achieve the Sustainable Development Goals (SDGs) targets
- Develop criteria for installation of new nutrition-sensitive safely managed drinking water supply schemes and ensure that all new schemes are rationalised and constructed through need based criteria so that all areas and communities are served
- Develop standardised service delivery models for both nutrition-sensitive safely managed urban and rural drinking water supply schemes to improve efficiency, improve monitoring and sustainability
- Develop and promote cost effective and appropriate technological options for nutrition-sensitive safely managed drinking water supply systems
- Aim for a minimum per capita requirement of 50 litres (11 gallons) per day in urban and rural areas for domestic purposes, and 25 litres (5.5 gallons) per day for communal points in rural areas
- Develop mechanisms for reuse, recycle and recharge of wastewater for other municipal and productive uses

Drinking Water Quality

- Ensure that all drinking water supply systems are designed and constructed in line with the national drinking water quality standards
- Ensure compliance of all municipal discharges with National Environment Quality Standards (NEQS)

- Install water treatment plants at existing drinking water supply schemes where required and incorporate water treatment facilities in all new drinking water supply schemes
- Ensure development of water safety plans for all drinking water supply systems
- Develop and sustain regular drinking water quality monitoring and surveillance, and institute mechanisms for remedial action

Sanitation and Solid Waste

- Eradicate Open Defecation from Sindh Province
- Ensure that households in Sindh have access to and use safely managed nutrition-sensitive sanitation services and facilities
- Strengthen and implement liquid waste management with sewer lanes and covered/improved drains
- Create and develop safe wastewater treatment mechanisms
- Implement integrated solid waste management

Health and Hygiene

- Increase public awareness about water borne and water-related diseases and their implications to health and nutrition, and enhance the role of communities for household water treatment/storage, water safety and conservation, and safe hygiene and improved nutrition practices
- Institute behaviour change so that households wash hands with soap at critical times

Education

- Introduce curricular change to incorporate health, hygiene and nutrition-sensitive improved water and sanitation practices among school children

Sector Efficiency

- Update the status of non functional drinking water supply schemes and rehabilitate those that are 'fit for repair' and can be operationalised on priority basis
- Develop an inventory of ageing infrastructure and prioritise replacement of old and dilapidated drinking water supply systems in a phased manner
- Institute reforms in the drinking water supply sector to improve governance and accountability, enhance professional management, introduce performance measurement, and strengthen monitoring and cost recovery mechanisms

Sector Capacity

- Enhance capacities of line departments, NGOs and communities at all levels to improve planning, implementation and monitoring of drinking water supply projects and institute sustainable O&M of drinking water supply systems

Sector Financing

- Periodically revise the water tariff according to ground realities and ensure its timely collection
- Introduce mandatory water metering in all new schemes and upgrade water metering in existing schemes in a phased manner
- Promote public-private-partnerships to enhance access to safe drinking water and sanitation and sustainable operation & maintenance of water supply systems
- Allocate and utilise at least 10% of the ADP towards water and sanitation

Sector Coordination

- Conduct mapping and stakeholder analysis to determine the sector state and non-state actors, and formulate coordination and reporting mechanisms for drinking water at provincial, district, taluka and village level cognisant of urban and rural implications
- Pursue multi/inter-sectoral collaboration to maximise the impacts of drinking water supply interventions

Sector Monitoring

- Develop the modus operandi for monitoring and clarify information pathways for collection, reporting, synthesis and dissemination of drinking water supply and sanitation data for improved planning, monitoring and evaluation, and execution
- Develop and ensure a viable support mechanism for effective O&M of both urban and rural drinking water supply and sanitation schemes

Institutional Arrangements

- Clarify the roles and responsibilities of various government agencies and other stakeholders in the drinking water sector and reduce fragmentation of services
- Ensure involvement of communities in identifying, planning, designing, construction, monitoring and O&M of drinking water supply and sanitation schemes for sustainability
- Promote research and development in collaboration with academia to enhance the access, effectiveness and sustainability of drinking water supply and sanitation interventions

Climate Change and Disaster Risk Reduction

- Institute adaptation measures and disaster risk reduction and mitigation strategies to minimise the impact of climatic events and disasters on drinking water supply and sanitation systems

Strategic Objectives/Outcomes and Actions

Legislations, Regulations, Policies and Strategies			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Finalisation of drafted policies and their implementation	Approval of Draft Drinking Water Policy, Revised Draft Sanitation Policy, and Draft Behaviour Change Communication Strategy and their implementation		
Sindh Local Government Act 2013 provisions for WASH operationalised	Conduct a review of the SLGA and develop Rules of Business for LG&HTPD and PHE&RDD. Seek amendment in SLGA 2013 to clearly indicate role of PHE&RDD in rural water supply and sanitation, O&M, and provide administrative transfer of staff and funds		
Municipal water governed by a legal framework	Enactment and promulgation of the Sindh Municipal Water Act (draft)	City and Town master plans developed and incorporate zone-wise development of water supply, sewerage and drainage, and solid waste management	Industrial wastewater management regulations put into effect in industrial zones and curbs to stop pollution enforced
Sindh Water Commission performs its functions as a regulatory body	Establishment of the Sindh Water Commission	Tariff structure revised Minimum service delivery standards established for municipal services (water supply, sanitation, solid waste management) Ensure that each local government has a master plan on water, sanitation and solid waste management for its area of jurisdiction At least 25% local governments achieve minimum service delivery standards for municipal services (water, sanitation, solid waste management)	At least 50% local governments achieve minimum service delivery standards for municipal services (water supply, sanitation, solid waste management)
Legislative review to harmonise existing legislation, policies and rules	Legislative review of drinking water acts, policies, regulations and development of harmonised new acts, regulations and guidelines,	Periodic review of new legislations, policies and regulations and their implications for WASH	Periodic review of new legislations, policies and regulations and their implications for WASH

	including O&M Introduce legislative change in SLGA 2014 for PHE&RDD to be responsible for O&M of water and sewerage and drainage schemes, and transfer resources and manpower to PHE&RDD for their proper maintenance Legislative review of sanitation, sewerage and drainage acts, policies, regulations and development of harmonised new acts, regulations and guidelines, including O&M		
Sectoral operating procedures (design guidelines) for planning and management developed	Development of Standard Operating Procedures (design guidelines) for water planning, management and O&M for PHE&RDD Development of Standard Operating Procedures (design guidelines) for wastewater and solid waste planning, management and O&M for LG&HTPD		
Operational guidelines for CBOs for water and sanitation developed	Development of guidelines for CBOs for project management and O&M of water supply schemes Development of guidelines for CBOs for project management and O&M for sanitation, sewerage and drainage schemes		
Municipal services duty bearers have necessary managerial and leadership skills for an integrated, safely managed and nutrition-sensitive water supply, sewerage and drainage, and solid waste management programme	Orientation and capacity building programme of 2 big cities, 119 town and 1297 union council officials on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive	At least 50% of 2 big cities, 119 town and 1297 union council officials have participated in a capacity building programme on planning for and implementing water supply, sewerage and drainage, and solid waste management that are integrated, safely managed and nutrition-sensitive	At least 90% of 2 big cities, 119 town and 1297 union council officials have participated in a capacity building programme on planning for and implementing water supply, sewerage and drainage, and solid waste management that are integrated, safely managed and nutrition-sensitive

Water Resources			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Improved water resource utilisation through efficient project design and execution	P&DD to issue the following Advisories/Circulars: All future reservoirs – basic design will have outlets for drinking water depending on storage capacity Gravity flow lines are used where feasible Every embankment must have provision for pipe outlet for drinking water There must be water storage provision in design for outlet in times of calamity – all field engineers would need to comply and ensure that a drinking water supply component was part of their projects and ensure that a share for drinking water is allocated It is mandatory to include GIS mapping for every drinking water supply project Every new drinking water supply scheme must have an outlet for distribution to local schools and health facilities - All new PHE&RDD Water Supply schemes must ensure that they provide an extension water pipe to the nearby school with its water tank		
District profiles developed for water resource management and development	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (5 districts in short-term) and upgradation	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (10 districts in medium-term) and upgradation	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (14 districts in long-term) and upgradation

	Manchar Lake should be preserved RBOD development should be completed on priority basis		Develop an integrated water resources management policy and implementation framework
District level preparedness for safety of water and sanitation systems and disaster risk reduction enhanced	Map out all UCs with risk associated with disasters and safety of water and sanitation systems (5 districts) Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (5 districts in short term) for duty bearers Ensure water quality focus of embankments	Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (10 districts in medium term) for duty bearers Build capacities at town and UC level for planning for safety of water and sanitation systems and disaster risk reduction at district level (60 towns and 500 UCs) Ensure water quality focus of embankments	Conduct planning for safety of water and sanitation systems and disaster risk reduction at district level (14 districts in long term) for duty bearers Build capacities at town and UC level planning for safety of water and sanitation systems and disaster risk reduction at district level (59 towns and 797 UCs) Ensure water quality focus of embankments
Sectoral capacity for climate change adaptation and mitigation developed	Sub-sector climate change adaptation and mitigation strategies developed Mapping of towns at risk of effects of climate change	Piloting of climate change adaptation and mitigation in selected towns (to be identified)	Climate change mitigation capacities developed in phased manner in towns located in zones vulnerable to climatic events (to be identified)
Municipal services duty bearers fully conversant with climate change and its mitigation strategies	Need assessment of sub-sector human resources for climate change adaptation and mitigation	Capacity building programme of city, town and union council officials in pilot areas on climate change mitigation strategies	Capacity building programme of city, town and union council officials on climate change mitigation strategies extended to other areas
Rainwater harvesting systems implemented in pilot areas	Rainwater harvesting pilot projects evaluated and plan to extend to other feasible cities developed	In participating pilot areas, rainwater harvesting provides at least 10% of water used for non-domestic municipal services and horticulture	In participating pilot areas, rainwater harvesting provides at least 30% of water used for non-domestic municipal services and horticulture

Water Supply			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
URBAN WATER SUPPLY			
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	At least 100% UCs (797) have completed baseline surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management on need basis Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 797 UCs
Improved and safely managed water supply coverage enhanced to meet access gap	Develop an SOP for all new and existing water supply schemes to provide improved and safely managed drinking water which is: - Accessible: located on premises - Available: available when needed - Safe: free of faecal and priority chemical contamination - Augmented by improved transmission and distribution networks and increased overhead reservoir capacity Plan and implement safely managed water supply schemes to reduce access gap - By 20% in short term - improved availability from 4 hours to 6 hours daily - piped drinking water that is 'fit for drinking; in at least 25% of areas Execution of schemes on	Plan and implement safely managed water supply schemes to reduce access gap - By 50% in medium term - improved availability from 6 hours to 8 hours daily - piped drinking water that is 'fit for drinking; in at least 50% of areas Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves	Plan and implement safely managed water supply schemes to reduce access gap - By 100% in long term - improved availability from 8 hours to 12 hours daily - piped drinking water that is 'fit for drinking; in at least 75% of areas Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves

	cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves		
Water supply schemes in 119 towns upgraded	Storage capacity needs of cities and towns determined Upgrade water supply schemes in 30 towns including extra overhead storage capacity	Upgrade water supply schemes in 40 towns including extra overhead storage capacity	Upgrade water supply schemes in 49 towns including extra overhead storage capacity
RURAL WATER SUPPLY			
Dysfunctional and non-functional schemes rehabilitated and maintained (538 schemes fit for repair plus 200 additional schemes)	Rehabilitate 260 dysfunctional and non-functional water supply schemes	Rehabilitate 278 dysfunctional and non-functional water supply schemes	Rehabilitate 200 newly dysfunctional and non-functional water supply schemes
Ageing water supply schemes infrastructure replaced (50 schemes per year)	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Replace infrastructure of ageing water supply schemes (more than 20 years) – 200 schemes
Energy efficient water supply schemes (600)	Map areas that have persistent power shortage Introduce solar energy supported water supply schemes At least 180 water supply schemes converted to solar energy All new water supply schemes are solar energy compliant where feasible	At least 180 water supply schemes converted to solar energy	At least 240 water supply schemes converted to solar energy
Community awareness about water use, safety, maintenance and preservation enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year
Strengthen community development activities of PHE&RDD for social mobilisation and O&M	Recruit 2 social mobilisers per UC and orient in water issues and maintenance	Maintain 2 social mobilisers per UC and orient in water issues and maintenance	Maintain 2 social mobilisers per UC and orient in water issues and maintenance

(2594 social mobilisers)			

Water Quality			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Quarterly water quality testing at water source	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 25% of tube wells (250)	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 50% of tube wells (500)	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 75% of tube wells (750)
Quarterly quality testing of distribution network	At least 25% coverage of distribution system every quarter (250 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	At least 50% coverage of distribution system every quarter (500 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	At least 75% coverage of distribution system every quarter (750 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department
District level water quality testing laboratories established (29 districts)	Establish water testing laboratory facilities in 5 districts	Establish water testing laboratory facilities in 10 districts	Establish water testing laboratory facilities in 14 districts
All ground and overhead reservoirs supplied with chlorination treatment	Conduct study to determine the status of ground and overhead reservoirs in cities and towns Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 30% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 60% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 90% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination
Community awareness about water quality (including adoption of treatment of safe drinking water in the household) enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level

Sanitation (Sewerage and Drainage)			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
URBAN SANITATION			
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	At least 100% UCs (608) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 608 UCs
Improved and safely managed sanitation services coverage enhanced to reduce access gap in urban areas and rural areas, especially in those that are also nutrition-sensitive	Develop an SOP for all new sanitation schemes to meet criteria for 'safely managed' which include: - not shared with other households - excreta are safely disposed in situ or transported and treated off-site - guidelines for integration in interventions in nutrition-sensitive areas Plan and implement safely managed sanitation schemes to reduce access gap - By 20% in short term - reduce proportion of households connected to open drains from 27% to 24% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Plan and implement safely managed sanitation schemes to reduce access gap - By 50% in medium term - reduce proportion of households connected to open drains from 24% to 20% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Plan and implement safely managed sanitation schemes to reduce access gap - By 100% in long term - reduce proportion of households connected to open drains from 20% to 15% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component

Wastewater treatment plants established in 119 towns (12 per year)	Establish wastewater treatment plants in 36 towns	Establish wastewater treatment plants in 36 towns	Establish wastewater treatment plants in 47 towns
Water supply and sanitation schemes linked with wastewater treatment	At least 25% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	At least 50% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	At least 75% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes
Monitor contamination levels of industrial effluent	LG&HTPD, PHE&RDD, Irrigation department, PCSIR and Sindh Environment Protection Agency map major industrial wastewater flows and conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Hazard and risk GIS mapping of contaminated rivers and water bodies done Conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced
Increased proportion of treated industrial wastewater	Set up Combined Effluent Treatment Plant (CETP) for cluster of industries where feasible Identify industries with high volume of untreated effluent and prioritise for enforcement of regulations	At least 5% of industrial wastewater treated	At least 10% of industrial wastewater treated
Optimal sewage flow capacity maintained	Sewage flows determined for all cities and towns, and six monthly de-silting and cleaning of 30% drains and sewers with safe sludge disposal in towns and zones in cities	Six monthly de-silting and cleaning of 60% drains and sewers with safe sludge disposal in towns and zones in cities	Six monthly de-silting and cleaning of 90% drains and sewers with safe sludge disposal in towns and zones in cities
Optimal status of sewer maintenance equipment (sucking machine, jetting machine, sucking/jetting machine)	Status of equipment availability and functionality determined for each town and city zone At least 30% of towns and city zones equipped with sewer maintenance equipment	At least 60% of towns and city zones equipped with sewer maintenance equipment	At least 90% of towns and city zones equipped with sewer maintenance equipment
Adequate and functional collector and branch sewers	Status of collector and branch sewers in each city and town determined	Phased replacement of 25% non-functional collector and branch	Phased replacement of 50% non-functional collector and branch

	Phased replacement or laying of new lines instituted	sewers or laying of new lines instituted	sewers or laying of new lines instituted
Optimal functionality of pumping stations	Status of pumping stations in each city and town determined Phased rehabilitation plan instituted for at least 30% dysfunctional pumping stations	Phased rehabilitation plan instituted for at least 60% dysfunctional pumping stations	Phased rehabilitation plan instituted for at least 90% dysfunctional pumping stations
Systematic management of Operation and Maintenance of sewerage and drainage systems	Develop O&M manual for sewerage and drainage including sewer desilting safety measures Train LG&HTPD and PHE&RDD staff in use of O&M manual	Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual	Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual
RURAL SANITATION			
Implement rural sanitation scale-up strategy in nutrition and WASH programmes	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (13 priority districts)	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (13 ongoing + 6 other districts)	Ensure provision of small water supply systems, implement PATS Plus Approach, disseminate health and hygiene related key messages on handwashing with soap during critical times and proper use of toilet and water safety practices through educating them on household water treatment options, establish WASH clubs in schools, promote handwashing through provision of handwashing stations, and establish WASH in Health Facilities (19 ongoing + 10 other districts)
Community awareness and social mobilisation regarding sanitation, nutrition and hygiene enhanced in all UCs through effective implementation of BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)
2 Community Resource Persons (preferably one male and one female) deployed for BCC for each UC (2594 Community	Deploy and orient 2594 Community Resource Persons in 1297 UCs	Maintain 2594 Community Resource Persons in 1297 UCs	Maintain 2594 Community Resource Persons in 1297 UCs

Resource Persons)			
Safe sanitation practices promoted in high open defecation zones, nutrition-sensitive and polio priority areas	Develop provincial and district level road maps on PATS/ODF for identified villages in 13 priority districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 13 priority districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 13 priority districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 13 priority districts	Develop provincial and district level road maps on PATS/ODF for identified villages in 6 additional districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 6 additional districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 6 additional districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 6 additional districts	Develop provincial and district level road maps on PATS/ODF for identified villages in 10 additional districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc in 10 additional districts Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component in 10 additional districts Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas, and strengthening the supply side interventions especially sanitation marketing (training of masons, entrepreneurs and small businesses) in 10 additional districts

Solid Waste			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities Conduct waste characterisation studies (including hospital waste) for mega cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs Conduct waste characterisation studies (including hospital waste) for intermediate cities	At least 100% UCs (797) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 797 UCs
Integrated solid waste management implemented in 29 districts (5 in short term, 10 in medium term, and 13 in long term)	Develop integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana)	Develop integrated solid waste management in 10 districts	Develop integrated solid waste management in 14 districts
Town and UC level profiles developed for wastewater and solid waste in 119 towns and 1297 UCs	Conduct a study on wastewater and solid waste in 119 towns to develop town level profiles (including infrastructure, equipment and staffing)	Conduct a study on wastewater and solid waste in 1297 UCs to develop UC level profiles (including infrastructure, equipment and staffing) Periodic updating of town and UC level profiles	Periodic updating of town and UC level profiles
Solid waste collection and disposal	At least 70% of solid waste generated is collected and disposed of per day At least 30 town councils providing door to door collection service Village based solid waste management piloted in selected villages	At least 80% of solid waste generated is collected and disposed of per day At least 60 town councils providing door to door collection service Village based solid waste management scaled up to 10% villages in Sindh	At least 90% of solid waste generated is collected and disposed of per day At least 100 town councils providing door to door collection service Village based solid waste management scaled up to 30% villages in Sindh
Effective solid waste management	Develop a minimum standards list of staffing, hardware and equipment for solid waste	Upgrade the hardware and equipment for solid waste management in 30 town councils (10 per year)	Upgrade the hardware and equipment for solid waste management in 40 town councils (10 per year)

	management and upgrade in 30 town councils (10 per year)		
Efficient Solid waste disposal and recycling	At least 30% town councils have established transfer stations to reduce disposal time Recycle at least 10% of solid waste by systematic separation Sanitary landfill options identified for towns where feasible	At least 60% town councils have established transfer stations to reduce disposal time Recycle at least 15% of solid waste by systematic separation At least 20 towns served by sanitary landfill sites	At least 90% town councils have established transfer stations to reduce disposal time Recycle at least 20% of solid waste by systematic separation At least 40 towns served by sanitary landfill sites
Waste to Energy	Formalise contracts with companies for waste to energy options	At least each mega city has a WTE option in place	At least each intermediate city has a WTE in place
Safe hospital high risk waste disposal	Health department establishes hospital waste management committees in each hospital in line with the Environmental and Medical Waste Management Guidelines Health department in collaboration with LG&HTPD orients each hospital waste management committee on Environmental and Medical Waste Management Guidelines, municipal solid waste and high risk waste and their separate disposal Each mega city and intermediate city has a centralised and functional high risk hospital waste disposal facility At least 50% of hospital high risk waste disposed of safely	Each town has a centralised and functional high risk hospital waste disposal facility At least 60% of hospital high risk waste disposed of safely	At least 90% of hospital high risk waste disposed of safely
Safe and hygienic Slaughterhouses	Update status of all slaughterhouses (recognised and unrecognised) in each district and prioritise those for rehabilitation, solid waste and wastewater management	Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of	Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of

	Develop slaughterhouse safety and hygiene practice guidelines and orient 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 30% of municipal services dispose of slaughterhouse solid waste safely	carcass, entrails, hides, and wastewater At least 60% of municipal services dispose of slaughterhouse solid waste safely	carcass, entrails, hides, and wastewater At least 90% of municipal services dispose of slaughterhouse solid waste safely
Efficient and effective management of Industrial Solid Waste	Determine the current status of industrial solid waste production and disposal	Develop strategies and actions for efficient and effective management of industrial solid waste	

Health, Hygiene and Nutrition			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Fully functional and safely managed water and sanitation services in health facilities DHQs, THQs/CHs, RHCs, CDs, MCHs at communal and facility level For Basic Health Units with missing facilities for water and sanitation (about 20% of BHUs), provide extension of water distribution pipe from water supply scheme, water tank and 2 latrines per BHU	Health Department and PHE&RDD to jointly conduct a situation analysis and update the status of missing facilities for safely managed water and sanitation in all health facilities and develop a Joint Action Plan (JAP) to address these Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 13 priority districts Provide water distribution point to local health facility in all new water supply schemes in 13 priority districts	Provide water distribution point to local health facility in all new water supply schemes Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 6 additional districts	Provide water distribution point to local health facility in all new water supply schemes Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) in 10 additional districts
Hospital Waste Management Rules implemented in 88 hospitals as initial priority.	Implement Hospital Waste Management Rules in 27 hospitals	Implement Hospital Waste Management Rules in additional 27 hospitals	Implement Hospital Waste Management Rules in additional 34 hospitals Hospital Waste Management Rules to be implemented in all health facilities.
Multi-sector nutrition-sensitive WASH programme implemented in nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 3 nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 10 nutritionally deficient districts	Surveillance and consolidation of multi-sector nutrition-sensitive WASH programme implemented in 13 nutritionally deficient districts
Nutrition-sensitive WASH integrated in health promotion in primary health care	Nutrition-sensitive WASH health education module added to curriculum of LHWs/CMWs/LHVs with supporting training material as part of multi-sector nutrition-sensitive WASH interventions Master trainers, district trainers and facility trainers	At least 60% of LHWs/CMWs/LHVs receive refresher training in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department	At least 100% of LHWs/CMWs/LHVs receive refresher training in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department

	oriented in key nutrition-sensitive WASH messages and LHWs/CMWs/LHVs provided training on nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department At least 100% of LHWs/CMWs/LHVs trained in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department		
Nutrition-sensitive WASH integrated in health advocacy and BCC campaigns and health weeks	Nutrition-sensitive WASH component of health promotion and hygiene integrated in mother and child health weeks as part of on-going campaign by health department across the province Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Continue Nutrition-sensitive WASH component of health promotion and hygiene disseminated in mother and child health weeks as part of on-going campaign by health department across the province Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Continue Nutrition-sensitive WASH component of health promotion and hygiene disseminated in mother and child health weeks as part of on-going campaign by health department Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns
IEC materials with key nutrition-sensitive hygiene messages distributed at health facility level	Development of nutrition-sensitive IEC materials for primary, secondary and tertiary health facilities; CBOs and faith based facilities Availability at and dissemination of IEC materials for 50% primary, secondary and tertiary health facilities; CBOs and faith based facilities	Availability at and dissemination of nutrition-sensitive IEC materials for 75% primary, secondary and tertiary health facilities; CBOs and faith based facilities	Availability at and dissemination of nutrition-sensitive IEC materials for 100% primary, secondary and tertiary health facilities; CBOs and faith based facilities
WASH services at health facilities monitored regularly by Health Department	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders

Education			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Nutrition-sensitive WASH integrated in teacher training programme	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board and incorporate nutrition-sensitive WASH hygiene promotion in pre-service and in-service teacher training programme and CPD training of teacher educators Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme
Nutrition-sensitive WASH integrated in schools' curriculum	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board for inclusion of topics on nutrition-sensitive water, sanitation and hygiene in curriculum for classes 1 to 12 WASH in Schools policy guidelines developed to ensure operation and maintenance of WASH infrastructure in schools Implement WASH in Schools policy guidelines in 30% schools	Implement WASH in Schools policy guidelines in additional 30% schools	Implement WASH in Schools policy guidelines in 100% schools
Menstrual hygiene management integrated in health and hygiene for girls	Nutrition-sensitive WASH hygiene promotion module incorporates menstrual hygiene management for girls Impart menstrual hygiene management education in nutrition-sensitive WASH	Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 50% of girls middle and high schools as part of on-going school health education and WinS	Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 75% of girls middle and high schools as part of on-going school health education and WinS

	hygiene promotion to at least 25% of girls middle and high schools as part of on-going school health education and WinS		
100% of schools with missing facilities have safely managed drinking water and latrines (extension of water distribution pipe from water supply scheme, water tank and 2 latrines per school) in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** More than 68% of primary, 76% of middle and 91% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in at least 10% schools **Sanitation** More than 71% of primary, 82% of middle and 97% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** More than 89% of primary, 92% of middle and 97% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in 10% ongoing and 20% additional schools **Sanitation** More than 90% of primary, 94% of middle and 99% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022	**Water Supply** 100% of primary, 100% of middle and 100% of high schools with missing facilities have safely managed drinking water in line with SESP and Sindh WinS strategic plan 2017-2022 Create linkages with PCRWR and PHE&RDD for water quality testing and reporting in 30% ongoing and 30% additional schools **Sanitation** 100% of primary, 100% of middle and 100% of high schools with missing facilities have safely managed latrines and include proper design of wastewater in schools in line with SESP and Sindh WinS strategic plan 2017-2022

Sector Efficiency and Capacity			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Reduced systems leakages of Non Revenue Water and Unaccounted for Water	Map out points of system leakages area by area and take remedial measures for Distribution Network Improvements (DNI) Reduce NRW losses from 60% to 30% in Karachi Reduce NRW and UAW to 20% or less Outsource at least 25% of revenue collection	Reduce NRW and UAW to 20% or less in Karachi and other cities of Sindh	Reduce NRW and UAW to 10% or less in Karachi and other cities of Sindh
Increased household water metering	Introduce water metering in phases All new connections to be metered At least 100% of high income areas have metering in place All commercial and business premises have water metering	At least 10% of medium income areas have metering in place	At least 20% of medium income areas have metering in place
Efficient Billing and Collection	Collection period reduced to less than 30 days Billing efficiency increased to 50% Financial collection efficiency increased to 50% Outsource billing and collection	Collection period reduced to less than 15 days Billing efficiency increased to 75% Financial collection efficiency increased to 75%	Collection period maintained at less than 15 days Billing efficiency increased to 90% and above Financial collection efficiency increased to 90% and above
A functional Biometric tracking system in all cities and towns	All mega cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 50% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 30% of towns have	At least 75% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 60% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles	At least 90% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles

	an installed and functional biometric tracking system for staff, equipment/vehicles		
Human Resource Development for the sub-sectors	Conduct a human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors and develop a human resource development plan Strengthen infrastructure and training capacities at Local Government Training Institutes		
Technical training / workshops conducted for town level Local Government staff	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year
Capacities developed of CBOs and civil society in solid waste management (LG&HTPD)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)
Technical training / workshops conducted for district PHED staff	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year
Capacities developed of CBOs and civil society in O&M of water supply schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)

Sector Financing			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Sectoral budgeting and expenditure reporting stratified separately for each sub-sector (environment, water supply, sewerage and drainage)	Conduct a financial budgeting and expenditure review of sectoral budgets and expenditures and stratify actual sub-sector spends against sub-sector budgets for last five years Introduce sub-sector expenditure reporting separately for environment, water supply, sewerage and drainage, and solid waste	At least 70% of districts and talukas report sub-sectoral spending by stratified reporting procedure	At least 90% of districts and talukas report sub-sectoral spending by stratified reporting procedure
Increased Own Source Revenue (OSR) in sub-sectors by Town Councils	Incentivise by providing matching grants to Town Councils related to sub-sector OSR At least 30% of Town Councils increase their baseline sub-sector OSR by 100% or more	At least 60% of Town Councils increase their baseline sub-sector OSR by 200% or more	At least 75% of Town Councils increase their baseline sub-sector OSR by 300% or more
Increased regulated private sector participation in sub-sectors	Incentivise private sector with subsidies to provide water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment in selected areas and city and town zones Determine type of contract arrangement and ensure regulatory mechanism in place	At least 30% or more of coverage of municipal services in mega cities provided by private sector At least 20% or more of coverage of municipal services in intermediate cities provided by private sector At least 10% or more of coverage of municipal services in Towns provided by private sector	At least 50% or more of coverage of municipal services in mega cities provided by private sector At least 30% or more of coverage of municipal services in intermediate cities provided by private sector At least 20% or more of coverage of municipal services in Towns provided by private sector
Increased development expenditure allocation to and spending by sub-sectors and prioritised by equity and need	Allocate 8% of ADP allocation to the sector and prioritise by equity and need Increase proportionate ADP allocation for ongoing schemes from 69% to 75% and correspondingly reduce ADP allocation to new schemes from 31% to 25%	Allocate 9% of ADP allocation to the sector and prioritise by equity and need Increase proportionate ADP allocation for ongoing schemes from 75% to 80% and correspondingly reduce ADP allocation to new schemes from 25% to 20%	Allocate 10% of ADP allocation to the sector and prioritise by equity and need Maintain proportionate ADP allocation for ongoing schemes at 80% and corresponding ADP allocation to new schemes at 20%

	40% of sector development allocation requirement and release achieved	50% of sector development allocation requirement and release achieved	60% of sector development allocation requirement and release achieved

Sector Coordination			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Provincial level coordination and programme management for WASH streamlined and enhanced	ACS Development P&DD notifies broadened scope of Multi-Sectoral Nutrition Steering Committee to encompass WASH ACS Development P&DD notifies Sector Coordination and Monitoring Unit for WASH as part of Nutrition Unit Establish a Sector Coordination and Monitoring Unit in Nutrition Unit Equip and furnish the SCMU Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee Establish a Design Cell in LG&HTPD and PHE&RDD	Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee	Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee
District level coordination and programme management for WASH streamlined and enhanced	DC Offices notify District WASH Committees Quarterly review of WASH schemes and activities in meetings of District WASH Committees ACS Development P&DD notifies District Coordination and Monitoring Unit for WASH under DC Office Establish and operationalise DCMU	Quarterly review of WASH schemes and activities in meetings of District WASH Committees	Quarterly review of WASH schemes and activities in meetings of District WASH Committees

Sector Monitoring			
Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Long Term Actions 7 - 10 years
Monitoring and reporting mechanism developed for water and sanitation schemes	Reporting templates for water supply and sanitation schemes developed and tested; Reporting pathway established from UC to district to provincial level District LG&HTPD and PHE&RDD staff trained in its use	Annual WASH progress reports produced	Annual WASH progress reports produced
Improved infrastructure for monitoring and reporting established for water supply schemes	Establish 29 district monitoring units based at DC Office – 1 per district Procure computers and accessories for MIS – 5 sets per district for water supply schemes. Develop computerised MIS for water supply schemes – 29 districts	Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application	Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application
Improved infrastructure for monitoring and reporting established for sanitation, sewerage and drainage schemes	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes. Develop computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application	Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application
Monitoring and reporting capacity enhanced for water and sanitation	Recruit and deploy a 29 District M&E Managers based at DC Office – 1 District M&E Manager per district Recruit and deploy 58 Water and Sanitation Reporting Officers – 2 per district based at DC Office Recruit and deploy 29 drivers – 1 driver per district based at DC Office	Maintain District M&E Managers, Water and Sanitation Reporting Officers and Drivers	Maintain District M&E Managers, Water and Sanitation Reporting Officers and Drivers
Travel for monitoring and reporting facilitated	Procure 29 vehicles for monitoring and reporting – 1 vehicle per district based at DC Office	Maintain vehicles	Maintain vehicles

Implementation Plan

Short and Medium Term Implementation Plan up to 2022

Goal 1: Improved implementation of legislative and policy framework for water and sanitation

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Finalisation of drafted policies and their implementation	Approval of Draft Drinking Water Policy, Revised Draft Sanitation Policy	Non Cost Activity		LG&HTPD PHE&RDD	P&DD	2016-2019
Sindh Local Government Act 2013 provisions for WASH operationalised	Develop Rules of Business for SLGA for LG&HTPD and PHE&RDD	5,000,000		LG&HTPD PHE&RDD	P&DD	2016-2019
Municipal water governed by a legal framework	Enactment and promulgation of the Sindh Municipal Water Act	Non Cost Activity		LG&HTPD	P&DD	2016-2019
Sindh Water Commission performs its functions as a regulatory body	Establishment of the Sindh Water Commission	Non Cost Activity		LG&HTPD PHE&RDD	P&DD	2016-2019
Legislative review to harmonise existing legislation, policies and rules	Legislative review of drinking water and sanitation acts, policies, regulations and development of harmonised new acts, regulations and guidelines, including O&M	20,000,000		LG&HTPD PHE&RDD	P&DD	2016-2019
Sectoral operating procedures (design guidelines) for planning and management developed	Development of Standard Operating Procedures (design guidelines) for planning, management and O&M	10,000,000		LG&HTPD PHE&RDD	P&DD	2016-2019
Operational guidelines for CBOs for water and sanitation developed	Development of guidelines for CBOs for project management and O&M of water supply and sanitation schemes	2,000,000		LG&HTPD PHE&RDD	P&DD	2016-2019
Municipal services duty	Orientation and capacity	5,000,000	5,000,000	LG&HTPD	Development Partners	2016-2026

bearers have necessary managerial and leadership skills for an integrated, safely managed and nutrition-sensitive water supply, sewerage and drainage, and solid waste management programme	building programme of 2 big cities, 119 town and 1297 union council officials on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive					

Goal 2: Improved and efficient use of water resources

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Improved water resource utilisation through efficient project design and execution	P&DD to issue Advisories/Circulars	Non Cost Activity		P&DD	LG&HTPD PHE&RDD	2016-2019
District profiles developed for water resource management and development	Conduct a study on water resource management and development in each district (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	25,000,000	50,000,000	P&DD	LG&HTPD PHE&RDD	2016-2026
District level preparedness for water safety and disaster risk reduction enhanced	Water safety planning at district level including disaster risk reduction (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	10,000,000	20,000,000	PHE&RDD	Development Partners	2016-2026
Sectoral capacity for climate change adaptation and mitigation developed	Sub-sector climate change adaptation and mitigation strategies developed with piloting in selected districts	10,000,000	15,000,000	PHE&RDD LG&HTPD	P&DD Development Partners	2016-2026
Municipal services duty bearers fully conversant with climate change and its mitigation strategies	Need assessment and capacity building programme of city, town and union council officials in pilot areas on climate change mitigation strategies	5,000,000	5,000,000	LG&HTPD PHE&RDD	P&DD Development Partners	2016-2026
Pilot rainwater harvesting schemes	Evaluate existing rainwater schemes and scale up piloting to other areas	To be determined	To be determined	To be determined	To be determined	2016-2026

Goal 3: Universal access to improved and safely managed drinking water supply

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management **(common to water supply, sanitation and solid waste)**	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	To be determined	To be determined	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026
Improved and safely managed water supply coverage enhanced to meet access gap	Develop an SOP for all new and existing water supply schemes to provide improved and safely managed drinking water Plan and implement safely managed water supply schemes to reduce access gap	132,465,000,000	198,697,000,000	PHE&RDD LG&HTPD	Urban Unit	2016-2026
Dysfunctional and non-functional schemes rehabilitated and maintained (538 schemes fit for repair plus 200 additional schemes)	Rehabilitate 74 non-functional water supply schemes per year (total 538 schemes plus additional 200 schemes in long term)	222,000,000	222,000,000	PHE&RDD LG&HTPD	Development Partners	2016-2026
Ageing water supply schemes infrastructure	Replace ageing water supply schemes (50	750,000,000	750,000,000	PHE&RDD LG&HTPD	Urban Unit	2016-2026

replaced (50 schemes per year)	schemes per year)					
Water supply schemes in 119 towns upgraded	Upgrade 119 township schemes (12 per year) including extra overhead storage capacity	3,600,000,000	3,600,000,000	PHE&RDD LG&HTPD	Urban Unit	2016-2026
Energy efficient water supply schemes (600)	Water supply schemes converted to solar energy (60 units per year)	900,000,000	900,000,000	PHE&RDD LG&HTPD	Urban Unit	2016-2026
Community awareness about water use, safety, maintenance and preservation enhanced in all districts through an effective BCC strategy	Community awareness, leaflets, billboards for water use	87,000,000	87,000,000	PHE&RDD LG&HTPD	Development Partners	2016-2026
Strengthen community development activities of PHE&RDD for social mobilisation and O&M (2594 social mobilisers)	Recruitment and deployment of 2594 Social Mobilisers – 2 per UC	5,603,040,000	5,603,040,000	PHE&RDD	Development Partners	2016-2026

Goal 4: Availability of water safe for drinking

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Periodic water quality testing at water source	Conduct monthly water quality tests of town water supplies and filtration plants, and quarterly testing at tube wells	Non Cost Activity	Non Cost Activity	PHE&RDD	PCRWR	2016-2026
Periodic water quality testing of distribution network	Periodic monitoring of water quality in rivers and streams in collaboration with Irrigation department	Non Cost Activity	Non Cost Activity	PHE&RDD	Irrigation Department	2016-2026
District level water quality testing laboratories established (29 districts)	Establish water testing laboratory facilities in 29 districts	100,000,000	200,000,000	PHE&RDD	PCRWR	2016-2026
All ground and overhead reservoirs supplied with chlorination treatment	Conduct study to determine the status of ground and overhead reservoirs in cities and towns	10,000,000	10,000,000	PHE&RDD	LG&HTPD	2016-2022
	Scheduled six monthly cleaning and maintenance of all reservoirs	Non Cost Activity	Non Cost Activity	PHE&RDD		2016-2026
	Installation of chlorinators in 30% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	As part of O&M and include in new schemes	As part of O&M and include in new schemes	PHE&RDD		2016-2026
Community awareness about water quality	Conduct community awareness sessions,	As part of overall BCC strategy	As part of overall BCC strategy	PHE&RDD		2016-2026

(including adoption of treatment of safe drinking water in the household) enhanced in all districts through an effective BCC strategy	including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297)					

Goal 5: Universal access to safely managed sanitation (sewerage and drainage) services

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management **(common to water supply, sanitation and solid waste)**	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	To be determined	To be determined	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026
Improved and safely managed sanitation services coverage enhanced to reduce access gap in urban areas and rural areas, especially in those that are also nutrition-sensitive	Develop an SOP for all new and existing sanitation (sewerage and drainage) schemes to ensure that they are safely managed Plan and implement safely managed sanitation (sewerage and drainage) schemes to reduce access gap	125,336,000,000	188,004,000,000	LG&HTPD PHE&RDD	Urban Unit	2016-2026
Wastewater treatment plants established in 119 towns (12 per year)	Establish wastewater treatment plants in 119 towns (12 per year)	540,000,000	540,000,000	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026
Water supply and sanitation schemes linked with wastewater treatment	New schemes have in-built wastewater treatment facility Incorporate wastewater	As part of new schemes	As part of new schemes	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026

	treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes					
Monitor contamination levels of industrial effluent	Map major industrial wastewater flows and conduct periodic wastewater testing and public reporting of industrial effluent quality Conduct periodic wastewater testing and public reporting of industrial effluent quality	Non cost activity	Non cost activity	PCRWR PCSIR Sindh Environment Protection Agency	LG&HTPD PHE&RDD Irrigation Department Industries	2016-2026
Increased proportion of treated industrial wastewater	Set up Combined Effluent Treatment Plant (CETP) for cluster of industries where feasible	To be determined	To be determined	LG&HTPD PHE&RDD	P&DD Urban Unit Industries Sindh Environment Protection Agency	2016-2026
Optimal sewage flow capacity maintained	Sewage flows determined for all cities and towns, and six monthly de-silting and cleaning of 30% drains and sewers with safe sludge disposal in towns and zones in cities	To be determined	To be determined	LG&HTPD	Sindh Environment Protection Agency	2016-2026
Optimal status of sewer maintenance equipment (sucking machine, jetting machine, sucking/jetting machine)	Status of equipment availability and functionality determined for each town and city zone Towns and city zones equipped with sewer maintenance equipment	To be determined	To be determined	LG&HTPD		2016-2026
Adequate and functional	Status of collector and	To be determined	To be determined	LG&HTPD		2016-2026

collector and branch sewers	branch sewers in each city and town determined Phased replacement or laying of new lines instituted					
Optimal functionality of pumping stations	Status of pumping stations in each city and town determined Phased rehabilitation plan instituted for dysfunctional pumping stations	To be determined	To be determined	LG&HTPD		2016-2026
Systematic management of Operation and Maintenance of sewerage and drainage systems	Develop O&M manual for sewerage and drainage including sewer desilting safety measures Train LG&HTPD and PHE&RDD staff in use of O&M manual	As part of capacity building	As part of capacity building	LG&HTPD	Development Partners	2016-2026
Community awareness and social mobilisation regarding sanitation, nutrition and hygiene enhanced in all UCs through effective implementation of BCC strategy	Community awareness, leaflets, billboards for safe sanitation and hygiene (1297 UCs in 29 districts)	87,000,000	87,000,000	LG&HTPD	Development Partners	2016-2026
2 Community Resource Persons (preferably one male and one female) deployed for BCC for each UC (2594 Community Resource Persons)	Recruitment of 2594 Social Mobilisers – 2 per UC	5,603,040	5,603,040	LG&HTPD	Development Partners	2016-2026
Safe sanitation practices promoted in high open defecation zones,	Develop provincial and district level road maps on PATS/ODF for	As part of ongoing and new schemes and Saaf Suthro Sindh	As part of ongoing and new schemes and Saaf Suthro Sindh	LG&HTPD	Development Partners	2016-2026

nutrition-sensitive and polio priority areas	identified villages in 13 priority districts Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas					

Goal 6: Improved, efficient and safe management of solid waste

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management **(common to water supply, sanitation and solid waste)**	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities Conduct waste characterisation studies (including hospital waste) for mega and intermediate cities	To be determined	To be determined	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026
Integrated solid waste management implemented in 29 districts (5 in short term, 10 in medium term, and 13 in long term)	Develop integrated solid waste management in 29 districts	To be determined	To be determined	LG&HTPD PHE&RDD	P&DD Urban Unit	2016-2026
Town and UC level profiles developed for wastewater and solid waste in 119 towns and 1297 UCs	Study to develop profile on wastewater and solid waste in 119 towns and 1297 UCs (5 districts in short term, 10 districts in medium term, and 14 districts in long term)	25,000,000	50,000,000	LG&HTPD	Urban Unit	2016-2026
Solid waste collection	At least 90% of solid	As part of solid waste	As part of solid waste	LG&HTPD	Urban Unit	2016-2026

and disposal	waste generated is collected and disposed of per day At least 100 town councils providing door to door collection service Village based solid waste management scaled up to 30% villages in Sindh	management programmes	management programmes			
Effective solid waste management	Develop a minimum standards list of staffing, hardware and equipment for solid waste management and upgrade in town councils	To be determined	To be determined	LG&HTPD	Urban Unit	2016-2026
Efficient Solid waste disposal and recycling	Town councils establish transfer stations to reduce disposal time Recycle proportion of solid waste by systematic separation Sanitary landfill options identified for towns where feasible	To be determined	To be determined	LG&HTPD	Urban Unit	2016-2026
Waste to Energy	Formalise contracts with companies for waste to energy options At least each mega city has a WTE option in place At least each intermediate city has a WTE in place	To be determined	To be determined	P&DD LG&HTPD	Urban Unit	2016-2026
Safe hospital high risk waste disposal	Health department establishes hospital waste management	Non cost activity	Non cost activity	Health Department	LG&HTPD	2016-2026

	committees in each hospital in line with the Environmental and Medical Waste Management Guidelines Health department in collaboration with LG&HTPD orients each hospital waste management committee on Environmental and Medical Waste Management Guidelines, municipal solid waste and high risk waste and their separate disposal Each mega city and intermediate city has a centralised and functional high risk hospital waste disposal facility Hospital high risk waste disposed of safely Each town has a centralised and functional high risk hospital waste disposal facility					
Safe and hygienic Slaughterhouses	Update status of all slaughterhouses (recognised and unrecognised) in each district and prioritise those for rehabilitation, solid waste and wastewater management	15,000,000	5,000,000	LG&HTPD		

	Develop slaughterhouse safety and hygiene practice guidelines and orient 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater					
Efficient and effective management of Industrial Solid Waste	Determine the current status of industrial solid waste production and disposal Develop strategies and actions for efficient and effective management of industrial solid waste		10,000,000	LG&HTPD	Urban Unit Industries	2019-2022

Goal 7: Improved health, hygiene and nutrition

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Fully functional water and sanitation services in health facilities DHQs, THQs/CHs, RHCs, CDs, MCHs at communal and facility level **For Basic Health Units with missing facilities for water and sanitation (about 20% of BHUs), provide extension of water distribution pipe from water supply scheme, water tank and 2 latrines per BHU**	Health Department and PHE&RDD to jointly conduct a situation analysis and update the status of missing facilities for water and sanitation in all health facilities and develop a Joint Action Plan (JAP) to address these Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes) in targeted health facilities based on Joint Action Plan (JAP) Provide water distribution point to local health facility in all new water supply schemes	57,100,000		PHE&RDD Health Department	LG&HTPD	2016-2019
Hospital Waste Management Rules implemented in 88 hospitals as initial priority.	Implement Hospital Waste Management Rules in 88 hospitals	540,000,000	540,000,000	LG&HTPD Health Department		2016-2026
Multi-sector nutrition-sensitive WASH programme implemented in nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in nutritionally deficient districts	As part of Nutrition Support Programme and Saaf Suthro Sindh	As part of Nutrition Support Programme and Saaf Suthro Sindh	LG&HTPD Health Department	Development Partners	2016-2026
Nutrition-sensitive WASH integrated in health promotion in	Nutrition-sensitive WASH health education module added to curriculum of					

primary health care	LHWs/CMWs/LHVs with supporting training material as part of multi-sector nutrition-sensitive WASH interventions Master trainers, district trainers and facility trainers oriented in key nutrition-sensitive WASH messages and LHWs/CMWs/LHVs provided training on nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department At least 100% of LHWs/CMWs/LHVs trained in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department					
Nutrition-sensitive WASH integrated in health advocacy and BCC campaigns and health weeks	Nutrition-sensitive WASH component of health promotion and hygiene integrated in mother and child health weeks as part of on-going campaign by health department Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health	2,000,000		LG&HTPD Health Department	Development Partners	2016-2019

	campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns					
IEC materials with key nutrition-sensitive hygiene messages distributed at health facility level	Development of nutrition-sensitive IEC materials for primary, secondary and tertiary health facilities Availability at and dissemination of IEC materials for primary, secondary and tertiary health facilities	5,000,000	1,000,000	LG&HTPD Health Department	Development Partners	2016-2026
WASH services at health facilities monitored regularly by Health Department	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Non cost activity	Non cost activity	Health Department		2016-2026

Goal 8: Improved school WASH

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Nutrition-sensitive WASH integrated in teacher training programme	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board and incorporate nutrition-sensitive WASH hygiene promotion in pre-service and in-service teacher training programme and CPD training of teacher educators Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Non cost activity	Non cost activity	LG&HTPD Education and Literacy Department	PHE&RDD Development Partners	2016-2026
Nutrition-sensitive WASH integrated in schools curriculum	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board for inclusion of topics on nutrition-sensitive water, sanitation and hygiene in curriculum for classes 1 to 12	Non cost activity	Non cost activity	LG&HTPD Education and Literacy Department	PHE&RDD Development Partners	2016-2026
Menstrual hygiene management integrated	Nutrition-sensitive WASH hygiene promotion	Non cost activity	Non cost activity	LG&HTPD Education and Literacy	PHE&RDD Development Partners	2016-2026

in health and hygiene for girls	module incorporates menstrual hygiene management for girls Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to girls middle and high schools as part of on-going school health education			Department		
100% of schools with missing facilities have safely managed drinking water and latrines (30% in short term, 30% in medium term, 40% in long term) (extension of water distribution pipe from water supply scheme, water tank and 2 latrines per school)	Schools with missing facilities addressed and have safely managed drinking water and latrines	1,948,455,000	1,948,455,000	LG&HTPD Education and Literacy Department	PHE&RDD Development Partners	2016-2026

Goal 9: Sectoral capacities enhanced for improved efficiency

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Reduced systems leakages of Non Revenue Water and Unaccounted for Water	Map out points of system leakages area by area and take remedial measures for Distribution Network Improvements (DNI) Reduce NRW and UAW to 20% or less Outsource at least 25% of revenue collection	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026
Increased household water metering	Introduce water metering in phases All new connections to be metered High and medium income areas have metering in place All commercial and business premises have water metering	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026
Efficient Billing and Collection	Collection period reduced Billing efficiency increased Financial collection efficiency increased Outsource billing and collection	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026
A functional Biometric tracking system in all	All mega cities have an installed and functional	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026

cities and towns	biometric tracking system for staff, equipment/vehicles Intermediate cities and towns have an installed and functional biometric tracking system for staff, equipment/vehicles in phases					
Human Resource Development for the sub-sectors	Conduct a human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors and develop a human resource development plan Strengthen infrastructure and training capacities at Local Government Training Institutes	10,000,000 To be determined		LG&HTPD PHE&RDD	Development Partners	2016-2019
Technical training / workshops conducted for town level Local Government staff	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	435,000,000	435,000,000	LG&HTPD	Development Partners	2016-2026
Capacities developed of CBOs and civil society in solid waste management (LG&HTPD)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per year)	435,000,000	435,000,000	LG&HTPD	Development Partners	2016-2026
Technical training /	Conduct 145 technical	435,000,000	435,000,000	PHE&RDD	Development Partners	2016-2026

workshops conducted for district PHED staff	training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year					
Capacities developed of CBOs and civil society in O&M of water supply schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	435,000,000	435,000,000	PHE&RDD	Development Partners	2016-2026

Goal 10: Improved sectoral financing

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Sectoral budgeting and expenditure reporting stratified separately for each sub-sector (environment, water supply, sewerage and drainage)	Conduct a financial budgeting and expenditure review of sectoral budgets and expenditures and stratify actual sub-sector spends against sub-sector budgets for last five years Introduce sub-sector expenditure reporting separately for environment, water supply, sewerage and drainage, and solid waste	10,000,000		LG&HTPD PHE&RDD	Development Partners	2016-2019
Increased Own Source Revenue (OSR) in sub-sectors by Town Councils	Incentivise by providing matching grants to Town Councils related to sub-sector OSR At least 30% of Town Councils increase their baseline sub-sector OSR by 100% or more	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026
Increased regulated private sector participation in sub-sectors	Incentivise private sector with subsidies to provide water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment in selected areas and city and town zones	To be determined	To be determined	LG&HTPD PHE&RDD	Development Partners	2016-2026

	Determine type of contract arrangement and ensure regulatory mechanism in place					
Increased development expenditure allocation to and spending by sub-sectors	Allocate 8% of ADP allocation to the sector Increase proportionate ADP allocation for ongoing schemes from 69% to 75% and correspondingly reduce ADP allocation to new schemes from 31% to 25% Increase sector development allocation requirement and release	To be determined	To be determined	LG&HTPD PHE&RDD		2016-2026

Goal 11: Improved sectoral coordination and planning

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Provincial level coordination and programme management for WASH streamlined and enhanced	ACS Development P&DD notifies Sector Coordination and Monitoring Unit for WASH Establish, equip and maintain a Sector Coordination and Monitoring Unit in P&DD Quarterly review meetings of Steering Committee and Departmental Technical Committees Establish a Design Cell in LG&HTPD and PHE&RDD	Non cost activity 116,000,000 Non cost activity To be determined	114,000,000	P&DD	LG&HTPD PHE&RDD Development Partners	2016-2026
District level coordination and programme management for WASH streamlined and enhanced	DC Offices notify district WASH committees Quarterly review of WASH schemes and activities in meetings of District WASH Committees ACS Development P&DD notifies District Coordination and Monitoring Unit for WASH	Non cost activity	Non cost activity	LG&HTPD PHE&RDD	Development Partners	2016-2026

Goal 12: Improved sectoral monitoring

Strategic Outcome/Objective	Actions	Indicative costs – Short Term	Indicative costs – Medium Term	Lead Responsibility	Collaborating Agencies	Time Frame
Monitoring and reporting mechanism developed for water and sanitation schemes	Reporting templates for water supply and sanitation schemes developed and tested; Reporting pathway established from UC to district to provincial level District LG&HTPD and PHE&RDD staff trained in its use Establish 29 district coordination and monitoring units based at DC Office – 1 per district	208,800,000	208,800,000	P&DD	LG&HTPD PHE&RDD Development Partners	2016-2026
Improved infrastructure for monitoring and reporting established for water supply schemes	Procure computers and accessories for MIS – 5 sets per district for water supply schemes. Develop computerised MIS for water supply schemes – 29 districts	18,125,000		PHE&RDD	Development Partners	2016-2019
Improved infrastructure for monitoring and reporting established for sanitation, sewerage and drainage schemes	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes. Develop computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	18,125,000		LG&HTPD	Development Partners	2016-2019
Monitoring and reporting capacity enhanced for water and sanitation	Recruit and deploy a 29 District M&E Managers based at DC Office – 1 District M&E Manager per district	250,560,000	250,560,000	P&DD	LG&HTPD PHE&RDD Development Partners	2016-2026

	Recruit and deploy 58 Water and Sanitation Reporting Officers – 2 per district based at DC Office Recruit and deploy 29 drivers – 1 driver per district based at DC Office					
Travel for monitoring and reporting facilitated	Procure 29 vehicles for monitoring and reporting – 1 vehicle per district based at DC Office	124,700,000	52,200,000	P&DD	LG&HTPD PHE&RDD Development Partners	2016-2026

Plan of Activities

Legislations, Regulations, Policies and Strategies

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Finalisation of drafted policies and their implementation	Approval of Draft Drinking Water Policy, Revised Draft Sanitation Policy, and Draft Behaviour Change Communication Strategy and their implementation		Submitting the polices/strategy to cabinet Approval of polices/strategy from cabinet Implementation of polices/strategy	Feb 2017 June 2017 June 2017 and onward
Sindh Local Government Act 2013 provisions for WASH operationalised	Conduct a review of the SLGA and develop Rules of Business for LG&HTPD and PHE&RDD		Review of SLGA by technical experts Stakeholder consultation Workshops Draft Rules of Business for LG&HTPD and PHE&RDD Final Rules with incorporating feedback on draft rules	March 2017 April-Sep 2017 Oct 2017 Dec 2017
Municipal water governed by a legal framework	Enactment and promulgation of the Sindh Municipal Water Act (draft)	City and Town master plans developed and incorporate zone-wise development of water supply, sewerage and drainage, and solid waste management	Engaging sector partners for preparation of Sindh Municipal Water Act Drafting Sindh Municipal Water Act by LG&HTPD Review of draft Act by Law Department Enactment and promulgation of the Sindh Municipal Water Act	Jan-June 2017 June-Sep 2017 Oct 2017- March 2018 June 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Engaging donors and private sector support for development of City and Town master plans	Jan-June 2019
			Deploying technical experts	July 2019
			Stakeholder consultation at City and Town level	Aug 2019-March 2020
			Drafting master plans incorporating zone-wise development of water supply, sewerage and drainage, and solid waste management	April-June 2020
			Review of draft master plans	July-Sep 2020
			Final master plans with incorporating feedback	Oct-Dec 2020
Sindh Water Commission performs its functions as a regulatory body	Establishment of the Sindh Water Commission	Tariff structure revised Minimum service delivery standards established for municipal services (water supply, sanitation, solid waste management) Ensure that each local government has a master plan on water, sanitation and solid waste management for its area of jurisdiction At least 25% local governments achieve	Notification for establishment of Sindh Water Commission	Jan-Feb 2017
			Allocation of human and other resources for SWC	March-Aug 2017
			Establishment of the Sindh Water Commission (SWC)	Sep 2017
			Revision of Tariff structure by SWC	Oct-Dec 2017
			Development of minimum service delivery standards by SWC	Jan-June 2018
			Collaborating with city/town governments for ensuring development of master plans	Jan 2019-Dec 2020

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
		minimum service delivery standards for municipal services (water, sanitation, solid waste management)	Monitoring of services of city/town governments against minimum service delivery standards	Jan 2021 to onward
Legislative review to harmonise existing legislation, policies and rules	Legislative review of drinking water acts, policies, regulations and development of harmonised new acts, regulations and guidelines, including O&M Introduce legislative change in SLGA 2013 for PHE&RDD to be responsible for O&M of water and sewerage and drainage schemes	Periodic review of new legislations, policies and regulations and their implications for WASH	Identification of technical experts Review of drinking water acts, policies, regulations through consultation process Development of harmonised new acts, regulations and guidelines, including O&M by consultant (draft) Approval of new acts, regulations and guidelines, including O&M by cabinet Revision of SLGA 2013 for PHE&RDD to be responsible for O&M of water and sewerage and drainage schemes	Jan-March 2017 April-June 2017 July-Dec 2017 Jan-June 2018 July-Dec 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	Legislative review of sanitation, sewerage and drainage acts, policies, regulations and development of harmonised new acts, regulations and guidelines, including O&M		Periodic review of new legislations, policies and regulations and their implications for WASH after every two years by technical experts and sector stakeholders	Dec 2020 Dec 2022
Sectoral operating procedures (design guidelines) for planning and management developed	Development of Standard Operating Procedures (design guidelines) for water planning, management and O&M for PHE&RDD Development of Standard Operating Procedures (design guidelines) for wastewater and solid waste planning, management and O&M for LG&HTPD		Deployment of Team Stakeholder consultation Development of draft Standard Operating Procedures (design guidelines) for planning, management and O&M by consultant; Review of developed SOPs by PHE&RDD , LG&HTPD and P&DD Incorporating Feedback in final SOPs Approval of SOPs by departments	Jan-March 2017 April-June 2017 July-Oct 2017 Nov-Dec 2017 Jan-March 2018 April-June 2018
Operational guidelines for CBOs for water and sanitation developed	Development of guidelines for CBOs for project management and O&M of water supply schemes Development of guidelines for CBOs for project management and O&M for		Advertising Request for proposal Selection of technical team Development of draft guidelines for project management and O&M of water supply schemes, sanitation, sewerage and drainage	Jan 2017 Feb 2017 March-June 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	sanitation, sewerage and drainage schemes		schemes Incorporating feedback in draft guidelines Approval of guidelines	 Sep-Oct 2017 Dec 2017
Municipal services duty bearers have necessary managerial and leadership skills for an integrated, safely managed and nutrition-sensitive water supply, sewerage and drainage, and solid waste management programme	Orientation and capacity building programme of 2 big cities, 119 town and 1297 union council officials on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive	At least 50% of 2 big cities, 119 town and 1297 union council officials have participated in a capacity building programme on planning for and implementing water supply, sewerage and drainage, and solid waste management that are integrated, safely managed and nutrition-sensitive	Identification of technical team Development of training modules on application of regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive Review of training modules Finalization of training modules with incorporating feedback	Jan-Feb 2017 March-Dec 2017 Jan-June 2018 July-Dec 2018
			Identification of Training Team Training of Trainers Conducting Trainings/ orientation workshops on regulations, policies and strategies in planning, development and delivery of municipal services that are integrated, safely managed and nutrition-sensitive by Master Trainers Ensuring 50% of 2 big cities, 119 town and 1297 union council officials participate in training programme	Jan-March 2019 April-June 2020 June 2020-June 2021

Water Resources

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Improved water resource utilisation through efficient project design and execution	P&DD to issue the following Advisories/Circulars: All future reservoirs – basic design will have outlets for drinking water depending on storage capacity Gravity flow lines are used where feasible Every embankment must have provision for pipe outlet for drinking water There must be water storage provision in design for outlet in times of calamity – all field engineers would need to comply and ensure that a drinking water supply component was part of their projects and ensure that a share for drinking water is allocated It is mandatory to include GIS mapping for every drinking water supply		Issuing of following advisories/circulars by Pⅅ All future reservoirs – basic design will have outlets for drinking water depending on storage capacity Gravity flow lines are used where feasible Every embankment must have provision for pipe outlet for drinking water There must be water storage provision in design for outlet in times of calamity – all field engineers would need to comply and ensure that a drinking water supply component was part of their projects and ensure that a share for drinking water is allocated It is mandatory to include GIS mapping for every drinking water supply project Every new drinking water supply scheme must have an outlet for distribution to local schools and health facilities - All new PHE&RDD Water Supply schemes must ensure that they provide an extension water pipe to the nearby school with its water tank	Jan-March 2017

	project Every new drinking water supply scheme must have an outlet for distribution to local schools and health facilities - All new PHE&RDD Water Supply schemes must ensure that they provide an extension water pipe to the nearby school with its water tank			
District profiles developed for water resource management and development	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (5 districts in short-term)	Conduct a study on water resource management and development in each district and map available water resources with potential for domestic and municipal use (10 districts in medium-term)	Development of ToRs for Study Reviewing the study design developed by technical team Finalizing the study design Data collection on water resource management and development in each district and mapping available water resources with potential for domestic and municipal use in 5 districts Data analysis and report writing by technical team Review of draft report Final Report of 5 districts by incorporating feedback	March 2017 April 2017 May-June 2017 July-Sep 2017 Oct-Nov 2017 Dec 2017 Jan-Feb 2018
			Replication of study in other 10 districts	Jan 2020-Feb 2021

District level preparedness for water safety and disaster risk reduction enhanced		Conduct water safety planning at district level including disaster risk reduction (10 districts in medium term) for duty bearers Build capacities at town and UC level for water safety planning and disaster risk reduction (60 towns and 500 UCs)	Recruitment of technical experts Development of study design Data collection for mapping out UCs at risk of disaster and poor quality water; Conducting water safety planning at district level including DRR in other 5 districts	Jan-March 2017 March-2017 April-June 2017 July-Sep 2017
			Conducting water safety planning at district level including DRR in other 10 districts Developing training material for Town and UC staff Training of Trainers Training of Town and UC staff on water safety planning and disaster risk reduction (60 towns and 500 UCs) by Master Trainers	Jan-June 2020 July-Sep 2020 Oct-Dec 2020 Jan-June 2021
Sectoral capacity for climate change adaptation and mitigation developed	Sub-sector climate change adaptation and mitigation strategies developed Mapping of towns at risk of effects of climate change	Piloting of climate change adaptation and mitigation in selected towns (to be identified)	Developing ToRs for strategy Stakeholder consultation Draft climate change adaptation and mitigation strategies Approval of climate change adaptation and mitigation strategies Study on Mapping of towns at risk of effects of climate change by consultants	Jan-Feb 2017 March-Sep 2017 Oct-Dec 2017 Jan-March 2018 April-Dec 2018

			Developing PC I for identified towns to pilot of climate change adaptation and mitigation projects Implementation of project; Review/Evaluation of project to assess lesson learnt/replication of project	April-June 2020 July 2020-June 2022 July 2022
Municipal services duty bearers fully conversant with climate change and its mitigation strategies	Need assessment of sub-sector human resources for climate change adaptation and mitigation	Capacity building programme of city, town and union council officials in pilot areas on climate change mitigation strategies	Developing ToRs for consultant; Finalizing study tools and design Training Need Assessment of sub-sector human resources for climate change adaptation and mitigation;	March-April 2019 May-June 2019 July-Dec 2019
			Development of training module on climate change adaptation and mitigation Training of Trainers Conducting training of city, town and union council officials in pilot areas on climate change mitigation strategies by Master Trainers	Jan-March 2020 April-June 2020 July-Dec 2020
Rainwater harvesting systems implemented in pilot areas	Rainwater harvesting pilot projects evaluated and plan to extend to other feasible cities developed	In participating pilot areas, rainwater harvesting provides at least 10% of water used for non-domestic municipal services and horticulture	Third Party evaluation of rainwater harvest pilot projects for replication of these projects;	Jan-March 2019
			Developing proposal for rainwater harvesting projects based on recommendation of evaluation report Mobilizing resources Implementation of project in participating pilot areas, rainwater harvesting provides at least 10% of water used for non-domestic	April-June 2019 July-Aug 2019 Sep 2019-June 2022

			municipal services and horticulture	

Water Supply

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	Deployment of Technical Experts; Development of software by Technical Experts; Survey for GIS mapping; Developing GIS maps for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management; Developing action plans for 500 UC on integrated water supply, water safety, sanitation, storm water drainage and solid waste management based on city GIS maps	Jan-March 2017 April-June 2017 July2017-June 2018 July 2018- June 2019 July 2020-June 2021
Improved and safely managed water supply coverage enhanced to meet access gap	Develop an SOP for all new and existing water supply schemes to provide improved and safely managed drinking water which is: Accessible: located on premises Available: available when needed Safe: free of faecal and priority chemical contamination Augmented by improved	Plan and implement safely managed water supply schemes to reduce access gap By 50% in medium term improved availability from 6 hours to 8 hours daily piped drinking water that is 'fit for drinking; in at least 50% of areas Execution of schemes on cost sharing basis i.e. Community invests in	Developing SoPs for all new and existing water supply schemes to provide improved and safely managed drinking water; Developing PC I of water supply schemes in 25% of areas for improved availability from 4 hours to 6 hours daily Allocating resources for water supply schemes Execution of water supply schemes project on component sharing basis i.e. Community invests in maintenance and internal component, while Government invests for	Jan-March 2017 April-June 2017 July-Aug 2017 Sep 2017-June 2019

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	transmission and distribution networks and increased overhead reservoir capacity Plan and implement safely managed water supply schemes to reduce access gap By 20% in short term improved availability from 4 hours to 6 hours daily piped drinking water that is 'fit for drinking; in at least 25% of areas Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves	maintenance and internal component, while Government invests for external component Install water flow monitors at tube wells; also introduce flow monitors at valves	external component Installation of water flow monitors at tube wells and valves level	Sep 2017-June 2019
			Developing PC I of water supply schemes in other 50% of areas for improved availability from 6 hours to 8 hours daily Allocation of resources Execution of water supply schemes project on component sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component Installation of water flow monitors at tube wells and valves level	April-June 2019 July-Aug 2019 Sep 2019-June 2022 Sep 2019-June 2022
Dysfunctional and non-functional schemes rehabilitated and maintained (538 schemes fit for repair plus 200 additional schemes)	Rehabilitate 260 dysfunctional and non-functional water supply schemes	Rehabilitate 278 dysfunctional and non-functional water supply schemes	Developing Proposal for rehabilitation of 260 dysfunctional and non-functional water supply schemes; Mobilizing resources for rehabilitation of	April-June 2017 July-Aug 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			schemes Rehabilitation of 260 dysfunctional and non-functional water supply schemes;	Sep 2017-June 2019
			Developing proposal for rehabilitation of 278 dysfunctional and non-functional water supply schemes Mobilizing resources for rehabilitation of schemes Rehabilitation of 278 dysfunctional and non-functional water supply schemes;	April-June 2019 July-Aug 2019 Sep 2019-June 2022
Ageing water supply schemes infrastructure replaced (50 schemes per year)	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Replace infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	Designing replacement of infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes Resource mobilization for replacement of infrastructure Replacing infrastructure of ageing water supply schemes (more than 20 years) – 150 schemes	April-June 2017 July-Aug 2017 Sep 2017-June 2019
			Reviewing the performance of short term action Designing replacement of infrastructure of ageing water supply schemes (more than 20 years) – other 150 schemes Resource mobilization for replacement of infrastructure	April-June 2019 April-June 2019 July-Aug 2019

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Replacing infrastructure of ageing water supply schemes (more than 20 years) – other 150 schemes	Sep 2019-June 2022
Water supply schemes in 119 towns upgraded	Storage capacity needs of cities and towns determined Upgrade water supply schemes in 30 towns including extra overhead storage capacity	Upgrade water supply schemes in 40 towns including extra overhead storage capacity	Storage capacity need assessment in all cities and towns; Developing PC I for upgrading water supply schemes in 30 towns including extra overhead storage capacity Allocating resources for work execution Upgrading water supply schemes in 30 towns including extra overhead storage capacity	Jan-March 2017 April-June 2017 July-Aug 2017 Sep 2017-June 2019
			Reviewing the performance of short term action Developing PC I for upgrading water supply schemes in other 40 towns including extra overhead storage capacity Allocating resources for work execution Upgrading water supply schemes in other 40 towns including extra overhead storage capacity	April-June 2019 April-June 2019 July-Aug 2019 Sep 2019-June 2022
Energy efficient water supply schemes (600)	Map areas that have persistent power shortage Introduce solar energy supported water supply schemes At least 180 water supply	At least 180 water supply schemes converted to solar energy	Map areas that have persistent power shortage Developing designs and proposal for installation of solar energy panels for water supply schemes; Converting 180 water supply schemes	Jan-March 2017 April-June 2017 June 2017-June 2019

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	schemes converted to solar energy All new water supply schemes are solar energy compliant where feasible		converted to solar energy in areas of persistent power shortage Circulating guidelines for designing all new water supply schemes, solar energy compliant where feasible;	Jan-March 2017
			Reviewing the performance of short term action Developing designs and proposal for installation of solar energy panels for water supply schemes; Converting other 180 water supply schemes converted to solar energy in areas of persistent power shortage	April-June 2019 April-June 2019 Sep 2019-June 2022
Community awareness about water use, safety, maintenance and preservation enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each district every year	District WASH Ranking Selection of Low ranked districts for community awareness programme Developing PC I for community awareness programme on WASH; Developing material for community awareness sessions, including women and children Formulate key messages for community awareness programme Designing billboards, leaflets and other IEC material for community awareness	Jan-Feb 2017 March 2017 April-June 2017 July-Sep 2017 July-Sep 2017 Oct-Dec 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Training of Trainers Training of Social Mobilizers by Master Trainers Conducting community awareness sessions, including women and children, and disseminate billboards, leaflets and other IEC material- in each district every year	Jan-March 2018 March-June 2018 July 2018-June 2019
Strengthen community development activities of PHE&RDD for social mobilisation and O&M (2594 social mobilisers)	Recruit 2 social mobilisers per UC and orient in water issues and maintenance	Maintain 2 social mobilisers per UC and orient in water issues and maintenance	Recruiting 2 social mobilisers per UC Orientation of social mobilizers in water issues and maintenance; Managing 2 social mobilisers per UC and orient in water issues and maintenance; Monitoring and reporting of social mobilisers	Jan-March 2018 April-June 2018 July 2018-June 2019 July 2018-June 2019

Water Quality

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Quarterly water quality testing at water source	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 25% of tube wells (250)	PHE&RDD conducts monthly water quality tests of town water supplies and filtration plants, and quarterly testing of at least 50% of tube wells (500)	Circulating guidelines for monthly water quality tests of town water supplies and filtration plants, and quarterly testing of tube wells to all district and sub-district offices of PHE&RDD	Jan-March 2017
			Conducting monthly water quality tests of town water supplies and filtration plants, and quarterly testing of by PHE&RDD	April 2017-Dec 2019
			Central data management of water quality and ensuring that quarterly testing of at least 25% of tube wells (250) done regularly	April 2017-Dec 2019
			Conducting monthly water quality tests of town water supplies and filtration plants, and quarterly testing of by PHE&RDD	Jan 2020-Dec 2022
			Central data management of water quality and ensuring that quarterly testing of at least 50% of tube wells (500) done regularly	Jan 2020-Dec 2022
Quarterly quality testing of distribution network	At least 25% coverage of distribution system every quarter (250 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	At least 50% coverage of distribution system every quarter (500 tube wells) Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department	Circulating guidelines for Quarterly water testing of coverage of distribution system;	Jan-March 2017
			Quarterly water testing of 25% coverage of distribution system every quarter (250 tube wells);	April 2017-Dec 2019
			Central database management and reporting	April 2017-Dec 2019
			Annual monitoring of water quality in rivers	2017, 2018, 2019

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			and streams in collaboration with Irrigation department;	
			Quarterly water testing of at least 50% coverage of distribution system every quarter (500 tube wells); Central database management and reporting Annual monitoring of water quality in rivers and streams in collaboration with Irrigation department;	Jan 2020-Dec 2022 Jan 2020-Dec 2022 2017, 2018, 2019
District level water quality testing laboratories established (29 districts)	Establish water testing laboratory facilities in 5 districts	Establish water testing laboratory facilities in 10 districts	Developing PCI for establishment of water testing laboratory facilities in 5 districts; Resource mobilization Recruitment of human resource and procurement of tools/equipment Establishment of water testing laboratory in 5 districts	April-June 2017 July-Aug 2017 Sep 2017-April 2018 May-June 2018
			Developing PCI for establishment of water testing laboratory facilities in other 10 districts; Resource mobilization Recruitment of human resource and procurement of tools/equipment	April-June 2019 July-Aug 2019 Sep 2019-April 2020

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Establishment of water testing laboratory in other 10 districts	May-June 2020
All ground and overhead reservoirs supplied with chlorination treatment	Conduct study to determine the status of ground and overhead reservoirs in cities and towns Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 30% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Scheduled six monthly cleaning and maintenance of all reservoirs Installation of chlorinators in 60% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Developing ToRs for study to determine the status of ground and overhead reservoirs in cities and towns Recruitment of Technical Experts; Conducting study to determine the status of ground and overhead reservoirs in cities and towns Schedule six monthly cleaning and maintenance of all reservoirs as per identified needs in study; Developing proposal for Installation of chlorinators in 30% of reservoirs; Installation of chlorinators in 30% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and safety for chlorination	Jan-March 2017 April 2017 May-Sep 2017 Oct 2017 and onward April-June 2017 July 2017-June 2019
			Six monthly cleaning and maintenance of all reservoirs as per identified needs in study; Developing PC I for Installation of chlorinators in 60% of reservoirs; Installation of chlorinators in 60% of reservoirs (or tube wells where storage capacity does not exist) and issue and orient users in standard operating procedure and	Jan 2020 and onward April-June 2019 July 2019-June 2021

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			safety for chlorination	
Community awareness about water quality (including adoption of treatment of safe drinking water in the household) enhanced in all districts through an effective BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy for water quality by using billboards and leaflets in each UC every year (1297) Promote use of low cost portable water quality testing and monitoring at village level	District WASH Ranking Selection of Low ranked districts for community awareness programme Developing PC I for community awareness programme on WASH; Developing material for community awareness sessions, including women and children Formulate key messages for community awareness programme Designing billboards, leaflets and other IEC material for community awareness Training of Trainers Training of Social Mobilizers by Master Trainers Conducting community awareness sessions,	Jan-Feb 2017 March 2017 April-June 2017 July-Sep 2017 July-Sep 2017 Oct-Dec 2017 Jan-March 2018 March-June 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			including women and children, and disseminate billboards, leaflets and other IEC material- in each district every year	July 2018 and onward

Sanitation (Sewerage and Drainage)

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs	Deployment of Technical Experts; Development of software by Technical Experts; Survey for GIS mapping; Developing GIS maps for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management; Developing action plans for 500 UC on integrated water supply, water safety, sanitation, storm water drainage and solid waste management based on city GIS maps	Jan-March 2017 April-June 2017 July2017-June 2018 July 2018- June 2019 July 2020-June 2021
Improved and safely managed sanitation services coverage enhanced to reduce access gap in urban areas and rural areas, especially in those that are also nutrition-sensitive	Develop an SOP for all new sanitation schemes to meet criteria for 'safely managed' which include: not shared with other households excreta are safely disposed in situ or transported and treated off-site guidelines for integration	Plan and implement safely managed sanitation schemes to reduce access gap By 50% in medium term reduce proportion of households connected to open drains from 24% to 20%	Developing SOP for all new sanitation schemes to meet criteria for 'safely managed' which include: not shared with other households excreta are safely disposed in situ or transported and treated off-site guidelines for integration in interventions in nutrition-sensitive areas Disseminating the SoPs to all district and sub-district offices	Jan-March 2017 April-May 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	in interventions in nutrition-sensitive areas Plan and implement safely managed sanitation schemes to reduce access gap By 20% in short term reduce proportion of households connected to open drains from 27% to 24% Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Execution of schemes on cost sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	Developing PC I for safely managed sanitation schemes to reduce access gap by 50% reduce proportion of households connected to open drains Allocation of resources for safely managed sanitation schemes Execution of sewerage schemes on component sharing basis i.e. Community invests in maintenance and internal component, while Government invests for external component	April-June 2019 July-Aug 2019 Sep 2019-April 2020
Wastewater treatment plants established in 119 towns (12 per year)	Establish wastewater treatment plants in 36 towns	Establish wastewater treatment plants in 36 towns	Designing wastewater treatment plant in 12 towns every year Installation of wastewater treatment plant in 12 towns every year O&M of installed wastewater treatment plant	April-June 2017 July 2017-June 2022 Jan 2018-Dec 2022

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Water supply and sanitation schemes linked with wastewater treatment	At least 25% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	At least 50% of new schemes have in-built wastewater treatment facility Incorporate wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	Developing guidelines for new schemes have in-built wastewater treatment facility Disseminating guidelines to all district and sub-district offices Monitoring the execution of guidelines for new schemes and ensuring at least 25% of new schemes have in-built wastewater treatment facility Introducing wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	Jan-March 2017 April-May 2017 June 2017 and onward July 2017-June 2019
			Monitoring the execution of guidelines for new schemes and ensuring at least 50% of new schemes have in-built wastewater treatment facility Incorporating wastewater treatment options (like oxidation ponds, wetlands, sewerage treatment units, community septic tanks) in rural sanitation schemes	Jan 2020 and onward July 2019-June 2022

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Monitor contamination levels of industrial effluent	LG&HTPD, PHE&RDD, Irrigation department, PCSIR and Sindh Environment Protection Agency map major industrial wastewater flows and conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Hazard and risk GIS mapping of contaminated rivers and water bodies done Conduct periodic wastewater testing and public reporting of industrial effluent quality Environment protection regulations enforced	Devising a collaboration mechanism between LG&HTPD, PHE&RDD, Irrigation department, PCSIR and Sindh Environment Protection Agency for mapping major industrial effluent quality; Mapping major industrial wastewater flows Conducting periodic wastewater testing and public reporting of industrial effluent quality Enforcement of Environment protection regulations	Jan-March 2017 April-June 2017 Quarterly June 2017 and onward July 2017 and onward
			Hazard and risk GIS mapping of contaminated rivers and water bodies done Conducting periodic wastewater testing and public reporting of industrial effluent quality Enforcement of Environment protection regulations	Jan-Dec 2020 Quarterly July 2017 and onward
Increased proportion of treated industrial wastewater	Set up Combined Effluent Treatment Plant (CETP) for cluster of industries where feasible Identify industries with high volume of untreated effluent and prioritise for enforcement of regulations	At least 5% of industrial wastewater treated	Feasibility study of installation of Combined Effluent Treatment Plant (CETP) for cluster of industries Installation of Combined Effluent Treatment Plant (CETP) for cluster of industries at feasible places Identification of industries with high volume of untreated effluent and prioritise for enforcement of regulations	April-June 2017 July 2017-June 2019 June 2017 and onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Monitoring the enforcement of regulations and ensuring at least 5% of industrial wastewater treated	Jan 2017 and onward
Optimal sewage flow capacity maintained	Sewage flows determined for all cities and towns, and six monthly de-silting and cleaning of 30% drains and sewers with safe sludge disposal in towns and zones in cities	Six monthly de-silting and cleaning of 60% drains and sewers with safe sludge disposal in towns and zones in cities	Designing a study for determining sewage flow of all cities and towns Data collection and identification of high flow towns and zones in cities Review of draft report and finalizing report six monthly de-silting and cleaning of 30% drains and sewers with safe sludge disposal in identified high flow towns and zones in cities,	April-June 2017 July-Sep 2017 Oct-Dec 2017 Jan 2018 and onward
			Six monthly de-silting and cleaning of 60% drains and sewers with safe sludge disposal in identified high flow towns and zones in cities	Jan 2020 and onward
Optimal status of sewer maintenance equipment (sucking machine, jetting machine, sucking/jetting machine)	Status of equipment availability and functionality determined for each town and city zone At least 30% of towns and city zones equipped with sewer maintenance equipment	At least 60% of towns and city zones equipped with sewer maintenance equipment	Development of questionnaire for mapping of sewer equipment Data collection for status of equipment availability and functionality determined for each town and city zone Identification of the needs of equipment Allocation of resources for equipment support Equipment support to at least 30% of towns and city zones for sewer maintenance equipment	Jan 2017 Feb-April 2017 May-June 2017 July-Aug 2017 Sep 2017-June 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Review the progress of short term action Allocation of resources for equipment support to 60% of towns and city zones Equipment support to at least 60% of towns and city zones for sewer maintenance equipment	April-May 2019 June-July 2019 Aug 2019-June 2020
Adequate and functional collector and branch sewers	Status of collector and branch sewers in each city and town determined Phased replacement or laying of new lines instituted	Phased replacement of 25% non-functional collector and branch sewers or laying of new lines instituted	Map out status of collector and branch sewers in each city and town Developing guidelines for phased replacement or laying of new lines Disseminating guidelines phased replacement or laying of new lines adopted as SoPs for sewer designs	Jan-June 2017 June-July 2017 Aug-Sep 2017
			Developing proposal and designing of phased replacement of non-functional collector and branch sewers Resource allocation Execution work for phased replacement of 25% non-functional collector and branch sewers or laying of new lines	April-June 2018 July-Aug 2018 Sep 2018 and onward
Optimal functionality of pumping stations	Status of pumping stations in each city and town determined Phased rehabilitation plan instituted for at least 30% dysfunctional pumping stations	Phased rehabilitation plan instituted for at least 60% dysfunctional pumping stations	Designing templates for information collection on status of pumping stations in each city and town Data collection and analysis Status report furnishing all necessary	Jan-March 2017 April-May 2017 June-Sep 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			information Developing phased rehabilitation plan for at least 30% dysfunctional pumping stations Rehabilitation plan of at least 30% dysfunctional pumping stations	Sep 2017 July 2018-June 2019
			Developing phased rehabilitation plan of other 60% dysfunctional pumping stations Rehabilitation plan of other 60% dysfunctional pumping stations	April-June 2019 July 2019-June 2021
Systematic management of Operation and Maintenance of sewerage and drainage systems	Develop O&M manual for sewerage and drainage including sewer desilting safety measures Train LG&HTPD and PHE&RDD staff in use of O&M manual	Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual	Identification of key challenges in O&M of sewerage and drainage Developing O&M manual for sewerage and drainage including sewer desilting safety measures addressing the identified challenges Pre-testing the manual in field Training of LG&HTPD and PHE&RDD staff in use of O&M manual	July-Aug 2017 Sep-Dec 2017 Jan-Feb 2018 March-June 2018
			Refresher training to LG&HTPD and PHE&RDD staff on use of O&M manual	Jan-March 2020
Community awareness and social mobilisation regarding sanitation, nutrition and hygiene enhanced in all UCs through effective implementation of BCC strategy	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	Conduct community awareness sessions, including women and children, and disseminate key messages developed under BCC strategy by using billboards and leaflets in each UC every year (1297 UCs)	District WASH Ranking Selection of Low ranked districts for community awareness programme Developing PC I for community awareness programme on WASH; Developing material for community	Jan-Feb 2017 March 2017 April-June 2017 July-Sep 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			awareness sessions, including women and children Formulate key messages for community awareness programme Designing billboards, leaflets and other IEC material for community awareness Training of Trainers Training of Community Resource Persons by Master Trainers Conducting community awareness sessions, including women and children, and disseminate billboards, leaflets and other IEC material- in each district every year	 July-Sep 2017 Oct-Dec 2017 Jan-March 2018 March-June 2018 July 2018 and onward
2 Community Resource Persons (preferably one male and one female) deployed for BCC for each UC (2594 Community Resource Persons)	Deploy and orient 2594 Community Resource Persons in 1297 UCs	Maintain 2594 Community Resource Persons in 1297 UCs	Training of 2594 Community Resource Persons in 1297 UCs on sanitation Conducting community awareness session on sanitation by Resource Persons Monitoring and supervision of Resource Persons	March-June 2018 July 2018 and onward July 2018 and onward
Safe sanitation practices promoted in high open defecation zones, nutrition-sensitive and polio priority areas	Develop provincial and district level road maps on PATS/ODF for identified villages in 13 priority districts Incentivising the ODF villages by laying of water	Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc Execution of schemes on cost sharing basis i.e.	Circulating the notification for developing road maps on PATS/ODF for identified villages in 13 priority districts Development of provincial and district level road maps on PATS/ODF for identified villages in 13 priority districts	Jan-Feb 2017 March-June 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	supply scheme, sewerage system, waste water treatment, etc Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas	Community invests in internal component, while Government invests for external component Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive area	Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc	July 2018 and onward
			Incentivising the ODF villages by laying of water supply scheme, sewerage system, waste water treatment, etc Execution of schemes on cost sharing basis i.e. Community invests in internal component, while Government invests for external component Collaborate with international partners and NGOs for integrating WASH component in interventions in nutrition-sensitive areas	Jan 2020 and onward Jan 2020 and onward

Solid Waste

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
All cities, towns and UCs have surveys, strategies and action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management (common to water supply, sanitation and solid waste)	All cities have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for all cities Conduct waste characterisation studies (including hospital waste) for mega cities	At least 50% of UCs (500) have completed surveys, GIS mapping and strategies, and start implementing action plans for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management Develop integrated water supply, water safety, sanitation, storm water drainage and solid waste management action plans for 500 UCs Conduct waste characterisation studies (including hospital waste) for intermediate cities	Deployment of Technical Experts; Development of software by Technical Experts; Survey for GIS mapping; Developing GIS maps for integrated water supply, water safety, sewerage and drainage, storm water drainage and solid waste management; Developing action plans for 500 UC on integrated water supply, water safety, sanitation, storm water drainage and solid waste management based on city GIS maps	Jan-March 2017 April-June 2017 July2017-June 2018 July 2018- June 2019 July 2020-June 2021
			Conduct waste characterisation studies (including hospital waste) for mega cities	July 2017-June 2018
Integrated solid waste management implemented in 29 districts (5 in short term, 10 in medium term, and 13 in long term)	Develop integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana)	Develop integrated solid waste management in 10 districts	Feasibility study for developing integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana) Developing PC I for integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana)	Jan-May 2017 June 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Execution of integrated solid waste management in 5 districts (Karachi, Hyderabad, Shaheed Benazirabad and Larkana)	July 2017-June 2019
			Feasibility study for developing integrated solid waste management in 10 districts Developing PC I for integrated solid waste management in 10 districts Execution of integrated solid waste management in 10 districts	Jan-May 2020 June 2020 July 2020-June 2022
Town and UC level profiles developed for wastewater and solid waste in 119 towns and 1297 UCs	Conduct a study on wastewater and solid waste in 119 towns to develop town level profiles (including infrastructure, equipment and staffing)	Conduct a study on wastewater and solid waste in 1297 UCs to develop UC level profiles (including infrastructure, equipment and staffing) Periodic updating of town and UC level profiles	Developing study guidelines Identification of experts Signing of contacts Field research by experts Draft report on wastewater and solid waste in 119 towns to develop town level profiles (including infrastructure, equipment and staffing) Review of report Final report with incorporating remarks of review	Jan 2017 Feb 2017 March 2017 April-Dec 2017 Jan-March 2018 April-May 2018 June 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Replicating the study in 1297 UCs to develop UC level profiles (including infrastructure, equipment and staffing) Annual updates in town and UC level profiles	Jan 2020-June 2021 July 2018 and onward
Solid waste collection and disposal	At least 70% of solid waste generated is collected and disposed of per day At least 30 town councils providing door to door collection service Village based solid waste management piloted in selected villages	At least 80% of solid waste generated is collected and disposed of per day At least 60 town councils providing door to door collection service Village based solid waste management scaled up to 10% villages in Sindh	Information collection for current status of solid waste collection and disposal Planning the resources to achieve, at least 70% of solid waste generated is collected and disposed of per day and at least 30 town councils providing door to door collection service Designing models for solid waste management at village level Piloting the model in selected villages	Jan-March 2017 April-May 2017 June-July 2017 Aug 2017-June 2019
			Review the progress of short term actions Extending the solid waste management services to 80% generated waste is collected and disposed of per day and at least 60 town councils providing door to door collection service Extending village base solid waste management services up to 10% villages in Sindh	April-June 2019 July 2019-June 2022 July 2019-June 2022
Effective solid waste management	Develop a minimum standards list of staffing, hardware and equipment for solid waste management and upgrade	Upgrade the hardware and equipment for solid waste management in 30 town councils (10 per year)	Develop a minimum standards list of staffing, hardware and equipment for solid waste management	Jan-March 2017 April-May 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	in 30 town councils (10 per year)		Reviewing the existing resources of 30 town councils (10 per year) against minimum standard list and identification of gaps Planning human, hardware and equipment resource to fill the gaps Upgrading the resources in 30 town councils (10 per year)	Jun-July 2017 Aug 2017 –June 2019
			Replicating the exercise for other 30 town councils (10 per year) and upgrading the resources	July 2019-June 2021
Efficient Solid waste disposal and recycling	At least 30% town councils have established transfer stations to reduce disposal time Recycle at least 10% of solid waste by systematic separation Sanitary landfill options identified for towns where feasible	At least 60% town councils have established transfer stations to reduce disposal time Recycle at least 15% of solid waste by systematic separation At least 20 towns served by sanitary landfill sites	Mapping the status of transfer station in town councils Designing transfer stations to reduce disposal time Mobilizing resources Execution work for establishing transfer stations in at least 30% town councils Reviewing the progress and lesson learnt of short term action Extending the transfer stations to 60% town councils	Jan-April 2017 May-June 2017 July-Aug 2017 Sep 2017-June 2019 April-June 2019 July 2019-June 2021
			Research on options systematic separation of solid waste Identification of feasible options for systematic	Jan-March 2017 April-June 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			separation of solid waste Introducing recycling of solid waste by systematic separation for at least 10% solid waste Examining the achievement of short term action Extending the recycling of solid waste by systematic separation for at least 15% solid waste	 July 2017-June 2019 April-June 2019 July 2019-June 2021
			Designing feasibility study for identifying landfill options for towns Deploying human resource for study Feasibility study report finalized Allocating resources for establishing land fill sites at feasible places in 20 towns Establishment of land fill sites at feasible places in 20 towns	Jan-March 2017 April-June 2017 July-Sep 2017 June 2018 July 2018-June 2020
Waste to Energy	Formalise contracts with companies for waste to energy options	At least each mega city has a WTE option in place	Estimating solid waste supplies in mega cities Designing terms of contract for contractors of WTE Tender publication	Jan-June 2017 July-Sep 2017 Oct 2017 Nov-Dec 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Selection of contractors Developing WTE option in each of mega cities by contractors Monitoring and regulation of contractors	Jan-Dec 2018 Jan 2018 to onward
Safe hospital high risk waste disposal	Health department establishes hospital waste management committees in each hospital in line with the Environmental and Medical Waste Management Guidelines Health department in collaboration with LG&HTPD orients each hospital waste management committee on Environmental and Medical Waste Management Guidelines, municipal solid waste and high risk waste and their separate disposal Each mega city and intermediate city has a	Each town has a centralised and functional high risk hospital waste disposal facility At least 60% of hospital high risk waste disposed of safely	Circulating letter to health department by LG&HTPD for formalizing hospital waste management committees in each hospital Facilitating the process of formalizing hospital waste management committees in each hospital in line with the Environmental and Medical Waste Management Guidelines Orientation of hospital waste management committees on Environmental and Medical Waste Management Guidelines, municipal solid waste and high risk waste and their separate disposal Functioning of hospital waste management committees for safe disposal of hospital waste Ensuring the centralised and functional high risk hospital waste disposal facility serving for at least 50% of hospital waste disposal in each mega city and intermediate city	Jan-March 2017 April-July 2017 Aug-Sep 2017 Oct 2017 and onward Nov 2017 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	centralised and functional high risk hospital waste disposal facility At least 50% of hospital high risk waste disposed of safely		Reviewing the progress of short term action Extending the high risk hospital waste disposal facility to town level with at least 60% of hospital waste safely disposal	Jan-March 2020 April 2020 and onward
Safe and hygienic Slaughterhouses	Update status of all slaughterhouses (recognised and unrecognised) in each district and prioritise those for rehabilitation, solid waste and wastewater management Develop slaughterhouse safety and hygiene practice guidelines and orient 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 30% of municipal services dispose of slaughterhouse solid waste safely	Provide refresher training on slaughterhouse safety and hygiene practice guidelines to 100% slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater At least 60% of municipal services dispose of slaughterhouse solid waste safely	Develop questionnaire for profiling of slaughterhouses Circulating questionnaire to district governments for collecting profiles of each slaughterhouse (recognised and unrecognised) Developing central database of slaughterhouses (recognised and unrecognised) Data Analysis for identifying the need of rehabilitation, solid waste and wastewater management Designing rehabilitation, solid waste and wastewater management of prioritized slaughterhouses during data analysis Execution of rehabilitation, solid waste and wastewater management work Developing slaughterhouse safety and hygiene practice guidelines Deployment of human resource for orientation	Jan-Feb 2017 March-June 2017 July-Aug 2017 Sep-Oct 2017 Nov-Dec 2017 Jan-Dec 2018 Nov-Dec 2017 Jan-March 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			of slaughterhouses' staff	April-June 2018
			Orientation of slaughterhouses' staff slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater	
			Reviewing the mechanism of slaughterhouse monitoring and ensuring at least 30% of municipal services dispose of slaughterhouse solid waste safely	July 2018 to Dec 2019
			Refresher training of slaughterhouses' staff slaughterhouse staff in recognised slaughterhouses in safe handling and disposal of carcass, entrails, hides, and wastewater	Jan-April 2019
			Extending the disposal of slaughterhouse solid waste safely to 60%	July 2019-Dec 2022
Efficient and effective management of Industrial Solid Waste	Determine the current status of industrial solid waste production and disposal	Develop strategies and actions for efficient and effective management of industrial solid waste	Identification of various sources of information on industrial solid waste production and disposal	Jan-March 2017
			Information collection and data analysis	April-June 2017
			Recognizing the key issues in industrial solid waste production and disposal	July-Aug 2017
			Stakeholder consultation on key issues	Sep-Dec 2017
			Drafting strategies and actions for efficient and effective management of industrial solid waste	Jan-June 2018
			Implementation of strategies and actions for	July 2018 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			efficient and effective management of industrial solid waste Monitoring progress on strategies and actions	June 2018 to onward

Health, Hygiene and Nutrition

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Fully functional water and sanitation services in health facilities DHQs, THQs/CHs, RHCs, CDs, MCHs at communal and facility level For Basic Health Units with missing facilities for water and sanitation (about 20% of BHUs), provide extension of water distribution pipe from water supply scheme, water tank and 2 latrines per BHU	Health Department and PHE&RDD to jointly conduct a situation analysis and update the status of missing facilities for water and sanitation in all health facilities and develop a Joint Action Plan (JAP) to address these Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) Provide water distribution point to local health facility in all new water supply schemes	Provide water distribution point to local health facility in all new water supply schemes Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP)	Devising mechanism for collaboration of Health Department and PHE&RDD Designing study situation analysis study missing facilities for water and sanitation in health facilities Deployment and training of data collection team Data collection from all health facilities including DHQs, THQs/CHs, RHCs, CDs, MCHs Data analysis and report writing Develop Joint Action Plan (JAP) to address identified gaps in missing facilities for water and sanitation at health facilities Mobilizing resources for implementation of JAP Provision of missing WASH facilities (latrines, hand washing spots, filter tap for drinking water purposes, supply of soap and water treatment technology at health facility) in targeted health facilities based on Joint Action Plan (JAP) Formulating guidelines by PHE&RDD for provision of water distribution point to local	Jan-March 2017 April-June 2017 July-Aug 2017 Sep-Dec 2017 Jan-Feb 2018 March-April 2018 May-June 2018 July 2018-June 2019 May-June 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			health facility in all new water supply schemes Circulating guidelines to all district and sub-district offices	 July 2018
Hospital Waste Management Rules implemented in 88 hospitals as initial priority.	Implement Hospital Waste Management Rules in 27 hospitals	Implement Hospital Waste Management Rules in 27 hospitals	Reviewing the status of Hospital Waste Management Identifying the gaps in Hospital Waste Management Provision of necessary resources for Hospital Waste Management Enforcing Hospital Waste Management Rules in 27 hospitals Formulating a monitoring team for Hospital Waste Management Quarterly review of the progress and troubleshooting	April-May 2017 June 2017 July 2017-June 2018 July 2018 to onward July 2018 Sep 2018 and onward
			Replicating the model in other 27 hospitals Plan for phased implementation of Hospital Waste Management Rules in all health facilities	Jan 2020-Dec 2022
Multi-sector nutrition-sensitive WASH programme implemented in nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 3 nutritionally deficient districts	Multi-sector nutrition-sensitive WASH programme implemented in 10 nutritionally deficient districts	Analysing the available datasets i.e. PDHS, PSLM, MICS and DHIS etc. for identifying the needs of multi-sector nutrition-sensitive WASH programme Designing the programme for multi-sector nutrition-sensitive WASH	Jan-March 2017 April-June 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Allocating resources for programme Establishing PMU for programme implementation in 3 priority districts Programme Implementation Programme Review	July-Aug 2017 Sep-Dec 2017 Jan 2018 to Dec 2019 Dec 2019
			Replicating the programme to other 10 districts	Jan 2020- Dec 2022
Nutrition-sensitive WASH integrated in health promotion in primary health care	Nutrition-sensitive WASH health education module added to curriculum of LHWs/CMWs/LHVs with supporting training material as part of multi-sector nutrition-sensitive WASH interventions Master trainers, district trainers and facility trainers oriented in key nutrition-sensitive WASH messages and LHWs/CMWs/LHVs provided training on nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department At least 100% of	At least 60% of LHWs/CMWs/LHVs receive refresher training in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department	Review of current curriculum of LHWs/CMWs/LHVs Identification of needs of adding education material on Nutrition-sensitive WASH Engaging experts to develop Nutrition-sensitive WASH educational material Material Development by experts Integrating the developed material in curriculum of LHWs/CMWs/LHVs Trainings of master trainers, district trainers and facility trainers on key nutrition-sensitive WASH messages Training of LHWs/CMWs/LHVs on nutrition-sensitive WASH by master trainers, district trainers and facility trainers	Jan-March 2017 April 2017 March-April 2017 May-Sep 2017 Oct-Dec 2017 Jan-June 2018 July-Dec 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	LHWs/CMWs/LHVs trained in nutrition-sensitive WASH health promotion and hygiene as part of on-going training by health department		Refresher Training of LHWs/CMWs/LHVs on nutrition-sensitive WASH	Jan-June 2020
Nutrition-sensitive WASH integrated in health advocacy and BCC campaigns and health weeks	Nutrition-sensitive WASH component of health promotion and hygiene integrated in mother and child health weeks as part of on-going campaign by health department Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Nutrition-sensitive WASH component of health promotion and hygiene disseminated in mother and child health weeks as part of on-going campaign by health department Advocacy and BCC campaign held at health facility, district and provincial levels as part of on-going health campaigns Key messages to advertised in electronic and print media as part of on-going health campaigns	Integration of Nutrition-sensitive WASH component of health promotion and hygiene in mother and child health weeks as part of on-going campaign by health department Developing key messages for advocacy and BCC campaign of Nutrition-sensitive WASH component Advertised key messages in electronic and print media as part of on-going health campaigns	Oct-Dec 2017 Jan-March 2017 April 2018 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
IEC materials with key nutrition-sensitive hygiene messages distributed at health facility level	Development of nutrition-sensitive IEC materials for primary, secondary and tertiary health facilities Availability at and dissemination of IEC materials for 50% primary, secondary and tertiary health facilities	Availability at and dissemination of nutrition-sensitive IEC materials for 100% primary, secondary and tertiary health facilities	Identification of experts Designing of IEC material on nutrition-sensitive WASH by experts Printing of IEC Material Dissemination of IEC material to 50% primary, secondary and tertiary health facilities	April 2017 Oct-Dec 2017 Jan-March 2018 April 2018 to onward
			Reviewing the response of IEC material (change assessment) Identifying necessary changes in IEC Material Printing and dissemination of IEC material in 100% primary, secondary and tertiary health facilities	Jan-March 2020 April-June 2020 July 2020 to onward
WASH services at health facilities monitored regularly by Health Department	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Regular monitoring and supervision conducted by health facility in-charges, DHOs and respective stakeholders	Designing questionnaire for WASH services monitoring at health facilities Disseminating the questionnaire to all health facility in-charges, DHOs and respective stakeholders Six monthly reporting by health facility in-charges, DHOs and respective stakeholders on WASH services in health facilities Managing database on WASH services in health facilities	Jan-March 2017 April-May 2017 June 2017 to onward July 2017 to onward

Education

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Nutrition-sensitive WASH integrated in teacher training programme	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board and incorporate nutrition-sensitive WASH hygiene promotion in pre-service and in-service teacher training programme and CPD training of teacher educators Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Nutrition-sensitive WASH hygiene promotion cascaded through Teacher Educators as part of on-going education programme	Reviewing the current training material of teachers Diagnosing the need of incorporating nutrition-sensitive WASH hygiene promotion material in pre-service and in-service teacher training programme and CPD training of teacher educators Developing nutrition-sensitive WASH hygiene promotion material by experts Collaborating with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board and incorporate nutrition-sensitive WASH hygiene promotion in pre-service and in-service teacher training programme and CPD training of teacher educators Designing cascade trainings of teachers through Teacher Educators as part of on-going education programme on Nutrition-sensitive WASH hygiene promotion Conducting trainings of teachers through Teacher Educators as part of on-going	March-April 2017 May-July 2017 Aug-Oct 2017 Nov-Dec 2017 Jan-March 2018 April-Aug 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			education programme on Nutrition-sensitive WASH hygiene promotion Monitoring the performance of trainings	April-Aug 2018
Nutrition-sensitive WASH integrated in schools curriculum	Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board for inclusion of topics on nutrition-sensitive water, sanitation and hygiene in curriculum for classes 1 to 12		Reviewing the current curriculum for classes 1-12 Diagnosing the need of incorporating nutrition-sensitive WASH hygiene promotion material in curriculum Developing nutrition-sensitive WASH hygiene promotion material by experts Collaborate with Sindh Teacher Education Development Authority, Board of Curriculum & Extension Wing, Provincial Institute of Teacher Education, Sindh Textbook Board for inclusion of topics on nutrition-sensitive water, sanitation and hygiene in curriculum for classes 1 to 12	Jan-March 2017 April-June 2017 July-Dec 2017 Jan-June 2018
Menstrual hygiene management integrated in health and hygiene for girls	Nutrition-sensitive WASH hygiene promotion module incorporates menstrual hygiene management for girls Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 25% of girls middle and high schools as part of on-going school health	Impart menstrual hygiene management education in nutrition-sensitive WASH hygiene promotion to at least 50% of girls middle and high schools as part of on-going school health education	Assessing the needs of school girls in menstrual hygiene education Developing material for menstrual hygiene management Incorporating menstrual hygiene management in Nutrition-sensitive WASH hygiene promotion module Impart sessions on menstrual hygiene management to 25% of girls in middle and high	April-May 2017 June-Sep 2017 Oct-Dec 2017 Jan-Dec 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	education		schools Reviewing the results of menstrual hygiene management sessions Make necessary change in approach (if highlighted in review) Impart sessions on menstrual hygiene management to 50% of girls in middle and high schools	 Jan-May 2019 June-Aug 2019 Sep 2019-May 2020
100% of schools with missing facilities have safely managed drinking water and latrines (30% in short term, 30% in medium term, 40% in long term) (extension of water distribution pipe from water supply scheme, water tank and 2 latrines per school)	More than 30% of schools with missing facilities have safely managed drinking water and latrines and include proper design of wastewater in schools	More than 60% of schools with missing facilities have safely managed drinking water and latrines and include proper design of wastewater in schools	Develop policy guidelines for operational maintenance of WASH infrastructure in schools Developing tools for information collection of schools with missing facilities of safely managed drinking water and latrines and proper design of wastewater in schools Data collection and analysis Developing proposal for provision of missing facilities in 30% schools Mobilizing resources Execution of construction work for missing facilities have safely managed drinking water and latrines and include proper design of wastewater in 30% of schools	Jan-Feb 2017 March-May 2017 March-May 2017 June 2017 July 2017 Aug 2017-June 2019

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			Examining the performance of short term action Provision of missing facilities have safely managed drinking water and latrines and include proper design of wastewater in other 30% of schools	July 2019 Aug 2019-June 2021

Sector Efficiency and Capacity

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Reduced systems leakages of Non Revenue Water and Unaccounted for Water	Map out points of system leakages area by area and take remedial measures for Distribution Network Improvements (DNI) Reduce NRW and UAW to 20% or less Outsource at least 25% of revenue collection	Reduce NRW and UAW to 20% or less	Developing guidelines for map out points of system leakages Mapping of points of system leakages area by area Taking remedial measures for Distribution Network Improvements (DNI) Consultation with WASAs/TMAs to identify key issues in Non-Revenue Water (NRW) and Unaccounted for Water (UAW) Devising mechanism to reduce NRW and UAW Execution of devised mechanism to reduce NRW and UAW to 20% or less Developing guidelines for out sourcing revenue collection Publishing tender notice for outsourcing revenue collection Awarding contracts to companies for at least 25% of revenue collection Regulating the contractors	Jan-Feb 2017 April-June 2017 July 2017-June 2018 July-Sep 2017 Oct-Dec 2017 Jan 2017 to onward Jan-March 2018 April 2018 May-June 2018 July 2018 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Increased household water metering	Introduce water metering in phases All new connections to be metered At least 100% of high income areas have metering in place All commercial and business premises have water metering	At least 10% of medium income areas have metering in place	Developing proposal for metering in high income and commercial areas Installation of meters in all high income residential areas, all commercial and business premises Regular billing to metered premises Circulating letters to all WASAs/TMAs for meter installation in all new connections	June 2017 July 2017-June 2018 July 2017 to onward June 2017
			Installation of meters in 10% of medium income areas Regular billing to metered premises	July 2020-June 2021 July 2020 to onward
Efficient Billing and Collection	Collection period reduced to less than 30 days Billing efficiency increased to 50% Financial collection efficiency increased to 50% Outsource billing and collection	Collection period reduced to less than 15 days Billing efficiency increased to 75% Financial collection efficiency increased to 75%	Reducing bill collection period to less than 30 days Taking essential measures to increase billing and financial collection efficiency by 50%	July 2017 July 2017 to Dec 2019
			Review the performance of short term actions Reducing bill collection period to less than 15 days Taking essential measures to increase billing and financial collection efficiency by 75%	Jan-March 2020 April 2020 April 2020 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
A functional Biometric tracking system in all cities and towns	All mega cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 50% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 30% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles	At least 75% of intermediate cities have an installed and functional biometric tracking system for staff, equipment/vehicles At least 60% of towns have an installed and functional biometric tracking system for staff, equipment/vehicles	Designing biometric tracking system for staff, equipment/vehicles Developing PC I for installation of biometric tracking system in mega cities at first stage, 50% of intermediate cities at second stage, 30% of towns at third stage Execution work for installation of biometric tracking system for staff, equipment/vehicles Monitoring the biometric tracking system at central level	Jan-April 2017 May-June 2017 July 2017-June 2018 July 2018-Dec 2019
			Developing PC I for installation of biometric tracking system in other 25% of intermediate cities and 30% of towns Execution work for installation of biometric tracking system for staff, equipment/vehicles Monitoring the biometric tracking system at central level	May-June 2020 July 2020-June 2020 July 2021-Dec 2022
Human Resource Development for the sub-sectors	Conduct a human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors and develop a human resource development plan Strengthen infrastructure and training capacities at Local Government Training Institutes		Designing a study on human resource capacity, infrastructure and training capacity, and training needs assessment in the sub-sectors Identification of experts Deployment of Team for data collection Data collection and analysis Report writing by experts highlighting the key areas to strengthen infrastructure and training	Jan-March 2017 April 2017 May 2017 June-Dec 2017 Jan-March 2018

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			capacities at Local Government Training Institutes Developing proposal for strengthening Local Government Training Institutes Execution work for strengthening Local Government Training Institutes	 April-June 2018 July 2018-June 2019
Technical training / workshops conducted for town level Local Government staff	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Conduct 238 technical training / workshops per year for Local Government on SWM, DRR, Record Keeping, Management and Community Mobilisation – 2 training workshops per town per year	Identification of Technical Expert Training Need Assessment by Technical Expert Designing training module for Local Government staff on SWM, DRR, Record Keeping, Management and Community Mobilisation Training of Master Trainers Imparting training of Local Government staff on SWM, DRR, Record Keeping, Management and Community Mobilisation (2 training workshops per town per year) through cascade training model by master trainers Monitoring training programme and ensuring 238 technical training / workshops conducted per year	Jan-March 2017 April-May 2017 June-Sep 2017 Oct-Dec 2017 Jan 2018-Dec 2022 Jan 2018-Dec 2022
Capacities developed of CBOs and civil society in solid waste management (LG&HTPD)	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per	Conduct 238 capacity development workshops per year of CBOs and civil society in solid waste management (LG&HTPD) (2 workshops per town per	Conducting capacity development workshops per year of CBOs and civil society in solid waste management by LG&HTPD (2 workshops per town per year) Monitoring training programme and ensuring	June 2018-Dec 2022

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	year)	year)	238 technical training / workshops conducted per year	June 2018-Dec 2022
Technical training / workshops conducted for district PHED staff	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Conduct 145 technical training / workshops per year for district PHED staff on O&M, DRR, Record – 5 training workshops per district per year	Identification of Technical Expert Training Need Assessment by Technical Expert Designing training module for PHED staff on O&M, DRR and Record Training of Master Trainers Imparting training of PHED staff on O&M, DRR, and Record (5 training workshops per district per year) through cascade training model Monitoring training programme and ensuring 145 technical training / workshops conducted per year	Jan-March 2017 April-May 2017 June-Sep 2017 Oct-Dec 2017 Jan 2018-Dec 2022 Jan 2018-Dec 2022
Capacities developed of CBOs and civil society in O&M of water supply schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conduct 145 capacity development workshops per year of CBOs and civil society in O&M of water supply and drainage schemes (PHE&RDD) (5 workshops per district per year)	Conducting capacity development workshops per year of CBOs and civil society in in O&M of water supply and drainage schemes by PHE&RDD (5 workshops per district per year) Monitoring training programme and ensuring 145 technical training / workshops conducted per year	June 2018-Dec 2022 June 2018-Dec 2022

Sector Financing

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Sectoral budgeting and expenditure reporting stratified separately for each sub-sector (environment, water supply, sewerage and drainage)	Conduct a financial budgeting and expenditure review of sectoral budgets and expenditures and stratify actual sub-sector spends against sub-sector budgets for last five years Introduce sub-sector expenditure reporting separately for environment, water supply, sewerage and drainage, and solid waste	At least 70% of districts and talukas report sub-sectoral spending by stratified reporting procedure	Recruitment of technical experts for financial budgeting and expenditure review of sectoral budgets and expenditures and stratify actual sub-sector spends against sub-sector budgets for last five years Data collection by technical experts Reviewing the report of technical experts Finalizing the report by technical experts Developing guidelines for sub-sector expenditure reporting separately for environment, water supply, sewerage and drainage, and solid waste Circulating guidelines to all relevant departments and stakeholders Monitoring the performance of sub-sector expenditure reporting and ensuring that at least 70% of districts and talukas report sub-sectoral spending by stratified reporting procedure	Jan-March 2017 April-July 2017 Aug-Sep 2017 Oct-Dec 2017Dec 2022 Jan-March 2018 April 2018 June 2018 to onward

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Increased Own Source Revenue (OSR) in sub-sectors by Town Councils	Incentivise by providing matching grants to Town Councils related to sub-sector OSR At least 30% of Town Councils increase their baseline sub-sector OSR by 100% or more	At least 60% of Town Councils increase their baseline sub-sector OSR by 200% or more	Formulating criteria for matching grants to Town Councils in sub-sectors having Increased Own Source Revenue (OSR) Assessing Town Councils having increased OSR in sub-sectors Awarding matching grants to town councils and ensuring that at least 30% of Town Councils increase their baseline sub-sector OSR by 100% or more	Jan-March 2017 April-June 2017 June 2018-Dec 2019
			Reviewing the performance of short term action Awarding matching grants to town councils and ensuring that at least 60% of Town Councils increase their baseline sub-sector OSR by 200% or more	Jan-March 2020 June 2020-Dec 2021
Increased regulated private sector participation in sub-sectors	Incentivise private sector with subsidies to provide water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment in selected areas and city and town zones Determine type of contract arrangement and ensure regulatory mechanism in place	At least 30% or more of coverage of municipal services in mega cities provided by private sector At least 20% or more of coverage of municipal services in intermediate cities provided by private sector At least 10% or more of coverage of municipal services in Towns provided by private sector	Formulating rules for incentivising private sector with subsidies to provide water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment Selection of areas , city and town zones for incentivizing private sector Subsiding private sector for provision water supply, filtration plants, O&M services, rehabilitation of dysfunctional schemes, solid waste management, wastewater treatment in selected areas and city and town zones Monitoring and regulating the contractors and	Jan-March 2017 April-June 2017 July 2017-Dec 2022 July 2017-Dec 2022

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
			ensuring that subsiding benefits results in 30% or more of coverage of municipal services in mega cities, 20% or more coverage in intermediate cities and 10% or more of coverage in Towns	
Increased development expenditure allocation to and spending by sub-sectors	Allocate 8% of ADP allocation to the sector Increase proportionate ADP allocation for ongoing schemes from 69% to 75% and correspondingly reduce ADP allocation to new schemes from 31% to 25% 40% of sector development allocation requirement and release achieved	Allocate 9% of ADP allocation to the sector Increase proportionate ADP allocation for ongoing schemes from 75% to 80% and correspondingly reduce ADP allocation to new schemes from 25% to 20% 50% of sector development allocation requirement and release achieved	Organizing annual reviews on allocation of ADPs in WASH sector Advocacy by Multi-Sectoral Steering Committee, Departmental Technical Committee, WASH Steering Committee and other sector partners on increasing proportion of WASH related budget in ADPs Annual and periodical reviews of sector financing guarantees that 40% of sector financing requirements released by June 2019 and 50% by June 2022	In July, every year Aug 2017 to onward In July, every year

Sector Coordination

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Provincial level coordination and programme management for WASH streamlined and enhanced	ACS Development P&DD notifies broadened scope of Multi-Sectoral Nutrition Steering Committee to encompass WASH ACS Development P&DD notifies Sector Coordination and Monitoring Unit for WASH as part of Nutrition Unit Establish a Sector Coordination and Monitoring Unit in Nutrition Unit Equip and furnish the SCMU Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee Establish a Design Cell in LG&HTPD and PHE&RDD	Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee	ACS Development P&DD notify broadened scope of Multi-Sectoral Nutrition Steering Committee to encompass WASH ACS Development P&DD notify Sector Coordination and Monitoring Unit for WASH as part of Nutrition Unit Establishing a Sector Coordination and Monitoring Unit in Nutrition Unit Equipping and furnishing the SCMU Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee Establishing a Design Cell in LG&HTPD and PHE&RDD	Jan-March 2017 Jan-March 2017 April May 2017 June-July 2017 June 2017 to Dec 2019 May 2017
			Quarterly review meetings of Multi-Sectoral Steering Committee, Departmental Technical Committee and WASH Steering Committee	Jan 2019-Dec 2022

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
District level coordination and programme management for WASH streamlined and enhanced	DC Offices notify District WASH Committees Quarterly review of WASH schemes and activities in meetings of District WASH Committees ACS Development P&DD notifies District Coordination and Monitoring Unit for WASH under DC Office Establish and operationalise DCMU	Quarterly review of WASH schemes and activities in meetings of District WASH Committees	Circulation notification to all DC and commissioner offices for formulation of District WASH Committees Formulation of District WASH Committees with representation of all relevant departmental, communal and private sector representation Notification of District WASH Committees by all DC offices Quarterly review of WASH schemes and activities in meetings of District WASH Committees ACS Development P&DD notifies District Coordination and Monitoring Unit for WASH under DC Office Establish and operationalize DCMU	Jan-March 2017 March-June 2017 July 2017 Sep 2017 to onward Aug 2017 Sep 2017
			Quarterly review of WASH schemes and activities in meetings of District WASH Committees	Jan 2019-Dec 2022

Sector Monitoring

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Monitoring and reporting mechanism developed for water and sanitation schemes	Reporting templates for water supply and sanitation schemes developed and tested; Reporting pathway established from UC to district to provincial level District LG&HTPD and PHE&RDD staff trained in its use	Annual WASH progress reports produced	Publishing request for Expression of Interest for improving reporting mechanism of District LG&HTPD and PHE&RDD	March 2017
			Deployment of technical expert	April 2017
			Assessment of existing mechanism of reporting and identifying gaps	May-July 2017
			Developing templates for water supply and sanitation schemes	July 2017
			Field testing of templates	Aug 2017
			Revising template based on field test	Sep 2017
			LG&HTPD and PHE&RDD device mechanism of reporting on template from UC to district to provincial level	Aug 2017
			Training/orientation of staff in reporting template	Sep-Nov 2017
			Central information management	Dec 2017 to onward
			Developing annual WASH progress reports	Jan 2019 and onward annually

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
Improved infrastructure for monitoring and reporting established for water supply schemes	Establish 29 district monitoring units based at DC Office – 1 per district Procure computers and accessories for MIS – 5 sets per district for water supply schemes. Develop computerised MIS for water supply schemes – 29 districts	Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application	Circulating notification for establish 29 district monitoring units based at DC Office – 1 per district Establishing district monitoring units by allocating offices and human resource Procure computers and accessories for MIS – 5 sets per district for water supply schemes Develop computerised MIS for water supply schemes – 29 districts	May 2017 June-Sep 2017 Sep 2017 Oct-Dec 2017
			Maintain district monitoring units Data collection and reporting of water supply schemes done on real time through web-based application	Oct 2017 to onward Jan 2018 and onward
Improved infrastructure for monitoring and reporting established for sanitation, sewerage and drainage schemes	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes. Develop computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application	Procure computers and accessories for MIS – 5 sets per district for sanitation, sewerage and drainage schemes Develop computerised MIS for sanitation, sewerage and drainage schemes – 29 districts	Sep 2017 Oct-Dec 2017
			Data collection and reporting of sanitation, sewerage and drainage schemes done on real time through web-based application	Jan 2018 and onward
Monitoring and reporting capacity enhanced for water and sanitation	Recruit and deploy a 29 District M&E Managers based at DC Office – 1 District M&E Manager per district	Maintain District M&E Managers, Water and Sanitation Reporting Officers and Drivers	Recruitment of district monitoring teams including 29 District M&E Managers, 58 reporting officers (2 in each district) and 29 drivers	June-Sep 2017

Strategic Objectives/Outcomes	Short Term Actions 1 - 3 years	Medium Term Actions 4 - 6 years	Activities	Time Frame
	Recruit and deploy 58 Water and Sanitation Reporting Officers – 2 per district based at DC Office Recruit and deploy 29 drivers – 1 driver per district based at DC Office		Training of District M&E managers and Reporting Officers on MIS and reporting templates Deployment of monitoring teams at DC Office	Oct-Dec 2017 Sep 2017
			Management and supervision of district monitoring team	Sep 2017 and onward
Travel for monitoring and reporting facilitated	Procure 29 vehicles for monitoring and reporting – 1 vehicle per district based at DC Office	Maintain vehicles	Tender publication for procurement of vehicles Selection of suitable tender for procurement of 29 vehicles Placing 1 vehicle each district for monitoring and reporting support	Sep 2017 Oct 2017 Nov-Dec 2017
			Management and maintenance of vehicles	Jan 2018 to onward

ACRONYMS

ACF	Action against Hunger
ADB	Asian Development Bank
AJK	Azad Jammu and Kashmir
Al	Aluminium
APHA	American Public Health Association
As	Arsenic
ASER	Annual Status of Education Report
AWB	Area Water Board
AZRI	Arid Zone Research Institute
BCEW	Bureau of Curriculum and Extension Wing
BHU	Basic Health Unit
BISE	Board of Intermediate and Secondary Education
BISP	Benazir Income Support Programme
Ca	Calcium
CAC	Community Advisory Committees
CAEWRI	Climate Change, Alternate Energy and Water Resources Institute
CBOs	Community Based Organisations
CCT	Conditional Cash Transfer
CDG	City District Government
CDP	Community Development Programme
CH	Civil Hospital
CIF	Curriculum Implementation Framework
Cl	Chloride
CMWs	Community Midwives
CPD	Continuing Professional Development
CRI	Climate Risk Index
CSUSC	Central Sindh Urban Services Corporation
DBG	Drainage Beneficiaries' Group
DC	District Commissioner
DCMU	District Coordination and Monitoring Unit
DMC	District Municipal Corporation
DNI	Distribution Network Improvements
DOs	Direct Outlets
DRIP	Drainage and Reclamation Institute of Pakistan
DSE	Directorate of School Education
DWUA	Drinking Water User Associations
ECHO	European Community Humanitarian aid Office
ELD	Education and Literacy Department

ELDC	Education Leadership Development Centre
EMIS	Education Management Information System
EPI	Expanded Programme for Immunisation
ETRC	Education Technology Resource Centre
EU	European Union
FANSA	Fresh Water Action Network South Asia
FATA	Federally Administered Tribal Areas
Fe	Iron (Ferrous)
FLCF	First Level Care Facility
FOs	Farmer Organisations
FY	Financial Year
GCA	Gross Command Area
H-WASA	Hyderabad Water and Sanitation Authority
HCU	Health Care Unit
HDI	Human Development Index
HRDC	Human Resource Development Centre
HSR	Higher Surface Reservoir
IBIS	Indus Basin Irrigation System
ID&FCRC	Irrigation, Drainage and Flood Control Research Council
IMNCI	Integrated Management of Newborn and Childhood Illnesses
IPs	Implementing Partners
IRSP	Integrated Rural Support Programme
IRWR	Internal Renewable Water Resources
ITE	Initial Teacher Education
IYCF	Infant and Young Child Feeding and care
K	Potassium
KBCA	Karachi Building Control Authority
KIA	Korangi Industrial Area
KW&SB	Karachi Water and Sewerage Board
LCMC	Local Council Monitoring Committee
LG	Local Government
LG&HTPD	Local Government and Housing Town Planning Department
LHWs	Lady Health Workers
LIA	Landhi Industrial Area
MC	Municipal Committee/Municipal Corporation/Metropolitan Corporation
MDGs	Millennium Development Goals
Mg	Magnesium
MGD	Million gallons per day
MHA	Million Hectares
MHM	Menstrual Hygiene Management

MNA	Member of National Assembly
MNCH	Mother Newborn and Child Health
MoA	Memorandum of Agreement
MoFEPT	Ministry of Federal Education and Professional Training
MPA	Member of Provincial Assembly
MPI	Multi-dimensional Poverty Index
MTRI	Municipal Training Research Institute
MUET	Mehran University of Engineering and Technology
Na	Sodium
NARC	National Agricultural Research Centre
Ni	Nickel
NRSP	National Rural Support Programme
NSP	Nutrition Support Programme
NSUSC	Northern Sindh Urban Services Corporation
NWQL	National Water Quality Laboratory
O&M	Operation and Maintenance
OHR	Overhead Reservoir
OPP-RTI	Orangi Pilot Project Research and Training Institute
ORS	Oral rehydration Solution/Salts
ORT	Oral Rehydration Therapy
P&DD	Planning and Development Department and Special Initiatives
PCAS-W	Pakistan Centre for Advanced Studies in Water
PCRWR	Pakistan Council of Research in Water Resources
PCSIR	Pakistan Council for Scientific and Industrial Research
PDMA	Provincial Disaster Management Authority
PEACe	Provincial Education Assessment Centre
PEFSA	Pakistan Emergency Food Security Alliance
PHE&RDD	Public Health Engineering and Rural Development Department
PHED	Public Health Engineering department
PITE	Provincial Institute for Teacher Education
PKR	Pakistani Rupees
ppb	Parts Per Billion
PPHI	People’s Primary Health Initiative
PPP	Parity
PSQCA	Pakistan Standards and Quality Control Authority
QASC	Quality Assurance and Support Centre
R&D	Research and Development
RBOD	Right Bank Outfall Drain
RDD	Rural Development Department
RO	Reverse Osmosis

RoB	Rules of Business
Rs	Rupees
RSU	Reform Support Unit
RWSS	Rural Water Supply Schemes
SAP	Social Action Programme
SARC	Southern Zone Agricultural Research Centre
SCADA	Supervisory Control And Data Acquisition
SCIP	Sindh Cities Improvement Investment Programme
SCMU	Sector Coordination and Monitoring Unit
SDGs	Sustainable Development Goals
SEMIS	Sindh Education Management Information System
SESP	Sindh Education Sector Plan
SIDA	Sindh Irrigation and Drainage Authority
SITE	Sindh Industrial Estate
SLO	Student Learning Outcomes
SMBBMU	Shaheed Mohtarma Benazir Bhutto Medical University
SMSDP	Sindh Municipal Services Delivery Programme
SO_4	Sulphate
SOP	Standard Operating Procedure
SRSO	Sindh Rural Support Organization
SSS	Saaf Suthro Sindh
SSUSC	Southern Sindh Urban Services Corporation
STBB	Sindh Textbook Board
STEDA	Sindh Teacher Education Development Authority
SWM	Solid Waste Management
TARWR	Total Actual Renewable Water Resources
TC	Town Council
TDS	Total Dissolved Solids
TEIs	Teacher Education Institutes
TMA	Tehsil Municipal Administration
TOTs	Training of Trainers
TP	Treatment Plant
UF	Ultra Filtration
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Emergency Fund
UP&SP	Urban Policy and Strategic Planning
US	United States
USAID	United States Agency for International Development
VDA	Village Development Association
VDP	Village Development Plan

WAC	Water Allocation Committee
WAPDA	Water and Power Development Authority
WCA	Water Course Association
WFP	World Food Programme
WHO	World Health Organization
WINS	Women's and Infants Nutrition Programme
WinS	WASH in Schools
WRRI	Water Resources Research Institute
WSS	Water Supply Schemes
WTP	Water Treatment Plant

OPERATIONAL DEFINITIONS

Agency - means an Agency established under any of the laws for the time being enforced and includes any government department and any other local or international organisation

Agricultural Solid Waste - Solid waste that is generated by the rearing of animals, and producing and harvesting of crops or trees.

Aquifer - means a layer of water-bearing strata located underground that conveys water in sufficient quantity to supply pumping wells or natural springs

Arsenic Contamination - is the natural contamination of drinking water caused by application of insecticides, wood preservatives, mining activities and petroleum refining. The water quality guidelines mentioned by the NDWQS state that the level of arsenic contamination for safe drinking water should not exceed 0.05 mg/L (50 ppb).

Authority - means an Authority established under any law and includes any government, local or international authority

Bacterial contamination - is usually measured by the faecal coliform levels in the water. Faecal coliform is an indicator organism; it is easily measured and can signal the presence of other harmful bacteria in water.

Basic Sanitation - means provision of sewerage services to the inhabitants of any area using the lowest-cost technology ensuring hygienic excreta and sludge disposal and a clean healthy living environment

Basic Water Supply - means the supply of prescribed quantity and quality of water to households, including informal households, to support life and personal hygiene

Bulk Water Entitlement - means the volumetric authorisation given by the Commission to a bulk water supplier for a specific period of time as provided in the permit granting the entitlement

Bulk Water Supplier - means any person, who having procured a bulk water entitlement, treats it as per prescribed standards and then supplies it to service provider in an area or service providers in more than one area for retail distribution; and includes a supplier of wastewater treatment services

CBO - refers to Community Based Organisation; Organise and motivate community of the village(s) of WSS Scheme for ascertaining need for the scheme, Providing support to Public Health Engineering for planning, designing, estimation, execution and operation of the scheme and operate & maintain rural water supply schemes.

Chemical contamination - is measured by a test specific to a particular chemical. Chemicals contaminations can naturally occur or can be caused by anthropogenic activities entering from either point sources (such as a specific leak from a pipe or a dumping site) or from non-point sources (such as oil or other gasoline products from large-scale runoff from a highway or parking lot), and are considered to be very harmful.

Community Led Total Sanitation - is an "innovative methodology for mobilising communities to completely eliminate open defecation. Communities are facilitated to conduct their own appraisal and analysis of open defecation and take their own action to become open defecation free."

Component Sharing - Approach by which responsibility for development of sanitation infrastructure is bifurcated between community and government. The community pays for and constructs internal infrastructure (household latrines, lane and small collector sewers) while the government agency construct external infrastructure (primary and trunk sewerage, disposal stations and treatment plants). The division of components is explained below.

a. Internal Development comprises of

- Inside the house-sanitary latrines,
- In the lane-underground sewerage line, and
- Small, secondary or collector sewers.

(Community is responsible for internal development)

b. External Development that constitutes

- Large secondary or collector sewerage,
- Trunk sewer/nullah development,
- Disposal station, and
- Treatment plant.

(Government is responsible for external development)

Conservancy - means the collection, treatment, removal and disposal of refuse

Consumer - means any end user who receives water supply or sanitation services from a service provider

Drain - includes a sewer, a house drain, a drain of any other description, a tunnel, a culvert, a ditch, a channel or any other device for carrying sullage or rain water

Drinking Water - means water used for municipal purposes including drinking, cooking, hygiene and other domestic uses

Effluent - means wastewater discharged from point sources which enters into a body of water or upon land, or wastewater arising as a by-product of any water use

Environmental Remediation Use - means use of water for environmental remediation purposes

Groundwater - means subsurface water that occurs beneath a water table in soils and rocks, or in ecological formations

Groundwater Vulnerability - is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface

Hospital waste management - It means the management of waste produced by hospitals (during diagnosis, treatment or immunisation of human beings or animals or in research) using such techniques that will help to check the spread of diseases

Improved sanitation facilities - Facilities that ensure hygienic separation of human excreta from the human contact. They include pour-flush latrines/ toilets, linked to piped sewerage system septic tank, pit latrines, ventilated improved pit latrine, pit latrine with slab, composting toilets

Improved source of drinking water – refers to piped into dwelling; piped into compound, yard or plot; piped to neighbour; public tap or standpipe; tube well; hand pump with tap; motorised pump; protected well; protected spring; bottled mineral water

Industrial (Residual) Solid Waste - Solid waste generated by industrial processes and manufacturing

LG&HTPD - refers to the Local Government and Housing Town Planning Department and its attached and affiliated entities

Local Government - means a local government established under the Sindh Local Government Act, 2013, and includes a Union Council, a Municipal Committee, a Municipal Corporation, the Metropolitan Corporation, and a District Council

Metropolitan Corporation - means the Metropolitan Corporation Karachi

Municipal Committee - means a Municipal Committee constituted under the SLGA 2013

Municipal Corporation - means a Municipal Corporation constituted under the SBLGA 2013

Municipal Purpose - means use of water in an area for drinking, domestic and recreational use, horticultural, industrial or commercial use and includes such other purposes as may be prescribed but excludes water used solely for the purposes of irrigation

Municipal services - include intra-city network of water supply, sanitation, conservancy, removal and disposal of sullage, refuse, garbage, sewer or storm water, solid or liquid waste, drainage, public toilets, express ways bridges, flyovers, public roads, streets, foot paths, traffic signals, pavements and lighting thereof, public parks, gardens, graveyards, arboriculture, landscaping, billboards, hoardings, fire fighting, land use control, zoning, master planning, classification declassification or reclassification of commercial or residential areas, markets, housing, urban or rural infrastructure, environment and construction, maintenance or development of these services and enforcement of any law relating to municipal services

Municipal Water - means the total water required for municipal purposes in an area

National Drinking Water Quality Standards - means the standards approved the Pakistan Environmental Protection Council in March 2010

National Environmental Quality Standards - means the standards issued by the Pakistan Environmental Protection Agency established under the Pakistan Environmental Protection act, 1997

Open defecation - Defecation in fields, forests, bushes, bodies of water or other open spaces, or disposal of human faeces with solid waste

Operational Cost Coverage – This is the ratio of total annual operational revenue divided by total annual operating costs

Public sector - refers to all ministries, departments, entities, bodies and local governments at the provincial, federal and local levels

Refuse - includes rubbish, offal, night-soil, carcasses of animals, deposits of sewerage, waste and any other offensive matter

Rural Councils – these include the following:

- Union Council for each Union, comprising a village or a number of villages having, as far as possible, an aggregate population between 7000 and 15000, excluding its urban areas and the cantonment areas
- District Council for each District, comprising the area of a revenue district, excluding its urban areas and the cantonment areas

Safe Drinking Water - refers to the water complying with national/provincial drinking water quality standards

Sanitation - is defined as hygienic means of preventing human contact with the hazards of wastes. Wastes include human and animal faeces, solid wastes, domestic wastewater (sewage, sullage, and grey water), industrial wastes, and agricultural wastes, hygienic means of prevention by using engineering solutions (e.g. sewerage and wastewater treatment), simple technologies (e.g. latrines, septic tanks), or even by personal hygiene practices (e.g. simple hand washing with soap)

Service Providers - refer to local government institutions, WASA, CBOs responsible for the management, treatment and distribution of municipal water or collection, transport, treatment and disposal of wastewater

Sewage & wastewater treatment - Chemical, biological, and mechanical procedures applied to an industrial or municipal discharge or to any other sources of contaminated water to remove, reduce, or neutralise contaminants before discharging it into a water body

Sewerage - means a system of collection of wastewater from an area including its houses, institutions, industry and public places; the pumping, treatment and disposal of such wastewater, effluent, sludge, and other end products

Shared sanitation facilities - Sanitation facilities of an otherwise acceptable type shared between two or more households. Shared facilities include public toilets

Small Towns - Small towns are those having a population of less than hundred thousand, comprising of two to three union councils devoid of any municipal council

Solid Waste - means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges

Sources of Drinking Water Supply – these include the following:

- Tap water is a delivery system where the water is delivered through a network of pipes and the water is treated before it is supplied. In urban areas generally, water comes in to house through pipes and is stored in tanks, built in the house. Then the water for the use of household is lifted to small tanks built at the top of the house
- Hand Pump is a pump operated manually to draw water from a bored hole. Sometimes hand pump and motor are operated at the same hole
- Dug well is of two types - opened and closed well. Closed well is a dug well with a covering and opened well is a dug well without covering

Surface Water - means water, which lies above the surface of the ground, is open to the atmosphere and is subject to surface runoff

Total Sanitation - Combination of four interventions that include; hygiene, foul water disposal/drainage, excreta disposal and solid waste management (sustaining ODF status and ensuring its sustainability)

Unimproved Sanitation facilities - Facilities that do not ensure hygienic separation of human excreta from human contact. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines

Urban Councils – these include the following:

- Metropolitan Corporation for the Capital City comprising an urban area having population exceeding 500,000
- Municipal Corporation for each City comprising an urban area having a population exceeding 100,000 but not exceeding 500,000
- Municipal Committee for each Municipality, comprising an urban area having a population exceeding 15,000 but not exceeding 100,000

User of Water - means any natural or artificial person or persons, whether Government owned or controlled or not, who or which uses water for any municipal purpose

Village - means an integrated and contiguous human habitation commonly identified by a name and includes a dhok, gaown, killi or any other comparable habitation. There may be one or more Villages / Killies in a Mauza

Water and Sewerage Services Provider - means any Government or private body established under any law and operating as services providers

Water Body - means both natural and man-made bodies of fresh, brackish, and saline waters, and includes, but is not limited to, aquifers, groundwater, springs, creeks, streams, rivers, ponds, lagoons, water reservoirs and lakes but does not include bodies constructed, developed and used purposely as water treatment facilities, or water storage for recycling and re-use which are integral to process industry or manufacturing

Water Coverage - refers to the proportion of the population that has access to safe drinking water.

Water Pollution - means any alteration of the physical, chemical, biological, or radiological properties of a water body resulting in the impairment of its purity or quality

Water Quality - means the quality of water, which conforms to the national drinking water quality standards. It also means water the quality whereof is appropriate as per standards issued by a regulating authority for the purpose for which it is supplied or used

Water safety planning approach - is a plan to ensure the safety of drinking water through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer

Water Service - means in general water supply and sewerage services, unless otherwise specified

Water Supply Services - means the appropriation, conveyance, treatment and distribution of municipal water, or water (through withdrawal and abstraction of ground or surface water or harvesting of rainwater) intended to be converted to municipal water

Well - means a well sunk for the search or abstraction of water by a person or persons for carrying out scientific investigations, exploration, development or management work for the survey and assessment of water resources or for providing water and includes open well, dug well, bore-well, dug-cum-bore-well, tube well and collector well

Working Ratio – This is the ratio of total operating expenses divided by total operating revenues

Annex 1 – Bottleneck Analysis – Safely Managed Water Resources

	Determinants	Bottlenecks Identified	Opportunities Description	Priority
ENABLING ENVIRONMENT	Social Norms	Water is generally considered a free and infinite source, and no voice and accountability mechanism in place for injudicious use of water.	The political leadership and media shaping the voices for depleting water resources, poor water quality, inapt water management and climate change impacting life.	High
	Legislation/ Policy	Lack of implementation arrangements/ structures for approved or draft drinking water policies in the provinces. The legal framework, even under LGA, for drinking water is patchy, weak and fragmented especially around O&M, community participation, and resource allocations criterion.	Sindh policies are drafted. The Ministry of Planning, Development and Reforms initiating to review existing policies to align with SDGs and national commitments Legislative review for drinking water is needed.	High
	Budget/ Expenditure	Political interests of the government drive the budgetary allocations rather inequities /needs. Lack of data in line with SDGs and appropriate planning tools. Need assessment, planning and budgeting is top down- wider community consultations rarely held for project proposals (PC-1) Sectoral WASH expenditure data is not readily accessible and available- including funds spent by CSOs, LG and private sector	WASH budget especially for drinking water increasing mostly on water filtration - advocacy with elected representatives to address regional inequities. Capacity development of provinces to refer SDGs in provincial budget- Extend support in preparing planning manuals to improve quality of government project proposals (PC1) Advocacy with Finance/ P&DD to track WASH expenditures through their existing system, with bifurcation by sector and source of financing.	High+
	Management/ Coordination	No single regularity and monitoring authority exist for M&E and reporting of drinking water in the provinces. Lack of clarity on roles and responsibilities- multiple institutions/ departments conduct need assessment and execution of drinking water projects with poor coordination and	The development of guidelines for water supply initiatives under new LGA in the province. Need for creation of Programme Management Unit or Steering Committee for WASH in the provinces for sector coordination, supervision and monitoring.	High

		knowledge management	Joint sector reviews needed.	
SUPPLY	Availability of essential commodities / inputs	Energy crisis: regular breakdown of power supplies and increasing costs limits efficiency of water supply schemes in rural and urban areas. The communities are unable to pay the burgeoning cost of electricity in rural water supply Lack of necessary equipment, tools and financing for O&M.	Develop provincial & district water supply plans validated by a wide range of stakeholders, defining clear targets, indicators, and budgeted activities. Conduct joint sector reviews to track progress. Assess and pilot new technological innovations like solar energy, water metering, O&M financing and sustainability- Learning should be documented.	Medium
	Access to adequately staffed services, facilities and information	Systematic professional capacity development is missing both for urban as well as rural WASH. Lack of ageing and efficiency profiling of equipment/ tools and machinery Lack of uniformity on WASH indicators under different HHs surveys and MIS of government and corporate bodies.	The capacity assessment of human resources for WASH in the provinces followed by capacity enhancement of training institutes with courses and infrastructure. Provincial & district based aging profiling of equipment, tools and machinery. Create consensus on WASH indicators to be covered in MICS/PSLM as well as MIS and proposed dashboards.	High+
DEMAND	Financial Access	Available funds are not distributed among the districts and tehsils on equity and need basis. Lack of information about contributions and resources available from public and private sources.	Periodic mapping of inequities for safe water for advocacy with political leadership & donors for resource mobilization. Budgetary analysis at the provincial/districts levels for advocacy through PMUs	High
	Social and Cultural Practices and Beliefs	Beliefs that water is free and readily available and disempowerment of rights holders including women and children impedes their demand for accountability from WASH service providers	Adoption of bottom up sustainable behavioral approaches to generate demand for safely managed water services by ensuring that perspectives, concerns and voices of all, including marginalized groups, are reflected in upstream policy dialogue, decision making, and interventions	High+
	Continuity of Use	The implementation arrangements are not backed with necessary legislation that defines	Strong social mobilization for ownership and accountability.	Medium

		roles and responsibilities of communities & stakeholders around O&M of water infrastructure	Conditional cash transfers for nutrition and health programmes be linked with O&M of drinking water and improved sanitation	
QUALITY	Quality	Over 80% of drinking water being used is bacterially contaminated as per PCRWR. The NEQS include water & sanitation but not followed largely	Review and develop water quality standards in line with international and SDGs needs. Work with PCRWR to capacitate stakeholders and local organizations on quality	High+

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 2 – Bottleneck Analysis – Safely Managed Sanitation Services

	Determinants	Bottlenecks Identified	Opportunities Description	Priority
ENABLING ENVIRONMENT	Social Norms	Sanitation is politically less attractive, and its responsibility is taken for granted with communities.	Increasing knowledge and information about burden of poor sanitation on health and economy.	High
	Legislation/ Policy	Lack of comprehensive sanitation frameworks for rural sanitation especially open defecation and hygienic latrines in the province The LGA, entrusted sanitation responsibilities, have not fully operational.	The draft sanitation policy is awaiting approval.. The Ministry of Planning, Development and Reforms interested to review the existing policies for alignment with SDGs and national commitments Legislative review for sanitation is needed	High
	Budget/ Expenditure	Need assessment, planning and budgeting is top down- wider community consultations rarely held for the preparation of project proposals (PC-1) Less than 30% of total WASH budget is for sanitation, which is mainly for hardware and drainage. The sanitation expenditures are difficult to track under current financial reporting.	The provincial government made allocations under ADPs or partnerships with other agencies for PATS & hygiene. Capacity development of provinces to refer SDGs in provincial budget- Extend support in preparing planning manuals to improve quality of government project proposals (PC1) Advocacy with Finance/ P&DD/ PHE&RDD/LG&HTPD to track expenditures through their systems, with bifurcation by sector and source of financing.	High+
	Management/ Coordination	No single regularity and monitoring authority exist for M&E and reporting of sanitation in the province. Lack of clarity on roles and responsibilities- multiple institutions/ departments conduct need assessment and execution of sanitation projects with poor coordination and knowledge management	The development of guidelines for sanitation interventions under new LGA in the province. Need for creation of Programme Management Unit or Steering Committee for WASH in the province for sector coordination, supervision and monitoring. Joint sector reviews needed.	High

SUPPLY	Availability of essential commodities / inputs	Less than 10% rural population has any drainage system outside their houses. Lack of necessary machinery and techniques for disposal stations and appropriate wastewater treatments along with financing for O&M Lack of access and availability of sanitation accessories especially to rural communities	Develop provincial & district sanitation plans validated by stakeholders, defining clear targets, indicators, and budgeted activities. Conduct joint sector reviews to track progress. Pilot and scale up new technological innovations in sanitation marketing, improved sanitation, wastewater treatment, O&M financing and sustainability- Learning should be documented.	Medium
	Access to adequately staffed services, facilities and information	Systematic capacity development through professional training and mentoring is missing both for urban as well as rural WASH. Lack of ageing and efficiency profiling of equipment/ tools and machinery Lack of uniformity on WASH indicators under different HHs surveys and MIS of government and corporate bodies.	The capacity assessment of human resources for WASH in the provinces followed by capacity enhancement of training institutes with courses and infrastructure. Provincial & district based ageing profiling of equipment, tools and machinery. Create consensus on WASH indicators to be covered in MICS/PSLM as well as MIS and proposed dashboards.	High+
DEMAND	Financial Access	Available funds are not distributed among the districts and tehsils on equity and need basis. Lack of information about contributions and resources available from public and private sources.	Periodic mapping of inequities for improved sanitation for advocacy with political leadership & donors for resource mobilization. Budgetary analysis at the provincial/districts levels for advocacy through PMUs	High
	Social and Cultural Practices and Beliefs	Open defecation in rural areas is part of their social behavior and cultural practices. Even having knowledge, gap exists in hygiene practices. Only 2/3rd of people WASH hands with soap and water.	Promote communication for social change initiatives that engage, motivate and empower communities and networks to influence or strengthen social norms and cultural practices that supports long-term sustainable social change for sanitation practices	High+
	Continuity of Use	The implementation arrangements are not backed with necessary legislation that defines roles and responsibilities of communities	Conditional cash transfers for nutrition and health programmes should be linked with sustainability of sanitation & hygiene.	Medium

		around construction, operation and maintenance of sanitation infrastructure for sustainability.	Strong social mobilization for PATS plus should be integrated into local community programmes.	
QUALITY	Quality	The quality standard of sanitation are not well defined and agreed. The NEQS include sanitation but not followed or practiced widely.	The PATS plus and community programmes should include quality standards linked with improved sanitation as integral component of programme delivery.	High+

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 3 – Bottleneck Analysis – Institutional WASH

	Determinants	Bottlenecks Identified	Opportunities Description	Priority
ENABLING ENVIRONMENT	Social Norms	The provision and maintenance of WASH in schools, health facilities and public buildings is considered the responsibilities s of state	The School Management Committees and Health Committees have representation of local communities whom are being capacited through training	High
	Legislation/ Policy	National Education policy 2009, a guiding document for the province, has not described specific interventions for WASH. Draft National Policy 2009 and Provincial Health Sector Strategies did not reflect WASH component. National housing policy 2001 out-dated, and did not talk about public and work place WASH.	Provincial Education Sector plan emphasized and defined activities for school WASH. Engage local representative and communities for legislation/ enforcement of public latrines /WASH at work place.	High
	Budget/ Expenditure	Fragmented information about budget allocated and spent on WASH in schools- that is mostly with missing facilities. No budgetary information about WASH in health facilities. No budgetary information about public toilets.	Increase budget for missing facilities in the province – advocacy for WASH specific budget in education/schools. Engage with PPHI and health department for reporting on WASH budget in health facilities Advocate LG for specific budget on public toilets	High
	Management/ Coordination	Poor coordination mechanism between health, education, PHE&RDD and LG&HTPD around institutional WASH at the national, provincial and district levels. The district WASH committees have lack of necessary legislative backing and upward reporting to single body.	The programme management unit for WASH should be advocated for setting up at the provincial level with line reporting from education, health, LG&HTPD and PHE&RDD, P&DD and environment with reporting from districts and TMAs. The provincial government advocated for endorsing ToRs of district WASH committees	High
SUPPLY	Availability of	Lack of necessary data/ information from	Create a database for availability of inputs/	High

	essential commodities / inputs	health facilities, school WASH and public toilets about availability of WASH including accessories like soap, detergent, etc. Lack of accessibility in WinS - WASH in health and WASH in public and work place.	commodities for monitoring by the SMCs/ health service providers and relevant department periodically. Develop accessibility guidelines including designs, manuals and training for accessible WASH.	
	Access to adequately staffed services, facilities and information	Ad-hoc training of schoolteachers and health facility staff around WASH. The current SEMIS, DHIS and MIS provide insufficient information about WASH. No information about public toilets is available	Collaborate with education and health departments to integrate the capacity assessment of WASH under their staff appraisal and development. Engagement with education, health and LG department to integrate WASH information in SEMIS, DHIS and MIS. Add public toilets in the LG surveys.	High+
DEMAND	Financial Access	Lack of necessary information at provincial and district levels about WASH expenditures at schools, BHUs and public places- community contributions under SMCs for WASH are not reported.	Engage with Education, Health and LG departments to compile and collate information about expenditures made on WASH either through public funds or community or private sources periodically.	High
	Social and Cultural Practices and Beliefs	Cleanliness of WASH facilities is considered a delegated job to specific people. Facility and Community based hygiene is rarely recognized as collective responsibility of people and service providers.	An innovative mix of communication tools, channels, and approaches to promote positive and measurable hygiene practices targeting schools & health facility workers should be employed	High+
	Continuity of Use	The SMCs and School WASH clubs exist in majority of places but less confient about audit issues like procurement of soaps, acceesories, etc. The health committees seek curative services with little emphasis on preventive and hygiene aspects.	Capacitate SMCs and WASH clubs for promotion of hygiene practices including accessories for hand washing and improved sanitation, etc. Innovative approach of conditional cash transfers for nutrition and health programmes should be linked with improved sanitation and	Medium

		Poor advocacy for public toilets by the local organizations.	hygiene. PATS plus approaches should be integrated into local development initiatives and scaling up of nutrition programme of Government.	
QUALITY	Quality	Draft WinS quality standards in schools and minimum service delivery standards including WASH in health facilities exist but not being implemented and monitored.	Develop and finalize WinS quality standards with respective department of education and other stakeholders in the provinces. Engage health departments to finalize and implement WASH related standard at PHC facility developed by Pakistan standards and quality control authority	High+

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 4 – Access to Improved Water by Quintiles

	Overall						Rural						Urban					
	Poorest	2nd	Middle	4th	Richest	Total	Poorest	2nd	Middle	4th	Richest	Total	Poorest	2nd	Middle	4th	Richest	Total
Pakistan	**81**	**87**	**89**	**89**	**86**	**86**	**78**	**86**	**88**	**90**	**92**	**87**	**90**	**86**	**88**	**86**	**81**	**86**
Sindh	**74**	**87**	**87**	**89**	**94**	**86**	**63**	**82**	**87**	**89**	**94**	**83**	**88**	**81**	**89**	**93**	**94**	**89**
Tharparkar	9	8	33	19	38	18	8	8	27	16	20	12	30	0	100	65	90	79
Thatta	37	47	63	73	82	60	37	45	62	70	84	57	.	100	100	100	79	84
Umerkot	48	54	61	70	81	62	43	52	56	59	64	53	100	100	100	99	99	99
Sujawal	47	55	65	78	71	63	47	55	64	75	66	60	.	.	100	100	75	80
Jacobabad	92	95	82	72	32	74	94	99	97	97	81	95	37	15	19	16	5	12
Mirpur Kh	63	70	75	86	89	76	63	68	71	77	75	69	78	86	96	98	96	96
Jamshoro	54	77	89	86	92	80	52	74	87	85	92	75	100	94	95	87	92	92
Shahdadkot	81	79	82	80	90	83	82	80	91	91	92	87	50	58	53	62	89	71
Karachi	84	72	88	97	95	87	74	68	100	100	.	74	86	72	88	97	95	88
Dadu	82	88	86	94	100	90	82	87	84	92	100	88	100	100	100	100	100	100
Hyderabad	88	95	94	85	92	91	94	91	95	93	96	93	82	96	94	85	92	91
Badin	89	94	90	94	91	91	89	93	89	95	89	91	93	100	97	89	92	93
Sukkur	94	98	96	94	86	94	91	96	96	100	100	95	100	100	97	93	85	93
Sanghar	97	95	97	97	95	96	97	95	96	98	93	95	.	100	99	97	98	98
Kashmore	100	99	98	99	92	97	100	99	97	99	100	99	100	100	98	98	88	94
Khairpur	90	98	99	98	99	97	88	98	99	97	99	96	100	100	100	100	100	100
TM Khan	96	97	95	98	97	97	96	97	96	99	100	97	.	100	70	95	95	94
Shaheed B	100	98	100	97	95	98	100	98	99	98	100	99	100	100	100	95	87	94
Tando All	97	100	100	100	96	99	97	100	100	100	97	99	100	100	100	100	95	97
Matiari	100	98	98	99	99	99	100	98	98	99	98	99	100	100	95	100	100	99
Shikarpur	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Larkana	99	99	100	100	100	100	100	100	100	100	100	100	93	97	100	100	100	99
Ghotki	100	98	100	100	99	100	100	100	100	100	100	100	100	87	100	100	99	98
Naushahro	100	100	100	98	100	100	100	100	100	100	100	100	100	100	100	89	100	98

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 5 – Access to Piped Water by Quintiles

Area	Poorest	Second	Middle	Fourth	Richest	Total
Pakistan	**9.9**	**21.0**	**24.9**	**36.4**	**32.5**	**25.2**
Sindh	**6.0**	**19.0**	**37.6**	**59.1**	**58.0**	**35.6**
Shikarpur	2.7	1.8	0.5	0.0	0.0	0.9
Larkana	0.0	1.2	0.0	0.5	2.3	0.9
Jacobabad	0.9	0.9	2.1	0.8	2.3	1.4
Kashmore	0.5	0.0	1.9	3.5	2.9	1.8
Khairpur	2.4	1.7	0.0	2.6	8.6	3.2
Tando Allah Yar	2.7	2.7	5.0	6.0	6.2	4.6
Matiari	3.3	1.2	4.0	4.7	9.5	4.7
Ghotki	2.6	2.8	4.6	4.5	11.4	5.1
Tharparkar	1.1	0.4	2.2	1.9	21.1	5.4
Tando Mohammad Khan	0.0	0.7	1.3	9.9	16.2	5.8
Shaheed Benazir Abad	3.4	3.1	3.9	9.7	9.2	6.1
Sanghar	0.0	0.0	10.9	14.0	6.1	6.6
Shahdadkot	5.5	3.8	9.3	9.3	16.6	9.3
Sujawal	0.7	1.9	0.8	9.9	32.0	10.0
Naushahro Feroze	1.7	0.0	4.2	21.8	22.0	10.6
Badin	3.2	5.5	6.5	12.7	27.1	11.5
Dadu	5.7	4.0	12.7	19.6	31.7	15.6
Umerkot	12.8	3.1	24.8	25.7	39.2	22.2
Thatta	0.3	13.2	20.7	23.7	49.2	22.9
Sukkur	11.5	20.9	21.7	28.2	39.1	24.1
Mirpur Khas	2.6	6.7	19.4	39.2	61.9	27.0
Jamshoro	21.6	37.4	53.0	53.7	58.3	45.6
Hyderabad	27.0	69.0	70.2	64.3	71.7	60.3
Karachi	79.2	64.8	84.3	94.8	87.8	81.9

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 6 – Water Quality and SDG Target for Water

	No Treatment for Drinking - PDHS 12-13	Appropriate Treatment for Drinking - PDHS 12-13	Improved Water	Water Accessible	Water Available in Premises	PCRWR		Safely Managed Water at HHs Level
						Bacterial Contamination	Contamination factor (% Safe)(100-col-8)	
Pakistan	**89.9**	**8.0**	**86**	**85.5**	**78.0**	**68**	**32**	**25.0**
Sindh	**80.1**	**16.5**	**86**	**86.1**	**74.0**	**39.0**	**61**	**45.1**
Badin	93.2	4.4	91	90.9	32.1	19.0	81	26.0
Dadu	83.2	0	90	91.5	44.6	32.0	68	30.3
Ghotki	99.2	0.8	100	99.5	96.4	85.0	15	14.5
Hyderabad	75.5	17.7	91	90.4	78.4	40.9	59	46.4
Jacobabad	100	0	74	74.0	55.4	4.0	96	53.2
Jamshoro	100	0	80	77.8	64.5	22.0	78	50.3
Karachi	58.3	38.4	87	84.4	82.8	39.56	60	50.0
Kashmore	100	0	97	97.9	84.9	100.0	0	0.0
Khairpur	100	0	97	97.4	75.4	25.0	75	56.6
Larkana	100	0	100	99.3	96	26.2	74	70.8
Matiari	100	0	99	98.7	78	37.0	63	49.1
Mirpur Khas	91.2	3.1	76	77.2	35	51.5	48	17.0
Naushahro Feroze	100	0	100	98.6	97.7	56.0	44	43.0
Sanghar	87.1	12.9	96	95.8	68.1	15.0	85	57.9
Shahdadkot	100	0	83	83.5	22.6	7.0	93	21.0
Shaheed Benazir Abad	99.1	0.9	98	97.6	89.2	10.0	90	80.3
Shikarpur	100	0	100	100.0	98.6	67.0	33	32.5
Sukkur	84.5	8	94	92.4	65.6	19.50	80.5	52.8
Tando Allah Yar	100	0	99	98.3	58.3	0.0	100	58.3
Tando Mohammad Khan	95.3	0	97	96.3	84.3	11.0	89	75.0
Tharparkar	91.5	1.8	18	16.8	35	12.0	88	30.8
Thatta	96.1	3	60	64.7	52.6	2.0	98	51.5
Umerkot	97	0	62	62.5	42.8	12.0	88	37.7

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 7 – Access to Improved Sanitation by Quintiles

	Overall						Rural						Urban					
District	**Poorest**	**2nd**	**Middle**	**4th**	**Richest**	**Total**	**Poorest**	**2nd**	**Middle**	**4th**	**Richest**	**Total**	**Poorest**	**2nd**	**Middle**	**4th**	**Richest**	**Total**
Pakistan	**20**	**45**	**63**	**77**	**82**	**57**	**15**	**29**	**47**	**63**	**77**	**46**	**58**	**75**	**82**	**85**	**84**	**77**
Sindh	**11**	**20**	**48**	**68**	**65**	**42**	**8**	**11**	**8**	**12**	**9**	**9**	**44**	**70**	**81**	**83**	**72**	**70**
Larkana	1	0	0	3	2	1	1	0	0	2	3	1	0	0	0	5	2	2
Naushahro	3	0	0	0	2	1	0	0	0	0	0	0	17	0	0	0	5	5
Dadu	0	1	1	3	1	1	0	1	1	3	0	1	0	0	0	0	1	1
Shikarpur	0	1	0	2	8	2	0	1	0	1	5	1	0	0	0	5	12	6
Matiari	1	1	2	3	5	2	1	0	2	5	6	3	0	6	0	0	2	2
Sujawal	0	0	0	2	6	2	0	0	0	1	3	0	.	.	0	10	9	9
Tharparka	1	1	0	2	4	2	1	1	0	1	3	1	15	0	0	7	5	6
Tando All	7	4	4	2	4	4	7	4	5	3	3	5	0	0	0	0	5	3
Umerkot	6	1	6	5	4	5	4	1	4	5	1	3	31	0	22	5	8	11
Jacobabad	2	5	6	5	12	6	1	5	6	6	20	6	9	0	9	2	8	7
Badin	6	6	4	3	13	6	4	4	3	3	17	5	48	18	10	2	9	10
Shaheed B	1	1	2	15	17	7	0	0	0	1	2	1	17	4	13	34	41	27
Jamshoro	2	6	7	12	10	7	1	6	2	1	10	4	27	8	21	28	9	18
Thatta	0	0	0	5	33	8	0	0	0	0	4	0	.	0	0	51	62	57
Khairpur	5	7	11	4	16	9	5	9	9	7	10	8	6	0	16	0	22	10
Sanghar	13	20	3	6	9	10	13	20	4	2	1	10	.	0	0	13	25	13
Shahdadko	12	16	8	9	10	11	13	17	10	14	13	13	0	0	0	0	8	3
Sukkur	14	9	8	5	19	11	19	14	19	23	14	17	5	2	2	1	19	7
Tando Moh	18	17	13	8	15	14	18	18	14	10	13	15	.	0	0	0	16	11
Kashmore	23	14	24	17	6	17	21	13	16	15	13	17	37	36	44	19	3	18
Ghotki	25	19	17	9	17	17	26	19	17	8	19	18	0	20	15	10	15	14
Hyderabad	17	21	20	26	21	21	23	23	0	7	6	19	9	21	22	26	21	21
Mirpur Kh	33	30	25	25	31	29	33	27	20	12	0	22	41	61	49	44	48	48
Karachi	91	97	98	100	100	97	56	58	67	61	.	57	99	100	99	100	100	99

(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 8 – No Toilet (Open Defecation) by Quintiles

Area	Poorest	Second	Middle	Fourth	Richest	Total	Literate	Illiterate
Pakistan	**39.8**	**17.7**	**6.7**	**2.2**	**0.9**	**13.0**	**6.2**	**20.9**
Sindh	**24.7**	**9.5**	**1.8**	**0.4**	**0.6**	**7.5**	**3.0**	**12.7**
Jacobabad	22.7	7.3	4.7	1.1	0.8	7.6	2.9	9.5
Kashmore	3.4	12.4	4.3	7.7	1.9	5.7	2.8	7.2
Shikarpur	10.0	9.1	2.9	1.4	0.7	4.5	2.4	5.9
Larkana	2.9	1.1	0.4	0.0	0.0	0.8	0.5	0.9
Shahdadkot	1.4	0.3	0.6	1.9	0.8	1.1	0.7	1.5
Sukkur	15.6	3.6	0.0	0.0	0.0	3.8	1.3	6.1
Ghotki	7.0	4.5	1.2	0.8	0.0	2.6	1.6	3.5
Khairpur	13.5	6.0	1.8	0.5	0.9	4.1	1.8	5.3
Naushahro Feroze	21.3	3.4	1.4	0.0	0.0	4.6	2.0	9.6
Shaheed Benazir Abad	10.3	3.8	2.9	1.6	0.0	3.3	1.9	4.7
Dadu	28.9	6.6	0.6	0.0	8.1	8.4	6.0	15.2
Jamshoro	50.8	24.5	8.5	4.9	0.7	16.8	6.4	24.8
Hyderabad	24.3	0.4	0.7	0.0	0.0	5.3	1.1	10.0
Tando Allah Yar	10.5	7.0	6.9	1.1	0.0	4.8	2.8	5.5
Tando Mohammad Khan	11.8	15.8	6.1	4.2	1.2	7.7	3.2	8.4
Matiari	43.2	31.5	15.9	12.1	9.5	22.2	12.9	28.3
Badin	22.5	24.9	25.7	14.8	1.5	17.7	8.4	21.5
Thatta	23.0	39.7	44.2	30.5	8.6	29.1	19.9	31.4
Sujawal	32.2	34.0	55.0	54.8	25.1	40.8	22.2	46.4
Sanghar	17.6	12.6	17.3	3.2	0.2	9.4	3.0	14.6
Mirpur Khas	15.0	24.8	17.5	7.0	0.0	12.6	5.2	17.1
Umerkot	62.0	57.4	45.9	28.5	7.3	39.5	23.9	46.7
Tharparkar	42.8	57.5	32.6	47.3	19.6	43.8	34.9	48.5
Karachi	0.9	0.7	0.4	0.0	0.0	0.4	0.3	0.8

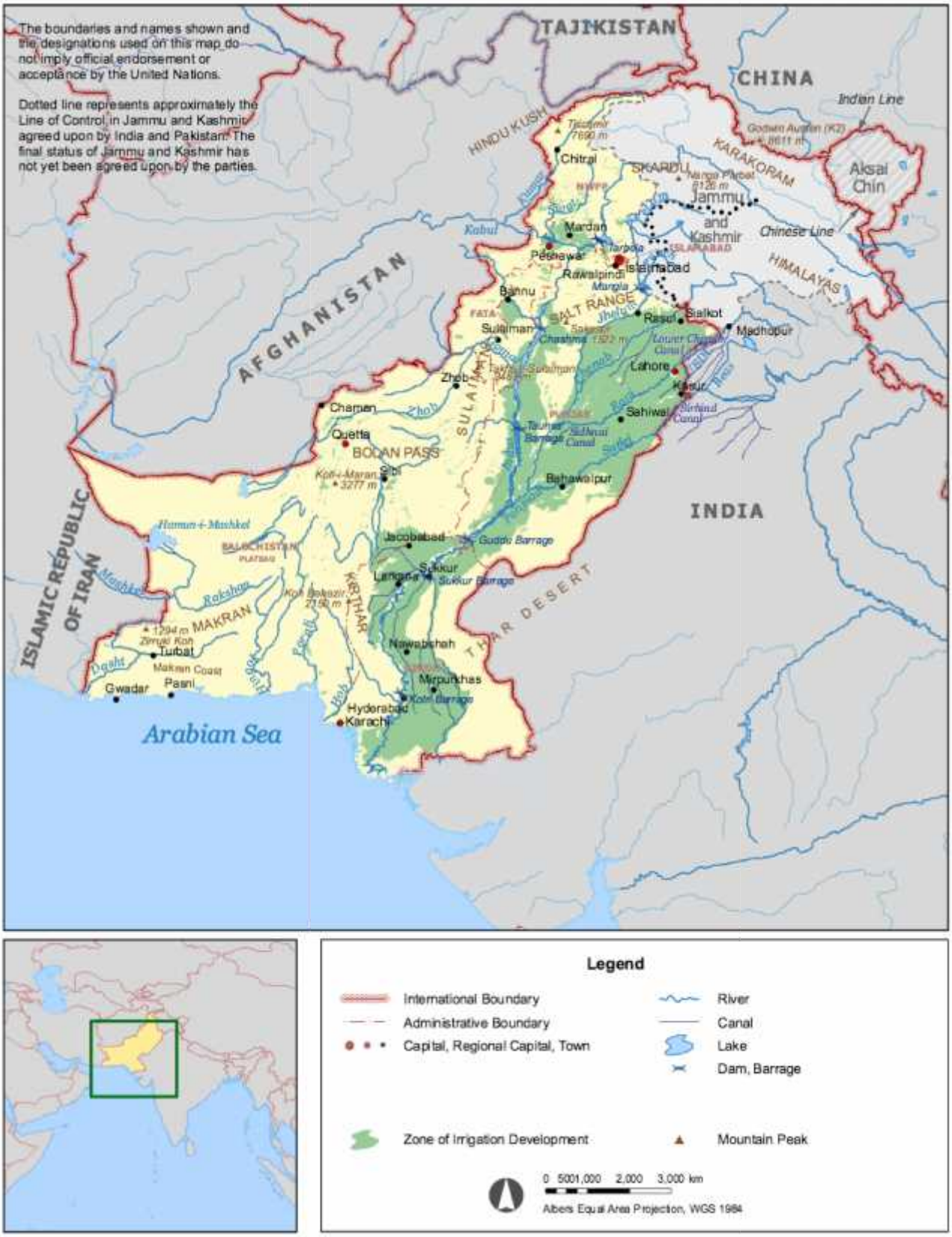
(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 9 – Hand Washing and SDG Target for Sanitation

Districts /Regions	Improved Sanitation	% Pop Water and Soap for hand washing DHS	Safely Managed Sanitation At HHs after applying hand wash factor	%age from DHS Not Share toilet with other households	Safely Managed Sanitation After applying not shared factor
Pakistan	**56.2**	**63.8**	**35.9**	**87.3**	**31.3**
Sindh	**36.7**	**50.9**	**18.7**	**92.5**	**17.3**
Tando Mohammad Khan	13.0	0.0	0.0		0.0
Sujawal	1.3		0.0		0.0
Matiari	2.4	6.3	0.1	100.0	0.1
Dadu	1.0	44.1	0.4	74.2	0.3
Naushahro Feroze	1.0	43.5	0.4	86.2	0.4
Jamshoro	7.2	6.6	0.5	54.0	0.3
Umerkot	5.1	10.5	0.5	23.8	0.1
Tharparkar	1.6	35.7	0.6	77.1	0.4
Tando Allah Yar	4.5	18.0	0.8	77.6	0.6
Larkana	1.8	52.9	1.0	100.0	1.0
Badin	5.8	20.8	1.2	79.6	1.0
Shikarpur	2.8	43.1	1.2	89.5	1.1
Kashmore	17.2	11.6	2.0		0.0
Jacobabad	6.3	32.4	2.0	56.1	1.1
Shaheed Benazir Abad	7.4	37.5	2.8	70.9	2.0
Khairpur	9.0	33.5	3.0	93.2	2.8
Thatta	8.0	38.4	3.1	80.8	2.5
Sanghar	10.0	34.9	3.5	83.5	2.9
Shahdadkot	11.0	43.1	4.8	73.9	3.5
Sukkur	11.2	51.1	5.7	95.8	5.5
Ghotki	16.0	42.8	6.8	79.8	5.5
Mirpur Khas	29.2	28.1	8.2	81.9	6.7
Hyderabad	21.3	61.6	13.1	94.6	12.4
Karachi	96.7	94.0	90.9	98.7	89.7

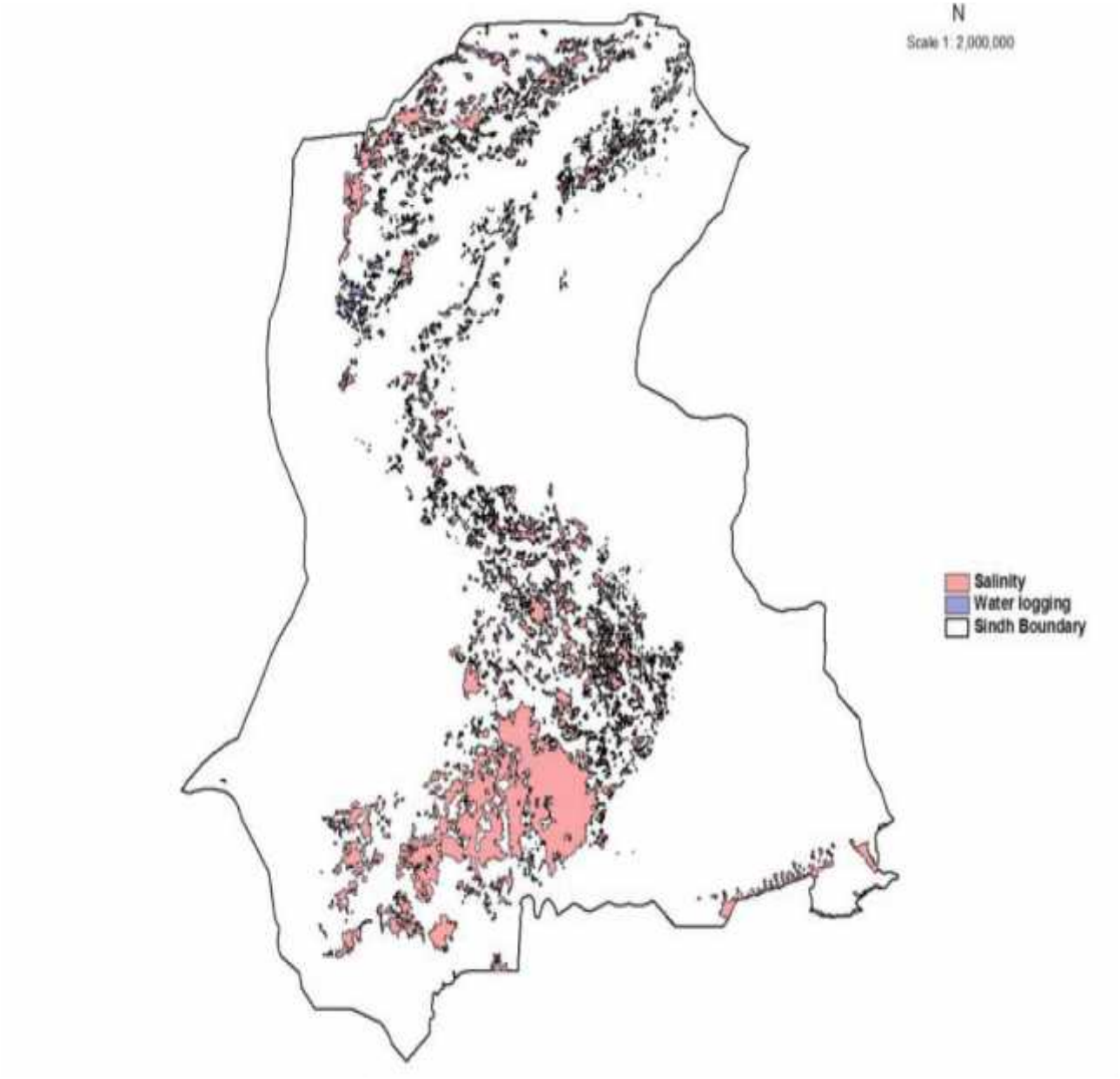
(Source: National Wash Data Diagnostic Study 2016. Ministry of Climate Change, Government of Pakistan)

Annex 10 – Zones of Irrigation Development



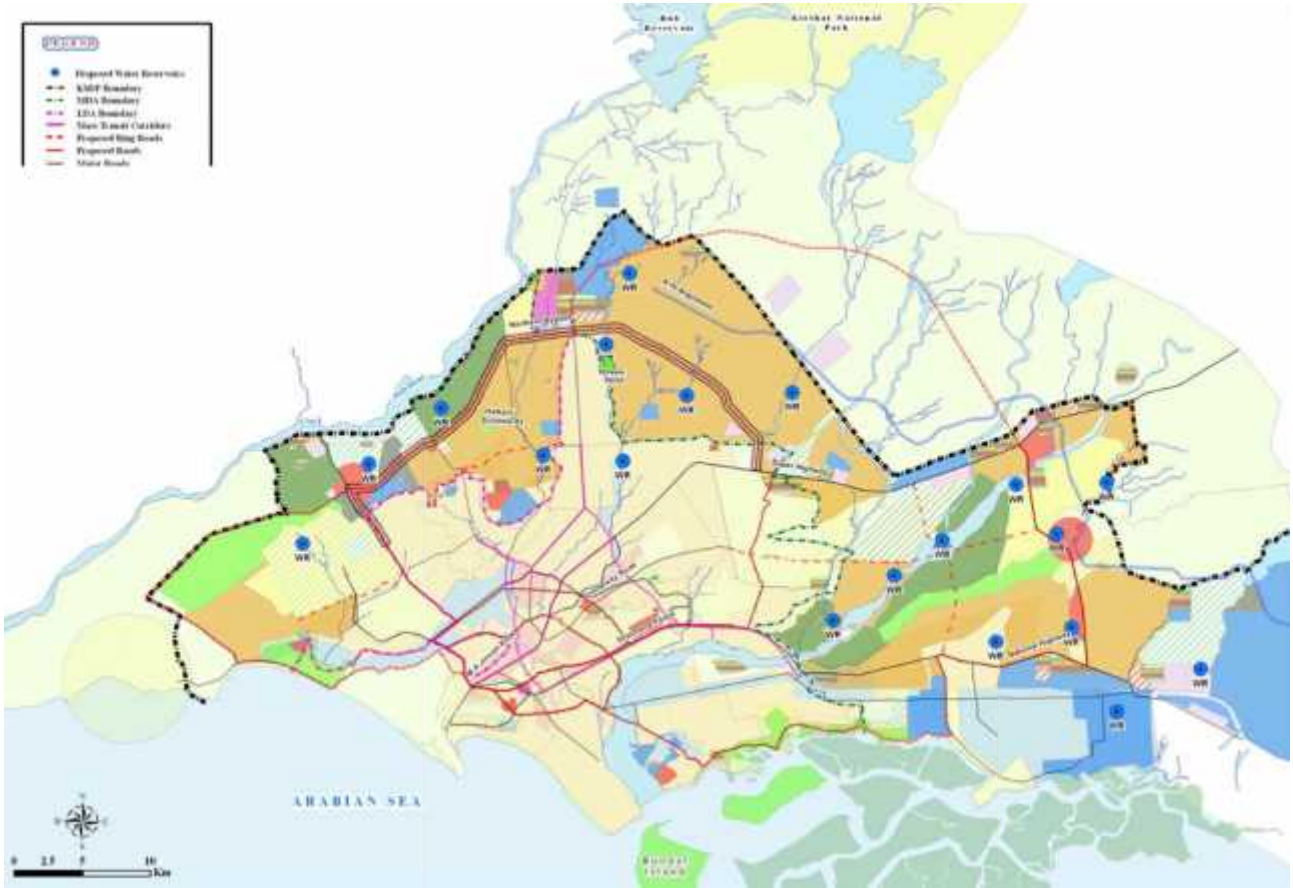
(Source: FAO, AQUASTAT 2011)

Annex 11 – Zones of Salinity and Water Logging



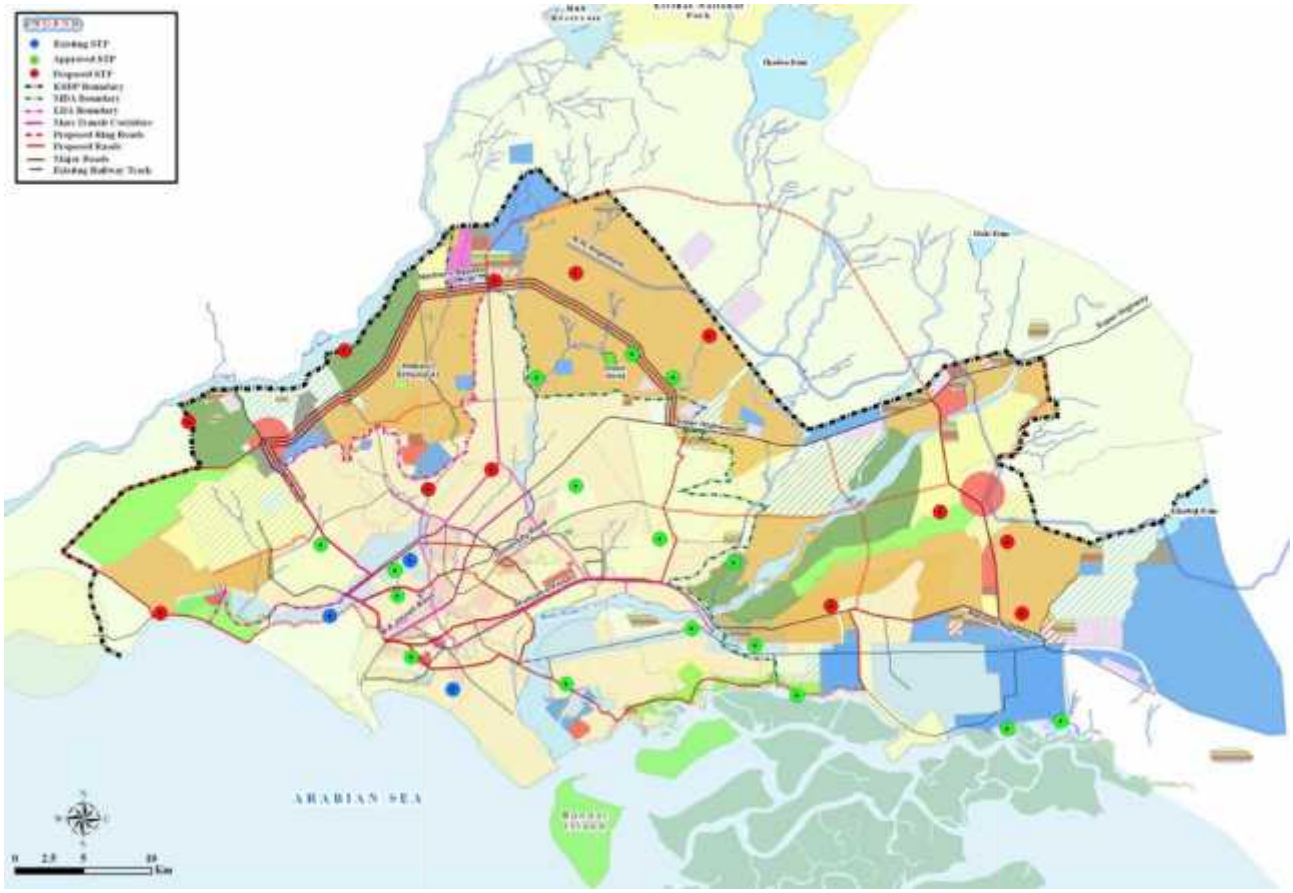
(Source: Land use Atlas of Pakistan, 2009. Ministry of Environment, Government of Pakistan)

Annex 12 – Proposed Water Reservoirs for Karachi



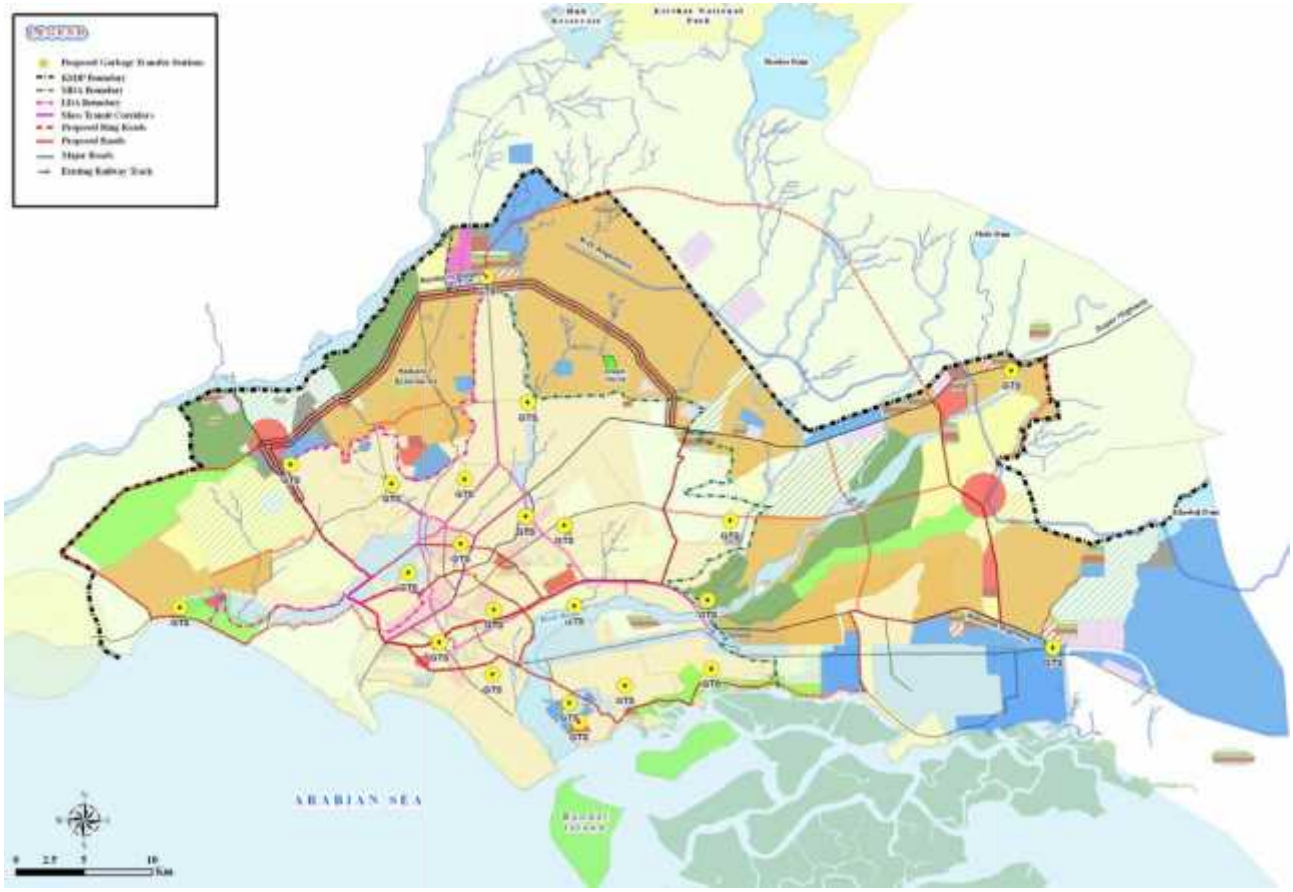
(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

Annex 13 – Proposed Sewage Treatment Plants in Karachi



(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

Annex 14 – Proposed Garbage Transfer Stations for Karachi



(Source: Karachi Strategic Development Plan 2020. Master Plan Group of Offices, City District Government Karachi)

Annex 15 – Stakeholder Analysis

Stakeholder Interviews

As part of the consultation process to develop the Sindh Sector Development Plan for WASH, several key stakeholders were consulted. The synthesis from this process is provided below.

Pakistan Council for Research in Water Resources

Pakistan Council of Research in Water Resources (PCRWR) is an apex autonomous research organisation established with the objective to conduct, organise, coordinate and promote research in all aspects of water resources. PCRWR was established in 1964, under a resolution and named as Irrigation, Drainage and Flood Control Research Council (IDFCRC) under the Ministry of Natural Resources. It was brought under the control of Ministry of Science and Technology in 1970. The Council was renamed as Pakistan Council of Research in Water Resources (PCRWR) in 1985. Since its inception, PCRWR has played its role as a national research organization by undertaking and promoting applied as well as basic research in various disciplines of water sector, more specifically, irrigation, drainage, surface and groundwater management, groundwater recharge, watershed management, desertification control, rainwater harvesting, , water quality assessment and monitoring, drinking water, industrial water, sewerage management and development of innovative water resource management, conservation and quality improvement technologies, etc.

The PCRWR is mandated to conduct, organise, co-ordinate and promote research in all fields of water resources engineering, planning and management, so as to optimally use the available land and water resources and to help achieve sustainability in the agricultural sector.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Inadequate water quality monitoring mechanism
- Poor dissemination of available knowledge (huge water quality data with PCRWR) among professionals for informed decision making
- Vast area of Sindh (about two-thirds) has brackish groundwater leading to no alternatives but costly surface water schemes
- Low priority of government on health and hygiene
- There is no check on effluent disposal into canals. The water in canals may be used for drinking and other household purposes in the downstream. This practice may have huge health impacts

Recommendations

- There is a need to take informed decisions in implementing water supply schemes while keeping water quality data in view
- Water conservation techniques should be promoted particularly rain water harvesting
- Low cost technological solutions need to be developed and adopted (indigenous bio-sand filters and arsenic removal filters) for rural areas
- Health and hygiene awareness should be made part of every scheme

- Untreated waste should not be disposed of into water bodies, particularly into canals which are the only sources of water supply in rural areas
- Irrigation department should make responsible for canal water quality

Sindh Environmental Protection Agency

Environmental and Alternate Energy Department was established in October 2002 through a cabinet order to supervise, administer and look after its subordinate directorates including Sindh Environmental Protection Agency and Alternative Energy Wing. The Sindh Environmental Protection Agency was established in July 1989 and has been working since then for the protection, rehabilitation, preservation and improvement of the environment It has two regional offices one each at Sukkur and Hyderabad while at Karachi it has a full-fledge analytical and testing laboratory.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Lack of financial and human resources in the sector
- Less sensitisation and lack of priority on wastewater treatment
- Inadequate capacity of EPA in monitoring and enforcing effluent standards
- Unplanned housing/industrial development making infrastructure planning more difficult and costly
- Burning of solid waste is on the increase by street sweepers
- Unplanned and uncontrolled cattle dens are making the sanitary conditions even worse

Recommendations

- An ecological study needs to be done for any significant change in cropping pattern (cotton reduced to 44% in Ghotki district) for better understanding of social and environmental impacts
- There should be separate policy for ground water abstraction/control
- Water logging should be addressed on priority to save/recover the most fertile lands
- Being a source of contamination; soakage pits should be banned in high water table areas
- Private sector should also be encouraged and sensitised to tackle environmental issues on priority
- The environmental mitigation measures should be properly estimated and anticipated costs should be reflected in every PC-I
- There is need to sensitise the policy makers on environmental related issues and hazards

Sindh Planning and Development and Special Initiatives Department

The P&DD is the main planning department for the Government of Sindh.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Capacity issue of professionals in the sector
- Inadequate sensitisation and lack of ownership in development works
- General tendency of over-design of schemes and thereby increasing costs
- Project management is a critical issue in designing and executing water and sanitation schemes
- Casual approach to project costing and planning as reflected through PC-1s (missing drawings, implementation plan and beneficiaries etc)

Recommendations

- Avoid duplication of efforts and resources by improving coordination among key players in the sector
- The schemes should be demand driven and should be well within the local context
- The schemes involving lower O&M costs should be preferred
- A workable implementation plan should be a part of every scheme design (PC-1) to adequately monitor progress
- Due to scarce financial resources; water and sanitation schemes need to design and implement wisely and optimally

Public Health Engineering and Rural Development Department

This is the main stakeholder responsible for execution of rural water supply and sanitation schemes.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Non-availability of potable ground water in most of Sindh
- Inadequate allocation of funds for O&M of completed schemes
- Inadequate capacity of local government department – both technical and financial- for taking over water supply and sanitation schemes completed and implemented by PHED
- Due to absence of electric connection, many completed water supply and sanitation schemes are non-functional

Recommendations

- There should be one organisation / department for both project execution and post completion O&M
- The schemes should be so designed that these could be completed in one year. The release of funds in subsequent years has always been a problem
- The funds allocated for a scheme should be made available (released) at the start of the fiscal year

- Electric connection for water supply and sanitation schemes should be given on priority basis. No scheme should be approved without approval of required electric connection
- There is need to establish a proper PHE wing in LG&RD having a pool of good engineers (transferred from PHED or newly recruited)
- Adequate funds should be allocated for O&M of the completed schemes

Directorate of Urban Policy and Strategic Planning

Government of Sindh has established the Directorate of Urban Policy and Strategic Planning (UP&SP) in the Planning and Development Department, with the mandate to plan for sustainable urban development in the province to realise the objectives of economic growth, planned infrastructure development - dictated by a strong policy and regulatory regime and to also address inequities caused by intra-urban and regional disparities. In order to achieve these objectives the Directorate has adopted a multi-pronged approach that includes preparation of policies, plans and projects - as well as discourse with the citizenry and the intellectuals.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Roles and responsibilities at various levels are vague and duplicating leading to diffused accountability
- The lack of capacity of public sector officials in taking right decisions and setting priorities for budget allocations
- Water and sanitation tariffs are too low to cover cost of service delivery that in turn leads to further deterioration of services

Recommendations

- In the Sindh context, untreated wastewater, currently being disposed of into sea, may also be looked into while developing WASH sector policies
- Instead of new schemes, budget allocation for on-goings schemes should be done on priority to ensure timely completion and to avoid cost over-run
- Water and sanitation sector policy should be synergetic with other related policies particular the health policies for having consolidated effects
- Sustainable Development Goals (SDGs) should be accounted for while developing Water and sanitation sector policies
- The O&M mechanism of Water and sanitation schemes need to be strengthened as brick and mortar type schemes are normally the priority of policy makers
- Emphasis should also be taken to complete PC-IV proforma which provides a sound basis to allocate proper O&M funds for a completed scheme
- No new scheme should be included in ADP for a particular area unless and until on-going schemes are completed
- Monitoring mechanism needs to be strengthened for effective development

Education Department – Reform Support Unit

The establishment of Reform Support Unit (RSU) was conceptualised as a means to build the institutional capability of the Department of Education. The very rationale of this programme is to streamline the existing edifice of education delivery and provide policy inputs for future advancement of education growth both in terms of access and quality. The institutional structure of RSU comprises of three wings: policy wing; monitoring and evaluation wing; and EMIS wing. The policy wing provides inputs for policy formulation and develops institutional memory of the department. The monitoring and evaluation wing develops reporting mechanisms as well as conducts evaluation of different interventions of Department of Education. The results of evaluations are ploughed back into policy. The existing structure of the Sindh Education Management System (SEMIS) has been made an integral part of the RSU as a first step to have a reliable and timely data for further policy formulation. The RSU is also envisioned as a forum to provide a platform for donor coordination as a measure to synchronise different donor's resources and efforts in a consolidated vision of educational excellence.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Inadequate funding resources for the sector
- A large majority of schools are without water and sanitation facilities
- Wrong priorities for allocation of development funds
- Capacity constraints in the water and sanitation sector

Recommendations

- Low cost technological models should be introduced, particularly for rural schools
- Aggressive awareness campaign should be launched regarding health impacts of poor sanitation and absence of proper hygiene practices
- Teaching curricula should be included in health and hygiene issues
- Water and sanitation sector should not go in isolation rather linkages should be developed with other sectors particularly health and education

Karachi Water Supply and Sewerage Board

The Karachi Water & Sewerage Board is a service based consumer oriented organisation responsible for production, transmission and distribution of potable water to the citizens of Karachi, managing sewerage systems within the city to ensure hygienic environment, development of scheme to cover short falls in services and collection of revenues for sustained economic viability.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Huge population influx in Karachi from all over Pakistan; putting more pressure on available water and sanitation services
- Ever widening demand and supply water gap in Karachi

- Water quality is a big issue in Sindh, as most of the available ground water is brackish

Recommendations

- Karachi should be given separate water quota other than for Sindh; as it is termed as mini Pakistan
- Climate change aspects need to be considered for all future developments in water and sanitation
- Water utilities need to adapt climate smart measures in their planning
- More storage reservoirs and dams are needed to capture increased water flows as a result of increased glacier melting
- Domestic and municipal water consumptions account for only 5% even then we are facing scarcity. There is need to prioritise competitive water uses
- More than 90% of available water is being used for agriculture (irrigation) with centuries old methods leading to huge losses. There is need to employ more water efficient irrigation methods and to conserve water for other uses
- Like water apportion award, we should have an interprovincial drinking water apportion award
- Wastewater recycling should be made on priority with needed treatment
- In rural areas we should introduce low cost wastewater solutions like floating gardens (constructed wetlands)
- There is need to sensitise policy makers (politicians) on water and sanitation issues and allocation of necessary funds and resources
- Water quality needs to be monitored on regular basis. Accordingly, a robust monitoring plan should be developed at provincial level

Sindh Solid Waste Management Board

The Sindh Solid Waste Management Board was established under the The Sindh Solid Waste Management Board Act, 2014 to provide for the establishment of a Board called as the "Sindh Solid Waste Management Board" for the collection and disposal of solid and other waste in the Province of Sindh.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Lack of will and dedication of public sector officials in efficient service delivery
- Wrong priority of funds allocation for development works
- Capacity constraints of water and sanitation professionals

Recommendations

- The overall goal should be to improve environment for uplifting quality of life
- Ideally solid waste management should be the purview of one entity dedicated for water and sanitation services. But solid waste should be handled by a separate entity other than water and sanitation service provider under the current circumstances
- There should be dedicated water and sewerage board at each Administrative Division level (similar to KW&SB). As water and sanitation services have upstream (if water source is in other district) and downstream (wastewater is disposed into a water body) effect, it needs macro level management

- The role of divisional boards would be to give policy and set directions. Whereas districts would be responsible for actual service delivery
- A separate section should be dedicated on solid waste in Sanitation Policy
- Adequate linkages should be suggested in policy with other areas (social, economic, health, environment etc.)

North Sindh Urban Services Corporation

The North Sindh Urban Services Corporation has been established under the Companies Ordinance 1984 for the secondary cities of the Northern cluster of Sindh Province. This Urban Services Corporation aims to aggregate participating Tehsil Municipal Administration's (TMAs) water supply, waste water and solid waste management operation in a single institution to leverage economies of scale, introduce new skills and management, and increase focus on operations, maintenance and financial management. Presently, NSUSC is being implemented in 7 cities (Sukkur/New Sukkur, Rohri, Khairpur Mirs, Shikarpur, Larkana, Jacobabad and Ghotki).

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Political Interference leading to compromised decision making
- Lack of capacity of sector officials
- Inadequate allocation of financial resources
- Insufficient machinery
- Water quality issue
- Lack of will among professionals and internal rift – impact negatively in achieving sector targets and objectives

Recommendations

- Mass awareness is needed particularly for effective water and sanitation services particularly for solid waste management
- Need to change the mind set of public – water and sanitation services are not free and need cost recovery for sustainability and further improvement
- Sensitisation and awareness campaigns should make use of schools, notables and public gatherings
- Improve water and sanitation tariff to cover at least operational costs
- Discourage free or even subsidised WSS services
- Seek customised technological solutions to meet local requirements
- Establish customers' care centre for quickly addressing public complaints
- Develop and implement SOPs for each process/step in WSS service delivery
- Involve /engage press and media proactively for disseminating of development activities, constraints and seek public support

Cantonment Board Malir

Malir Cantonment is administratively governed through "Cantonment Board Malir", a Local Body by its charter, under the jurisdiction of Ministry of Defence, through the Military Lands and Cantonment Department, headed by a Director General. The governance of the Cantonment Board derives authority from the Cantonment Act, 1924 and rules and regulations made thereunder. The cantonment maintains its own infrastructure of water supply, electricity and is outside the jurisdiction of City District Government Karachi.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- No water pricing mechanism
- Lack of solid waste dumping sites
- No or inadequate wastewater treatment

Recommendations

- Wastewater reuse needs to be encouraged after proper treatment
- Cost recovery of water and sanitation services should be ensured
- Close monitoring and keen follow up of development works should be made on priority
- Coordination mechanism among various water and sanitation sector stakeholders should be improved for expeditious outputs
- Dedicated dumping sites should be made available for solid waste disposal
- Water quality monitoring should be made a part of the overall development agenda
- Filter plants need to be installed in areas where normal water supply schemes are not economically feasible

Hyderabad Water and Sanitation Agency

Hyderabad WASA is the main utility for Hyderabad City.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Haphazard development in absence of any master plan at city level
- Low cost recovery leading towards ever deteriorating water and sanitation services
- Lack of awareness among consumers towards better use of water and sanitation services, (leakages, garbage dumping in sewers, illegal water connections and pumping through main lines etc.)
- The development projects are politically motivated thus jeopardise or at least compromise the true demand
- Change of government is detrimental to on-going schemes; as the new government has its own priorities. Resultantly the on-going schemes are inordinately delayed and in most cases are cost over-runs

Recommendations

- City wide master planning needs to done
- The funding once allocated for a scheme should be properly ensured
- The on-going schemes should have priority in receipt of development funds
- Adequate funds should be allocated for water treatment (chemicals) facilities to ensure supply of potable water to consumers
- Public awareness on water and sanitation services, cost recovery and other related issues should be aggressively followed
- Dignitaries should be involved for effective dissemination of key motivating messages
- At national level, the awareness campaign (like of polio) should be launched particularly for water conservation, health impacts and on cost recovery
- Water metering should be promoted as a critical demand management tool
- Water and sanitation sector should be reformed at city level by separating and designating responsibilities of Production, Distribution and Maintenance to three different entities
- Capacity building of water professionals should be made on regular basis
- Cash crunched water utilities should be given bailout package by government to make them financially self-sufficient
- Legal authority should be given to water utilities for enforcing its policy (illegal water and sewer connections) and boosting cost recovery
- Consumers' survey should be conducted on regular intervals to gauge the utilities outreach and level of services
- Effluent should be treated on priority
- Water storage capacity should be increased
- Governance of water sector institutions should be improved for efficient services delivery

NED Engineering University of Engineering and Technology

The NED University of Engineering and Technology, was established in March 1977 under an Act of the Provincial Assembly of Sindh after upgrading of the former NED Government Engineering College, which was set up in 1922. The NED University is thus one of the oldest institutions in Pakistan for teaching and producing Engineering graduates.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Overexploitation of groundwater which is threatening the water balance
- Water scarcity forces migration to other places which are not yet water scarce areas but could lead to further water stress
- Most of the water and sanitation infrastructure is old and hampering effective service delivery
- Irrational water pricing causes poor level of service and enhance corruption
- Most of water supply schemes are politically motivated rather than cope with the actual needs
- Water availability and demand gap is widening day by day due to increased population and lack of proper planning

Recommendations

- Wastewater should be treated and managed at source for cost effectiveness

- Pipe leakages should be addressed on priority; as these not only lead to huge wastage of treated water but also a continuous source of pollutions in overall water supply network
- Groundwater abstraction needs to be controlled
- More storage reservoirs and dams need to be built to adequately cater for variations in water availability
- The water and sanitation management for urban and rural should be designed with respect to social, cultural and economic context
- There is need to define a clear ownership of various water bodies for better monitoring of water resources
- There should be a mechanism for regular technological updating and capacity building of sector professionals
- Accountability needs to be strengthened at all levels
- Reduce discretionary powers as a policy measure
- High moral values need to be inculcated among people from all walks of life through enhanced awareness and behavioural change campaigns
- There is need to raise awareness on current water challenges (scarcity, conservation and climate change effect etc.)
- Systems should be so designed that water theft (through pumps and illegal connections) is minimised
- Solid waste should be taken as a resource and accordingly be reused or recycled
- Introduce policy of award and penalty at all levels to promote accountability and efficient service delivery

Mehran University of Engineering Technology

The Pakistan Centre for Advanced Studies in Water (PCAS-W) has been established at the Mehran University of Engineering and Technology (MUET) Jamshoro under the Cooperative Agreement signed with USAID on Dec. 12, 2014 for five years. The USAID-funded Pakistan Centre for Advanced Studies MUET in water is a state of the art and modern applied research centre. PCAS-W is a world class education and applied research centre dedicated to resolving Pakistan's water crises through applied research, developing specialist human resources and technologies; academia-industry collaboration; and policy formulation. The centres will generate cost-effective and sustainable solutions to Pakistan's challenges related to water and educating the next generation of scientists, engineers, and policy makers through innovative academic programmes in water that are focused on applied research.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Water Quality is a serious issue and is being grossly neglected by concerned agencies.
- Water treatment measures are not adequate, particularly in water treatment plants, (case of H-WASA), treatment process is being compromised (lesser degree of sedimentation, inadequate flocculation – adding no coagulant- and inappropriate filtration and absence of chlorination). Such a situation is leading to serious health risks for the consumers
- The machinery is in dilapidated situation due to no or deferred O&M
- There is no robust mechanism of monitoring and oversight
- There is need to improve accountability with proper check and balance arrangements in place

- Insufficient cost recovery
- Embedded corruption in the system

Recommendations

- Rural urban migration – needs to be studied in context of push and pull factors as water is also a push factor. Urban areas are already water stressed and any additional population influx could further aggravate the situation
- Water mapping in terms of its availability / scarcity needs to be done
- Population settlements should be adoptive of water availability /scarcity context
- Water governance needs to be strengthened
- Availability of water should be taken as a right and access should accordingly be universal (for all)
- Increase water and sewerage tariff to cover operational expenditures
- Community Participation should be through the entire project cycle
- Raising awareness on water borne diseases and its linkage with provision of water and sanitation services
- Mechanism should be in place for wider dissemination of R&D findings in the sector
- Promote low cost technologies in the sector
- In the context of growing water scarcity, wastewater re-cycling should be an option

National Rural Support Programme

Established in 1991, National Rural Support Programme (NRSP) is the largest Rural Support Programme in the country in terms of outreach, staff and development activities. It is a not for profit organisation registered under Section 42 of Companies Ordinance 1984.

NRSP's mandate is to alleviate poverty by harnessing people's potential and undertake development activities in Pakistan. It has a presence in 61 Districts in all the four Provinces including Azad Jammu and Kashmir through Regional Offices and Field Offices. NRSP is currently working with more than 2.9 million poor households organised into a network of 185,766 Community Organisations. With sustained incremental growth, it is emerging as Pakistan's leading engine for poverty reduction and rural development.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Water quality is a major issue in Sindh context
- Lack of coordination among various actors in the sector; leading to overlapping and duplication of resources and efforts
- There is no mechanism to monitor the sector issues and progress in a coherent way
- Inadequate low cost solution in rural localities particularly in sparsely populated areas

Recommendations

- Health and Hygiene should be an integral part of all schemes
- Exclusive yet mandatory funds need to be allocated for health and hygiene (soft component) in water and sanitation schemes

- An integrated approach (water, sanitation, health and hygiene) should be adopted; as schemes meeting such criteria appeared to be more sustainable and long lasting
- IEC material needs to be developed for use of improved quality water
- Behaviour change is a key in sanitation and solid waste management
- ODF needs to be promoted by sensitising communities on related health issues
- At district level, a water and sanitation coordination committee should be formulated to assess the need, monitor progress in sector and liaise with/ among participating organisations
- There should be central database for the sector to know precisely who is doing what and where
- For civil society organisations working in the sector; increased level of government support is critical for efficient service delivery
- More effective tools (school teachers, LHVs) need to be developed for sensitising the communities on health and hygiene related issues
- Softer issues should be promoted through smart messages in the media

Sindh Rural Support Organisation

Established in 2003, the Sindh Rural Support Organisation (SRSO) is the major Rural Support Programme in Northern Sindh. It is a not-for-profit organisation registered under Section 42 of the Companies Ordinance 1984. SRSO is present in 10 districts, namely Sukkur, Khairpur, Ghotki, Nausharo Feroze, Shaheed Banazirabad, Shikarpur, Jacobabad, Larkana, Kashmore-Kandhkot, and Qambar-Shadadkot. The mandate of SRSO is to alleviate poverty by harnessing the people's potential and to undertake development activities in Sindh.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Poor implementation of policy, developmental activities
- Lack of horizontal and vertical linkages in the water and sanitation sector
- Lack of consultation with key stakeholders in development planning
- Politically motivated schemes having lesser impact in overall service coverage
- Inadequate government writ in implementing its policy measures

Recommendations

- Community involvement and their active participation are critical for success of projects
- Communities' voice could be integrated through community based organisations
- There is a need to formulate a rural development policy
- All developments in rural areas should broadly follow the principles and guidelines given in policy documents
- Village Development Plans (VDPs) should be prepared for each village and should adhere to the general guidelines given in the rural development policy
- Channel more financial resources in the water and sanitation sector
- Discourage/avoid construction of open drains as these are a source of pollution and contamination
- Government officers should be given a tenure posting to avoid political influence (no threat of transfer) and promote accountability (have to leave the job after certain time)

- Capacity building of professionals involved in the sector is of paramount importance and requires due attention
- Sector planning should be done at national/provincial level and all development should follow the macro level planning
- Hygiene is a critical issue and community should be sensitised in the context of health impacts
- Governance in the sector needs to be improved by giving civil society organisations a more proactive role in planning, monitoring and execution of public sector projects
- Access to information for public sector projects should be encouraged /promoted

Research and Development Foundation

The organisation was established and registered in the year 2002 at Hyderabad with the objective to innovate social solutions against long standing problems through action research and creating impacts on lives and livelihoods of the less privileged sections of the society. The organisation was established by young and energetic development professionals who believed in values of transparency, accountability and equality. The organisation started its operations as a volunteer effort in its formative phase but later on since 2008 it started implement development projects in collaboration with funding agencies and humanitarian organisations. Hence by 2008, a formal structure of the organisation evolved and professional staff were hired to carry out the projects. The organisation is being looked after by an elected Board of Directors.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Brackish ground water in almost two-thirds of the province makes water supply schemes costly
- Communities are forced to access brackish water in the absence of any water supply scheme
- Poor consultation with communities in case of public sector schemes
- Most of the sector schemes are not demand driven; as such more likely to fail when these are handed over to communities for post completion O&M

Recommendations

- Promote low cost technologies like bio-sand filters
- Solar based technologies should be introduced in rural areas to reduce operational cost and achieve sustainability of schemes
- ODF sanitation approach should be intensified
- CLTS may be strengthened and consolidated
- More resources should be injected in the sector

HANDS

Health and Nutrition Development Society (HANDS) was founded in 1979.HANDS has evolved since then as one of the largest Non-Profit Organisation of the country with an integrated development model. HANDS has a network of 30 offices across the country and has access to more than 16.2 million population in nearly 20,274 villages/settlements in 34 districts of Pakistan.

HANDS strength is 18 volunteer Board Members, more than 1502 full time staff and nearly one million community based volunteers of 5205 medium and small size organisations.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- In urban areas, slums and poor settlements are often neglected for water and sanitation services
- Very low coverage of sanitation in rural areas of Sindh has huge health implications
- Water utilities lack in needed policy and regulation with regards to cover slum areas

Recommendations

- Water and sanitation sector should also not only be capable of responding to disasters but should also get prepared for such events
- In rural areas CLTS model should be promoted
- Low cost sanitation models should be designed and implemented for universal sanitation coverage
- Every water utility should have an exclusive policy to expand its outreach in slums and katchi abadies
- Water and sanitation services should be provided in an integrated way (water, sanitation, solid waste and wastewater treatment) where possible
- The sector plans and policy should have a strong monitoring mechanism to gauge progress and to take corrective measures during course of implementation

WaterAid Pakistan

WaterAid launched its programme in Pakistan in 2006. It has helped marginalised communities establish sustainable water supplies and sanitation services. It has also influenced government policy-makers to serve the interests of vulnerable people. WaterAid's strategy in Pakistan is to work through local partners to improve hygiene behaviour and ensure people have access to water supply and sanitation services, with a special emphasis on innovative approaches, participatory methods, women and other vulnerable groups, hygiene promotion, monitoring and evaluation, and sustainability. WaterAid is working with seven partner organisations in seven districts of Sindh, Punjab and Khyber Pakhtunkhwa to bring change in the lives of those living without safe water and sanitation.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Monitoring of water quality is a critical issue and often neglected despite huge health impacts
- Health and hygiene do not get proper attention in water and sanitation sector
- Demand management by service provider does not get proper attention leading to water scarcity in already water stressed environment

Recommendations

- Water Security mapping needs to be done and updated periodically

- Water conservation technologies should be promoted (rainwater harvesting, ground water recharging etc.)
- Donors should build capacity of the government with particular focus on policy and reforming the sector
- An integrated approach needs to be followed in the water and sanitation sector. End of pipe solutions (effluent treatment) should also get priority in overall development agenda/ planning
- District level water and sanitation coordination mechanism needs to be developed for developing synergies and avoiding overlapping of resources and efforts
- Strengthen implementation monitoring mechanism for development effectiveness
- Central database for water and sanitation sector need to be maintained at district/provincial level for generating updated reports
- There should be time bound targets at all levels (policy, implementation, service providers, increasing access etc.)

Plan Pakistan

Plan is an International, Child Centred Community Development Organisation with no religious, political, or government affiliation. Plan Pakistan is a member of its global network of 66 Countries working with 10 million children, women and men. Plan Pakistan began its programmes in Pakistan in 1997 and its work covers around 150 communities, benefiting about 50,000 children under the areas of health, education, livelihood, child and gender rights, and disaster risk reduction and response. Plan implements its programmes and projects at the grassroots level in Health, Education, Water and Sanitation, Income Generation, and Building Relations.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Lack of capacity of services provider in synergetic planning and implementation
- Absence (or insufficient) of central database of the water and sanitation sector
- Negligible attention on wastewater treatment
- Lack of support funds (for logistics, travel, equipment, stationery etc.) in public sector entities, leading to inefficient services delivery
- Ambiguity and confusion in sector jargons (ODF, CLTS, PATS etc.)

Recommendations

- Need to develop workable coordination among sector actors particularly among donors
- CLTS approach should be effectively followed for expanding access to safe sanitation services
- The villages that have successfully achieved ODF status should be given water supply schemes on priority as an incentive
- There is a need to develop ground water monitoring to regulate abstraction of this scarce resource
- Water and sanitation sector should be viewed in totality (keeping in view, other developments, environment and social aspects) for sustainability of interventions
- Encourage re-use of water through treatment
- ODF campaign should be followed religiously

- Appropriate tools should be employed for awareness raising and behaviour change; these include use of LHWs, School teachers, UC Secretaries, and children. The capacity should accordingly be built for persons involved
- BHU doctors should also be involved in ODF campaign; as they can better highlight health impacts of poor sanitation conditions
- A dedicated unit should be established at provincial level to monitor progress of milestones identified in water and sanitation policy/strategy
- Uniformity and consistency – with clear definitions- should be made in sector Acronyms to avoid confusion
- Consistent approach (with similar incentives, subsidies etc.) should be followed, at least in the same district; in implementing various programmes in an area to avoid implementation confusion
- Academia should involve in the water and sanitation sector particularly for finding low cost solutions for water, sanitation and wastewater treatment

Asian Development Bank

The Asian Development Bank (ADB) was conceived in the early 1960s as a financial institution that would be Asian in character and foster economic growth and cooperation in one of the poorest regions in the world. ADB assists its members, and partners, by providing loans, technical assistance, grants, and equity investments to promote social and economic development.

The following key challenges were identified and recommendations made during the consultation.

Challenges

- Diffused responsibilities in the sector leading to inefficient services and lack of accountability
- Absence of any anchor/ focal department at district level (to whom interested parties/donors could directly interact)
- Lack of political will to implement the development agenda
- Wrong priorities in allocation of funds and resources
- Capacity building gaps among the policy makers, institutions and civil society organisations

Recommendations

- Overall management/ governance of water and sanitation sector needs to be strengthened
- In urban context, provision of water and sanitation services should be well integrated with the overall urban sector planning. Sector development in isolation would be bound to fail or ineffective
- Political leadership needs to be sensitised on water and sanitation sector's needs and requirements through awareness raising, dialogue and exposure visits
- Need to find political champions among the policy makers and critical mass within the system to bring required change in a sustainable fashion
- Different governance/ management structure for rural and urban areas in water and sanitation sector should be kept in mind while doing development planning
- A synergetic approach should be followed in policy measures for water and sanitation sector (Considering urban planning, environment, education and other related sectors)
- Performance benchmarking in the sector needs to be introduced. Accordingly, the sector institutions should be rewarded/penalised

- Monitoring of sector should be strengthened by introducing crispy and measureable indicators
- An output based budgeting needs to be done
- Academia also be sensitised to play its active role in water and sanitation sector through R&D and technological innovations

Focus Group Discussions

Over 50 Focus Group Discussions (FGDs) were held with students, teachers, local councillors, community members, LHWs etc to gauge their views about water and sanitation in the province. These FGDs were undertaken in Hyderabad, Sanghar, Dadu and Gadap Town in Karachi.

The following key themes emerged from the FGDs.

Water

A mixed trend of piped water supply and ground water pumping has been observed. Cities i.e. Hyderabad, Karachi and some areas of Dadu have water supply connections. However, towns/small cities i.e. Mithi, Shahdad Pur (Sanghar) rely entirely on ground water. In rural areas, ground water is the major source, while dug wells (particularly in Tharparkar) and canal water are other sources. Complaints of old laid water supply lines; water contamination (bad smell, taste and colour) and brackish water are very common. Filtration plants have been installed in big cities and towns. However, timely maintenance (Cartridge replacement) of these filters remains a question mark. Furthermore, delay in construction of development projects has also observed i.e. water filtration plant in village Tando Fazal, Hyderabad is under construction since the last one and half year and, while a city level filtration plant in Shahdadpur Sanghar is under construction since the last two years. A trend of purchasing drinking water at the rate of PKR 20-30 per can (10-20 litres) has also been observed in urban areas. Hepatitis and jaundice diseases are found in all of the interviewed communities.

Sewerage/Drainage

Piped sewerage is available in most of the urban areas of Karachi, Hyderabad, Dadu and Shadadpur (Sanghar). However, there are common issues of overflowing of sewerage gutters. There are two major factors that lead to this situation 1) desilting of gutter/sewerage line has not been performed regularly; 2) natural gravity is not available for sewage flow and lines are connected with sewerage wells that throw water to the main trunk line by way of a motor pump - however, due to load-shedding or disconnection (because of over-dues) of electricity from motor-pumps, this system is not functional. Furthermore, open drains exist in some areas of Dadu, Shadadpur (Sanghar) and Mithi, and in entire rural areas. However, in urban areas drains are paved while in rural areas unpaved drains are common. It is generally observed that waste water flows directly to canals without any treatment in urban areas, while in rural areas it is flows to the streets (if drain system doesn't exist) or to the fields (if drain system exists).

Toilets

Household toilets are available in almost all of the urban areas except urban slums (Bhagri Mohalla Dadu). Majority of these toilets are connected directly with sewerage lines or open

drains. However, toilets connected with septic tanks also exist in urban areas. In larger villages, household level toilets exist above 50%, while in smaller villages/hamlets the concept of household toilet is not common or its need appreciated. The members of households without toilets defecate in the open. Furthermore, toilets in rural areas are mostly connected with unpaved pits and infrequently with septic tanks.

Solid Waste Management

Urban areas have been served with solid waste management services by the Government. However, non availability of street level dumping stations or trolleys are very common complaints. Generally, garbage is dumped in empty plots from where it is collected in a range of time between 2 days to a month. Furthermore, regular sweeping of streets is very uncommon in small cities/towns i.e. Dadu and Mithi. There are no solid waste services in rural areas. In larger villages, communities themselves allot a place for dumping solid waste and very occasionally burn it.

Hand Washing

Regular hand washing with soap before eating and after toilet is not above 50%. However, washing hands with water only or occasionally hand washing with soap is common. In FGDs with LHWs, it was revealed that hand washing before breastfeeding by lactating women is not common.

Governance

Generally, the community doesn't show their satisfaction from WASH services by the government. However, the newly elected local government representatives prioritise WASH issues. But these elected representatives are not clear about their role as per the SLGA 2013.

NGOs Initiatives

A number of NGOs have been implementing WASH related projects i.e. HANDS and OPP in Karachi; Sukaar Foundation, Sami Foundation and NRSP in Mithi; RDF in Hyderabad; Oxfam in Dadu and; DevCon in Sanghar etc.

National Lady Health Workers Programme

National LHW programme is the largest programme in terms of outreach in which almost 90% or more areas are covered with this programme. WASH is part of the curriculum of LHWs i.e. use of boiled or filtered drinking water, keeping toilets clean and door closed, hand washing before eating/feeding and after toilet use. LHWs have also formed women groups to whom they deliver sessions for peer to peer learning. Furthermore, WASH mapping of respective areas i.e. type of water sources, toilet availability and drainage system is part of LHWs monthly reports. However, there is no centralised WASH database to capture information obtained from these monthly reports.

School WASH

Piped water in urban area schools and ground water in rural area schools are the main source of drinking water. However, bad taste, yellow colour, bad smell and brackish water have also been recorded regarding school water. Furthermore, except for some NGO initiatives, the water test has never been performed for school water.

School toilets exist in almost all of the schools. However, there are a considerable number of non-functional toilets due to inappropriate management. There are a number of factors that contribute to this situation e.g. unavailability of water or excess of water in toilets, not cleaning toilets regularly and choked toilets due to improper drainage. Furthermore, implementation of guidelines of Sindh Education Sector Plan 2014-18 for toilet facility i.e. one toilet per 25 girls and one toilet per 40 boys has not observed in the schools visited. In high schools, this ratio is above 100 students per toilet.

Soap availability at hand washing facilities of schools has not been seen in schools except those schools where an NGO or soap company provided soap. However, most of the students claim that they wash hands with soap after using toilet. This suggests that there is knowledge of critical times of hand washing and may even be practiced.

Except some NGO's training of teachers and school level sessions, no WASH training of teachers has been conducted by the education department. However, school level sessions on hand washing by some soap companies in urban areas and by NGOs in rural areas has created awareness among students. A nutrition officer from the respective BHU also visits the school on monthly basis and he/she occasionally imparts a session on WASH practices. Teachers don't consider that the existing curriculum addresses the WASH issues.

The themes that emerged from stakeholder consultation were used to develop strategic priorities for the sector development plan.