

Bridging the Gap: Clean Water Access and Hygiene Innovations for Karachi's urban Poor Communities



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Inauguration of Water Filtration Plant
at Pak Colony, Karachi
by
Mr. Eugene Willemsen
Chief Executive Officer PepsiCo for Africa,
Middle East and South Asia
March 16, 2022

Plant has been handed over to District Municipal Corporation (DMC) Pak Colony for its future operations & maintenance.



Citation:

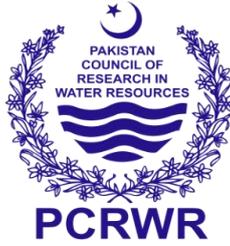
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**Pakistan Council of Research in Water Resources (PCRWR)
(2025)**

Abbreviations and Acronyms

BCC	Behavior Change Communication
CSR	Corporate Social Responsibility
DMC	District Municipal Corporation
ERS	Electric Resistivity Survey
GBSS	Government Boys secondary School
HCF	Health Care Facility
IP	Implementing Partner
KII	Key Informant Interview
KMC	Karachi Metropolitan Corporation
KWSB	Karachi Water and Sewerage Board
M& E	Monitoring & Evaluation
MGD	Million Gallon per Day
MICS	Multiple Indicator Cluster Survey
MOU	Memorandum of Understanding
NGOs	Non Government Organizations
O&M	Operations and Maintenance
PCRWR	Pakistan Council of Research in Water Resources
PSF	Pakistan Science Foundation
R.O	Reverse Osmosis
SEGMITE	Society of Economic Geologists and Mineral Technologists
SEPA	Sindh Environmental Protection Agency
SITE	Sindh Industrial and Trading Estate
TDS	Total Dissolved Solids
UF	Ultra Filtration
WASH	Water, Sanitation and Hygiene
WAP	WaterAid Pakistan
WHO	World Health Organization
WSS	Water Supply Scheme
WUC	Water User Committee

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Executive Summary

The project "Improving Access to Clean Drinking Water for the Urban Poor in Karachi City" was a collaborative effort between the Pakistan Council of Research in Water Resources (PCRWR), WaterAid Pakistan (WAP), and PepsiCo. It aimed to address the acute water scarcity and poor hygiene conditions faced by underserved communities in Pak Colony (SITE) and Damba Goth (Gadap Town), Karachi. Karachi, Pakistan's largest metropolis, grapples with severe water challenges, including unreliable piped water supply, saline and contaminated groundwater, and heavy reliance on costly private water sources. These issues have disproportionately impacted low-income communities, where waterborne diseases and inadequate sanitation remain prevalent. This project was designed to provide sustainable solutions, reduce health risks, and empower communities through access to clean drinking water and improved hygiene practices.

The installation of Water Filtration Plants was a cornerstone of the initiative, ensuring affordable and safe drinking water for over 40,000 people. These systems addressed critical water quality issues such as high salinity and contamination, which had long posed significant health risks. Alongside the technical interventions, the project mobilized community members, healthcare facilities, and schools to adopt better hygiene and sanitation practices. Awareness campaigns emphasized safe water handling, handwashing, and other key practices, with particular focus on women and children as key agents of change.

Sustainability was embedded in the project through the formation of Water User Committees (WUCs) and School WASH Clubs. These community-level institutions were trained to manage, operate, and maintain water supply systems effectively, ensuring long-term functionality. Targeted training sessions equipped water operators, caretakers, and community representatives with the skills needed for operation, maintenance, and water quality management. These efforts ensured that the interventions remained operational and impactful beyond the project's lifecycle.

To share knowledge and inspire replication, human-interest stories were documented to showcase the project's transformative impact. A knowledge-sharing event brought together stakeholders to highlight the project's achievements, best practices, and lessons learned, fostering opportunities for replication in other urban areas facing similar challenges. By integrating technical solutions with institutional strengthening and community engagement, the project significantly reduced waterborne diseases and enhanced the overall health and resilience of the target communities. It stands as a model for addressing water and hygiene challenges in urban settings through multi-stakeholder collaboration and community-driven approaches.

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Our sincere appreciation goes to Ms. Raheema Panhwar, Provincial Coordinator, WaterAid Pakistan for Sindh Province, whose dynamic role bridged PCRWR, the Local Government of Sindh, and WaterAid for effective project management and successful outcomes. We are equally grateful to Mr. Adnan Hakeem, Manager Program Urban, Mr. Munawar Hassan Memon, Head of Programs, Mr. Khurram Hassan, M&E Coordinator, and Ms. Nighat Immad, M&E Officer, for their instrumental role in project development, evaluation, approval, and technical support.

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1. Background

Water scarcity in Pakistan has reached critical levels, posing a serious threat to public health, economic development, and social and political stability. Pakistan is the third most water-stressed country in the world and is rapidly approaching absolute water scarcity, with forecasts predicting that it will run out of water by 2040 (Shahzaib et al., 2022). The combination of rapid population growth, urbanization, climate change, poor governance, and water scarcity exacerbates the problem, leaving millions of people without access to safe and reliable drinking water (World Bank, 2018). Poor governance, aging infrastructure, and a lack of awareness among the population about water conservation and safe water systems have exacerbated this national crisis (Kumar et al., 2022).

Karachi, Pakistan's largest and most populous city, is a prime example of the water crisis plaguing the country. The Karachi Water and Sewerage Board (KW&SB) oversees the city's extensive water supply network, primarily sourcing from the Indus River via Keenjhar Lake, which accounts for approximately 95% of the supply (Sindh Bureau of Statistics, 2021). As of the 2023 census, Karachi's population has reached approximately 20.3 million (Pakistan Bureau of Statistics, 2023) and a water demand of about 1,200 million gallons per day (MGD). However, the city is currently receiving approximately 650 MGD, leaving a huge gap of 550 MGD (WWF, 2019; Kumar et al., 2022; DAWN News, 2023). This shortage forces many residents to rely on illegal and unregulated water markets, such as private water tankers and oil refineries operated by traders. This dependency disproportionately affects low-income communities, where the financial burden of purchasing water is difficult (Shahzaib et al., 2022). In addition, groundwater in Karachi has a salinity level of 4,000 to 12,000 ppm, which is above the World Health Organization's recommended drinking water limit of 1,000 ppm, making it unsafe to drink (WWF, 2019).

Karachi's water woes don't end there; studies show that 41 percent of the city's population lacks access to well-managed drinking water, and more than 90 percent of water sources are contaminated with bacteria and other pollutants (Kumar et al., 2022, Ahmed, 2023). As a result, waterborne diseases such as diarrhea, typhoid, and hepatitis are widespread, particularly affecting the health of vulnerable groups such as women, children, and the elderly (Bocha et al., 2023, PCRWR, 2022). According to the Sindh Multiple Indicator Cluster Survey (MICS) 2017–2018 report, published in 2021, 65.4% of the household population in Sindh province faces the risk of fecal contamination in source water due to *E. coli* presence, with the percentage rising to 79.1% in Karachi. Notably, contamination levels are higher at the household level, reaching 85.3% in Sindh province and 85.5% in Karachi, indicating significant risks throughout the water distribution chain (Sindh MICS, 2021). In addition, the city's water infrastructure is clogged and poorly maintained, with frequent leaks and illegal connections leading to water waste and pollution (DAWN News, 2023).

Challenges such as aging infrastructure, insufficient supply against growing demand, high contamination levels, and water theft persist. Frequent pipeline leaks and illegal connections exacerbate water losses, while the insufficient residual chlorine in supply water indicates compromised quality (Ahmed, 2023). A survey conducted in Karachi found that 86 percent of respondents said they had not received piped water from the KWSB for a long time. Instead, residents rely on private water suppliers or water sources such as hand pumps and wells, which are unreliable and unsafe (Shahzaib et al., 2022). Surprisingly, 42 percent of respondents said that the authorities have not conducted any water quality testing, and 58 percent were unaware of any testing. The lack of regulation poses a risk to public health and hinders building trust in water systems (Kumar et al., 2022). The KWSB, the city's main water utility, is struggling to address the problem, plagued by financial inefficiency, mismanagement, and political interference (WWF, 2019).

Recognizing these urgent challenges, the Pakistan Council of Research in Water Resources (PCRWR), in collaboration with WaterAid Pakistan and with funding from PepsiCo, initiated the project "Improving Access to Clean Drinking Water for the Urban Poor in Karachi City." This intervention aimed to address water access, quality, and management issues in two of Karachi's most underserved communities: Pak Colony (SITE) and Damba Goth (Gadap Town) (PCRWR, 2022).

1.1. Objectives and Approach

The overarching goal of the project was to improve access to clean and safe drinking water while promoting hygiene and environmental sanitation in low-income urban settlements. Specific objectives included:

- i) **Ensuring Sustainable Access to Safe Drinking Water:** Providing clean water to underserved communities through improved infrastructure and sustainable solutions.
- ii) **Strengthening Institutions:** Establishing and upgrading water and sanitation facilities in schools and healthcare institutions to improve health outcomes.
- iii) **Capacity Building:** Training community-based water operators and technical staff for effective operation and maintenance (O&M) of water supply systems.
- iv) **Behavioral Change and Awareness:** Promoting safe water practices, hygiene, and environmental sanitation through targeted campaigns and community engagement.

The project adopted a multi-dimensional approach, combining technical interventions with community-driven solutions. This included installing and rehabilitating water filtration plants, providing WASH (Water, Sanitation, and Hygiene) facilities in healthcare and educational institutions, and conducting public awareness campaigns to encourage safe water usage and hygiene practices. The project also focused on empowering women and marginalized groups, ensuring that their voices were included in decision-making processes related to water management.

1.2. Key Outputs and Results

a) Improved access to clean drinking water:

The program directly addresses critical gaps in access to clean water in target communities through the installation of community treatment plants and rehabilitation of water supply infrastructure. As a result, thousands of residents in Pak Colony and Damba Goth now have access to safe drinking water, reducing their dependence on the expensive and unregulated sanitary water market.

b) Reduce water-borne diseases:

By ensuring access to clean water and promoting sanitation, the program helps to significantly reduce water-borne diseases such as diarrhea and typhoid in target areas. The impact is more important for the poor, including children under five and patients in health centres.

c) Construction and Public Ownership:

Waterworker and technician training programs ensure the operation and maintenance of water supply systems. At the same time, community institutions were established to oversee water management and enhance residents' sense of ownership and responsibility.

d) Improving WASH facilities in schools and health care facilities:

The installation of sanitation facilities in schools and health care facilities improves the overall quality of services provided by these facilities. Students, teachers and health workers reported improved hygiene standards and increased access to clean drinking water, creating healthy learning and recovery environments.

e) Behavior Change and Public Awareness:

The program conducts activities to educate the public about the use of safe water, sanitation and a clean environment. These include clean and green campaigns and community workshops that successfully encourage residents to adopt practices such as hand washing, safe water storage and household water purification.

The Improving Access to Clean Drinking Water for the Urban Poor in Karachi project represents a pivotal effort in addressing the city's pressing water crisis. By integrating technological innovations with community-driven solutions, the initiative exemplifies that achieving sustainable and equitable access to clean water is feasible, even in underprivileged urban areas. However, to secure long-term water sustainability for Karachi's residents, it is imperative to tackle broader systemic challenges, including efficient water management, infrastructure modernization, and heightened public awareness.

This initiative underscores the pressing need for greater investment in water infrastructure, the establishment of robust governance frameworks, and active community engagement in managing water resources. As Karachi's population continues to expand, the insights gained from this program can provide a valuable blueprint for scaling up similar interventions in other underserved areas, fostering a healthier and more sustainable future for all.

1.3. Project Implementation Methodology

The project employed a systematic, community-centered, and sustainable approach to ensure the effective and efficient achievement of its objectives. The methodology was carefully designed to integrate technical, social, and behavioral interventions, addressing the complex water supply and sanitation challenges in Karachi's targeted informal settlements. The key steps undertaken during the project implementation are outlined below:

I. Baseline Assessment and Community Engagement

Comprehensive baseline studies were conducted to evaluate the existing water and sanitation infrastructure, identify gaps, and understand community needs. Stakeholder consultations and focus group discussions were organized to engage local residents and build trust, ensuring their active participation throughout the project lifecycle.

II. Capacity Building and Awareness Campaigns

Training sessions were conducted for community members, focusing on water conservation, safe hygiene practices, and the operation and maintenance of water systems. Awareness campaigns, including workshops and door-to-door outreach, emphasized the importance of clean water and sanitation, fostering behavioral change at the grassroots level.

III. Infrastructure Development and Technological Interventions

Modern, cost-effective water treatment systems were installed, including borewells, community water collection units, water storage facilities, tailored to the specific needs of the target communities. The project incorporated technology-driven solutions, such as water quality monitoring and efficient distribution mechanisms, to ensure sustainability and reliability.

IV. Strengthening Institutional Frameworks

Local water user committees (WUCs) were established and trained to oversee the maintenance of installed infrastructure. Partnerships with local government agencies and non-governmental organizations (NGOs) were fostered to ensure long-term support and scalability.

V. Monitoring and Evaluation

Regular monitoring and evaluation mechanisms were implemented to track progress, assess the impact of interventions, and identify areas for improvement. Feedback from the community was continuously incorporated to refine and optimize project activities.

1.4. Introduction to the Project Areas

The proposed project aimed to address the pressing challenge of access to clean drinking water and improved hygiene within targeted communities in Karachi. Site selection was guided by a comprehensive assessment of water availability, quality, and overall sanitation conditions in the identified areas. Based on this evaluation, two primary locations were selected for implementing water supply interventions: Pak Colony in S.I.T.E. Town and Damba Goth in Gadap Town, District Malir.

1.4.1. Pak Colony, S.I.T.E. Town (District WEST, Karachi)

The first location identified for the intervention was Union Council 05, Pak Colony, in S.I.T.E. Town. This area was prioritized due to the acute scarcity of clean drinking water, as municipal water supply services were virtually non-existent. A joint field visit conducted by PCRWR, WaterAid, and local government officials in December 2020 revealed that municipal water connections were either unavailable or, where present, water reached the community only once every 30–40 days. According to community reports, this irregularity significantly compounded the challenges of accessing potable water.

The water crisis was further intensified by the absence of surface water sources and the poor quality of groundwater, which exhibited salinity levels between 4,000 and 12,000 ppm Total Dissolved Solids (TDS). These conditions forced residents to rely on purchasing water from tankers or shops or resort to using contaminated groundwater for drinking purposes, leaving the community highly susceptible to waterborne diseases.

To thoroughly evaluate the extent of the water crisis and identify viable solutions, a detailed field assessment was carried out on December 11, 2020, by PCRWR, WaterAid, and local government representatives. The team inspected water sources, assessed available land for potential interventions, and explored sustainable approaches. Water samples collected from an underground borewell installed at a depth of 250 feet near the DMC office in Kemari revealed a TDS level of 4,500 ppm, confirming the high salinity of the groundwater in the area.

Given the unavailability of surface water and the severe contamination of groundwater, the installation of a Reverse Osmosis (RO) system was proposed. With a capacity of 50,000 gallons per day (approximately 2,000 gallons per hour), the system was intended to provide clean drinking water to an estimated population of 10,000–12,000 residents daily.

1.4.2. Gabolabad and Damba Goth, Gadap Town (District Malir)

The second location identified for intervention encompassed Gabolabad and Damba Goth, situated near the M-9 motorway (Karachi-Hyderabad) in Gadap Town, District Malir. Based on recommendations from senior management of both partner organizations, the project team conducted field visits to these areas to assess the drinking water situation.

Gabolabad consists of 15 scattered villages housing over 900 households. Among these, only four villages have access to surface water, while the remaining rely solely on untreated water delivered by tankers.

Damba Goth, with an estimated population of 20,000 individuals across more than 4,000 households, primarily depends on untreated surface water, which is fecally contaminated and frequently mixes with sewage lines. During the site visit, it was observed that the water pipes in the existing water supply system were outdated and damaged, contributing to significant water contamination. The community, particularly children under 5 and female population group was reported to suffer from waterborne diseases due to these unhygienic conditions.

After conducting a transect walk of the area, the PCRWR and WaterAid teams identified the Eid Gah location in Damba Goth as the most suitable site for establishing a filtration plant. This site was selected for its strategic accessibility to both the broader community and local schools. The proposed water source for the filtration plant is surface water supplied through the K1 scheme, which was determined to be non-saline. However, the surface water was biologically contaminated, necessitating disinfection.

To ensure safe drinking water for the community, the project proposed installing a solar-powered ultra-filtration plant at the site. This solution is designed to treat the contaminated water effectively, providing clean and safe drinking water to the residents of Damba Goth and the surrounding areas.

1.5. Site Selection Process

The selection of these sites was based on a detailed analysis of water availability, water quality, and the existing infrastructure challenges. The major criteria for site selection included:

- **Lack of Access to Clean Drinking Water:** Both areas had limited or no access to clean, safe drinking water, with groundwater being saline and surface water contaminated.
- **High Population Density:** Both sites had significant populations in need of immediate intervention, with a high number of households relying on unsafe water sources.

- **Infrastructure Challenges:** The existing water supply systems were either non-functional or inadequate, requiring the installation of new filtration systems to ensure clean water access.
- **Community Vulnerability:** Both areas had a high prevalence of waterborne diseases, particularly among vulnerable groups such as children, underscoring the urgency of intervention.

1.6. Key Issues in the Project Areas

Several major issues were identified during the site assessments:

- **Absence of Reliable Surface Water Supply:** The unavailability of reliable surface water sources posed a significant challenge to providing clean drinking water.
- **Contaminated Groundwater:** The elevated salinity and contamination of groundwater, with TDS levels ranging from 4,000 to 12,000 ppm, rendered it unfit for consumption without proper treatment.
- **Inadequate Water Supply Infrastructure:** The existing water supply infrastructure, where available, was either outdated or in disrepair, further contributing to water contamination.
- **Health Impacts:** The community, especially children, faced severe health risks due to waterborne diseases caused by the consumption of contaminated water.
- **Lack of Treatment and Disinfection:** The lack of water treatment facilities, both for surface water and groundwater, necessitated the installation of advanced filtration systems.

By addressing these key challenges and selecting strategic locations based on community needs and water quality assessments, the project aims to provide sustainable and safe drinking water solutions to these underserved communities .

2. Project Interventions

2.1. Baseline Survey and Data Collection

The project began with a comprehensive baseline survey designed to collect essential data on the targeted communities, schools, and healthcare facilities. This survey offered valuable insights into the availability and quality of clean drinking water, hygiene and sanitation practices, and the overall Water, Sanitation, and Hygiene (WASH) landscape. These findings informed the project's strategic planning, allowing for a customized approach to address the specific needs and gaps of each community effectively.

WaterAid Pakistan (WAP) led the baseline survey, conducted between April and May 2021, to evaluate the conditions of the targeted communities in Karachi. The survey involved 330 community members and included seven Key Informant Interviews (KIIs). Gender balance was prioritized, and respondents were randomly selected from five key areas: Willayatabad Pak Colony, Asifabad Colony, Hasrat Mohani, Punjabi Parra, and Yasin Zubairi Colony in Union Council-5, SITE area, Karachi.

The primary objective of the baseline survey was to collect critical data on the availability and quality of clean drinking water, as well as community awareness and practices regarding water sources, treatment, storage, and hygiene behaviors. A mixed-methods approach was employed, integrating qualitative and quantitative data collection techniques. These included literature reviews, household assessments, and KIIs, ensuring alignment with the project's objectives and facilitating the development of targeted interventions tailored to the specific needs of the communities.

2.1.1. Household Assessment

A structured household assessment was carried out using a comprehensive questionnaire designed to evaluate key aspects such as drinking water access, water treatment practices, handwashing behaviors, and sanitation. A cluster sampling approach was employed to ensure a representative sample of 330 households, maintaining a 95% confidence level with an 8% margin of error. On average, 65 respondents were randomly selected from each of the five targeted locations.

Special efforts were made to achieve balanced representation of men and women in the survey, although cultural constraints presented challenges in securing full female participation. Enumerators employed a random selection method to identify households, ensuring diverse participation from adult men and women within each household. The method ensured the inclusivity and reliability of the data collected, providing a well-rounded understanding of household water and sanitation practices.

2.1.2. Key Informant Interviews (KIIs)

To supplement household data, 7 KIIs were conducted with stakeholders from PCRWR, KWSB, the District Health Office, and local government schools. A standardized KII checklist was used to guide the interviews, which focused on

challenges related to water availability, demand and supply gaps, operation and maintenance of water systems, and community engagement with government interventions.

2.1.3. Data Collection Challenges and Solutions

Challenges	Solutions Applied
Hesitancy of participants due to the COVID-19 pandemic	Adherence to COVID-19 SOPs, including maintaining social distance
Unavailability of respondents during the day	Data collection at alternative times
Low female participation	Recruitment of female enumerators to encourage participation, though cultural constraints limited full representation

2.1.4. Study Delimitation and Limitations

The baseline survey was conducted as a regular monitoring exercise, with data used to inform the project's implementation strategy. Given the time constraints and procedural requirements in Pakistan for survey approval, public dissemination of the findings was not pursued.

2.1.5. Ethical Considerations

Informed consent was obtained from all participants, with a clear explanation of the survey's purpose and the confidentiality of the collected data. Participants were assured of voluntary participation and that the findings would be used solely for program design and intervention planning.

This baseline survey provided valuable insights into the WASH landscape in the targeted communities and guided the development of interventions tailored to address specific water, sanitation, and hygiene needs.

2.1.6. Baseline Survey Key Findings

i) Drinking Water Sources

The baseline survey revealed that 81% of respondents, representing an overwhelming majority, rely on private vendors to purchase drinking water from filtration plants. This underscores the critical dependence on private-sector solutions for water access in the absence of reliable public infrastructure. Only 14% of respondents reported accessing water through piped water supply, while a mere 5% use communal hand pumps or boreholes, reflecting limited accessibility to alternative water sources (Fig.1).

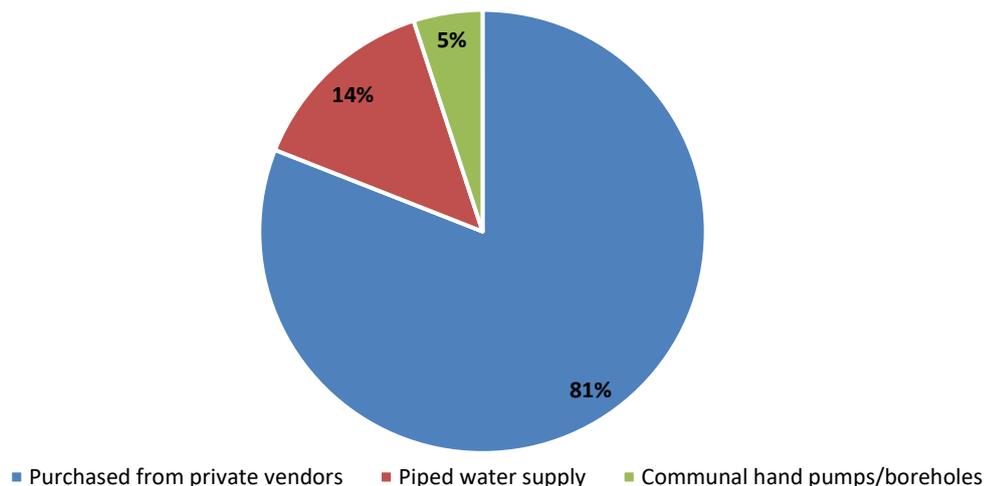


Figure 1: Showing the drinking water sources based on Base line survey

ii) Location of Water Sources

For 86% of households surveyed, the primary drinking water source is located outside their dwelling, with 81% relying on filtration plants and 5% depending on communal hand pumps or boreholes. Only 14% of households have access to piped water sources within their dwellings, emphasizing the logistical challenges faced by the majority in fetching water from external locations (Fig.2).

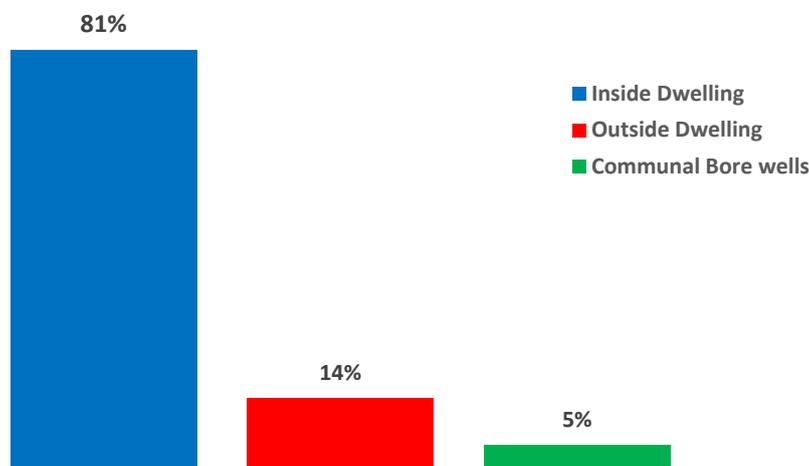


Figure 2: Showing Locations of water sources (%) based on baseline survey

iii) Time Spent Fetching Water

Among the 86% of households that obtain drinking water from sources outside their homes, 39% reported completing one round trip in under 5 minutes, while 37% required 6–15 minutes per trip. Overall, the majority (39%) indicated that their water sources were within a 30-minute round-trip distance. While this may suggest proximity, it still translates to a substantial daily time burden for water collection in many households (Fig.3).

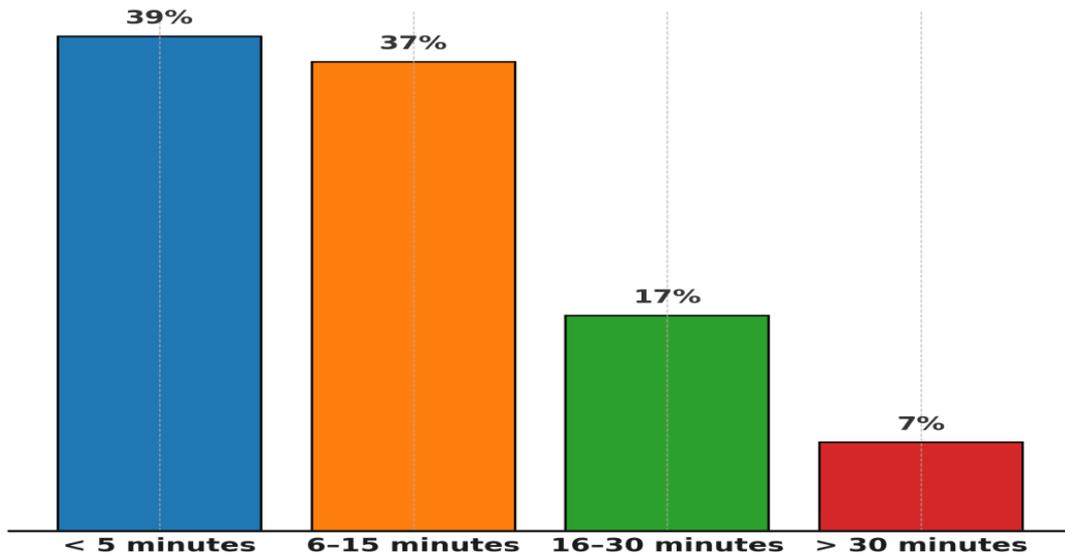


Figure 3: Showing the time spent by house holds for water collection

iv) Discontinuation of Water Supply

A staggering 86% of respondents reported prolonged discontinuation of piped water supply from the Karachi Water Supply Board (KWSB), highlighting the unreliability of municipal water services. Only 14% of households stated that they had not experienced significant interruptions and enjoyed relatively consistent water availability (Fig.4).

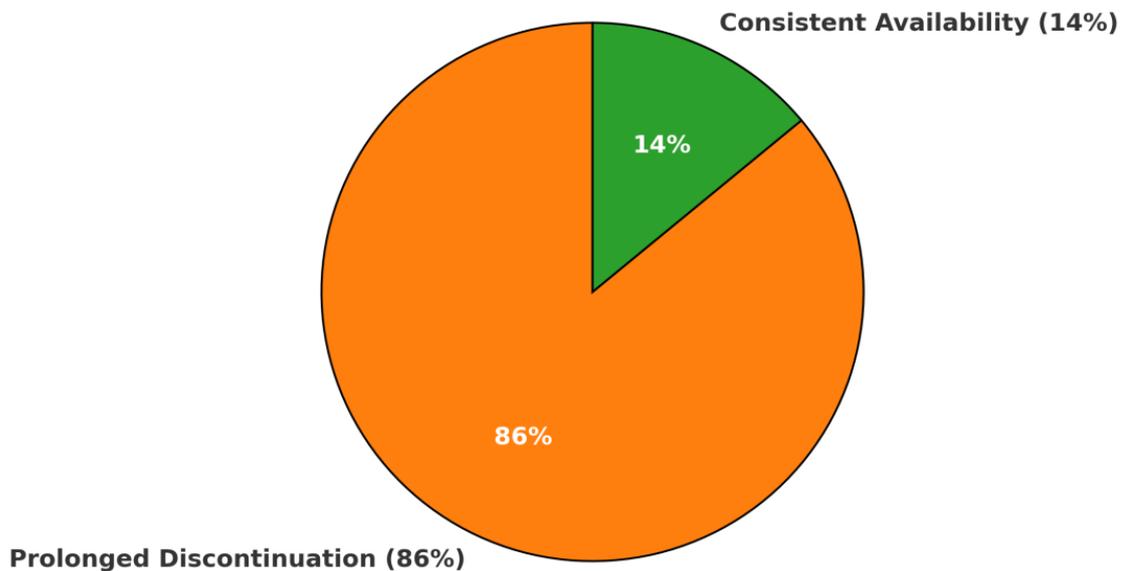


Figure 4: Showing the water supply by municipality in the targeted area

v) Water Quality Testing

The survey revealed a significant gap in water quality monitoring, as 42% of respondents reported that no water quality tests had been conducted by relevant authorities, while 58% were unaware of whether such tests had been performed. This lack of water quality assurance exposes households to potential health risks associated with contaminated water consumption (Fig.5).

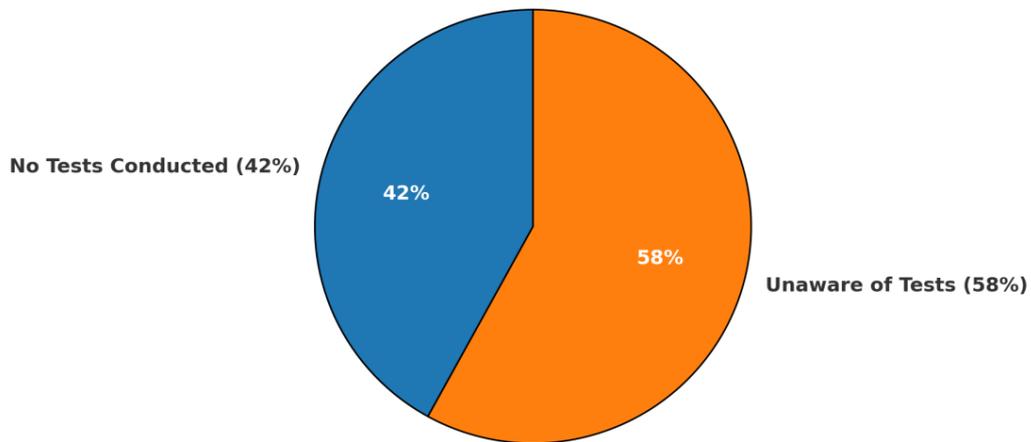


Figure 5: Showing the response on Water Quality Monitoring in the Area

vi) Responsibility for Water Provision

Only 14% of respondents recognized the Karachi Water Supply Board (KWSB) as the entity responsible for water provision and the operation and maintenance (O&M) of infrastructure. In contrast, 86% attributed water provision to private companies and philanthropists, reflecting a lack of awareness about KWSB's role or diminished trust in its services (Fig.6).

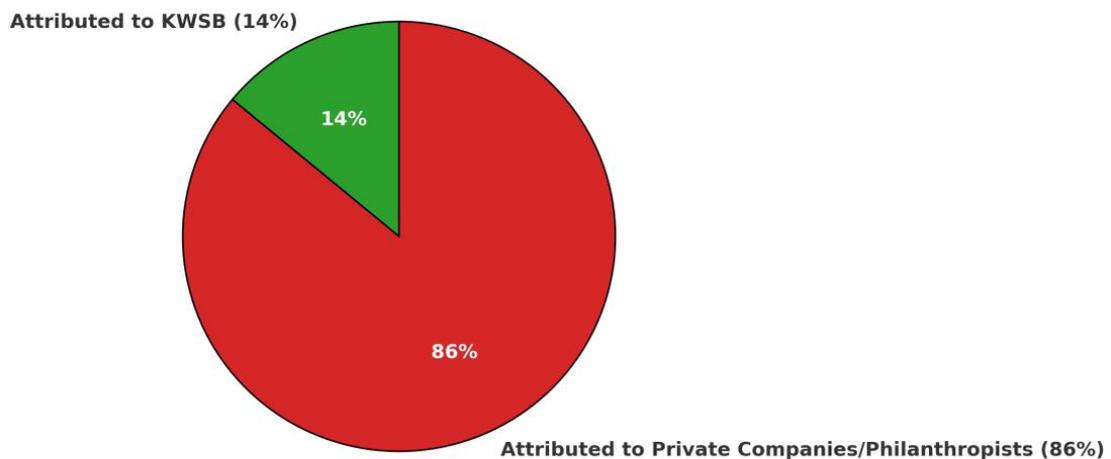


Figure 6: Shows the response of community on responsibility of supply of water

vii) Household Water Treatment and Storage Practices

Household-level water treatment practices were reported by 61% of respondents, indicating that a majority of households are actively taking steps to ensure the safety of their drinking water. However, 39% of households were not practicing any form of water treatment, leaving a significant proportion of the population at risk of consuming contaminated water. Among those who treated their water, boiling emerged as the most common method, with 87% of respondents relying on it as a primary strategy for water purification. Other methods included cloth straining (11%) and the use of water purification tablets (2%) (Fig.7).

These practices reflect the adaptive strategies employed by households to mitigate the risks associated with consuming unsafe water, particularly in the absence of reliable water quality monitoring and infrastructure. However, the heavy reliance on boiling an energy-intensive process also highlights the lack of access to more efficient and cost-effective water treatment solutions. Moreover, the 39% of households not practicing any form of treatment underscores the need for targeted awareness campaigns, capacity building, and access to affordable water purification technologies to ensure safe drinking water for all.

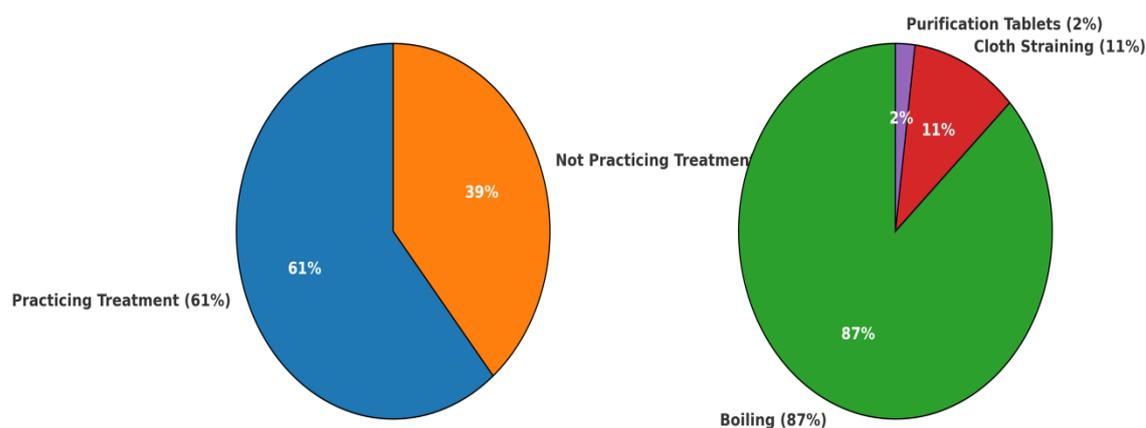


Figure 7: Shows the response of community on house hold water treatment practices

viii) Payment for Water

An overwhelming 95% of respondents reported paying for water, with 81% purchasing it from filtration plants and 14% making monthly payments for piped water supplied by KWSB. The remaining 5% accessed free water from communal hand pumps or boreholes, illustrating the financial burden on households for securing a basic necessity (Fig.8).

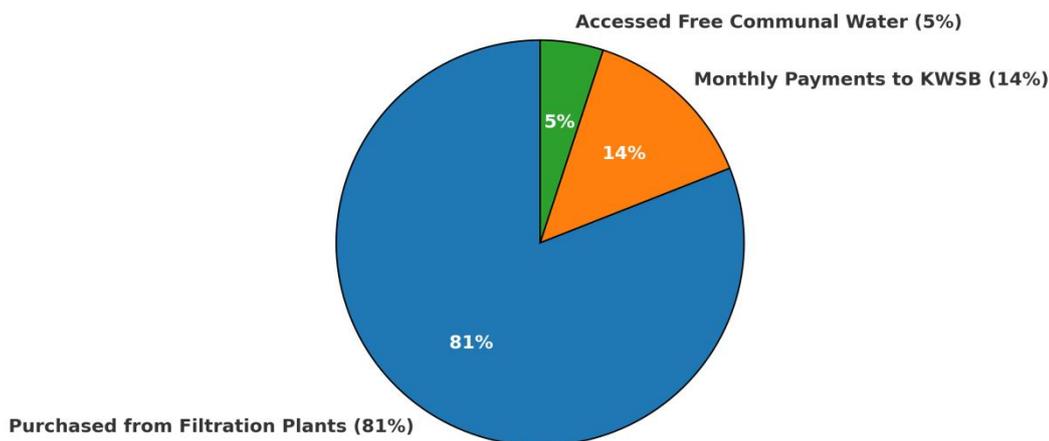


Figure 8: Illustrate the response of community on payment of water charges

ix) Garbage Disposal Mechanism

In terms of waste management, 58% of respondents rely on informal service providers for garbage collection, while 35% utilize formal services. However, 7% reported the absence of any garbage disposal mechanism, resorting to dumping waste in designated areas, which poses environmental and public health challenges (Fig.9).

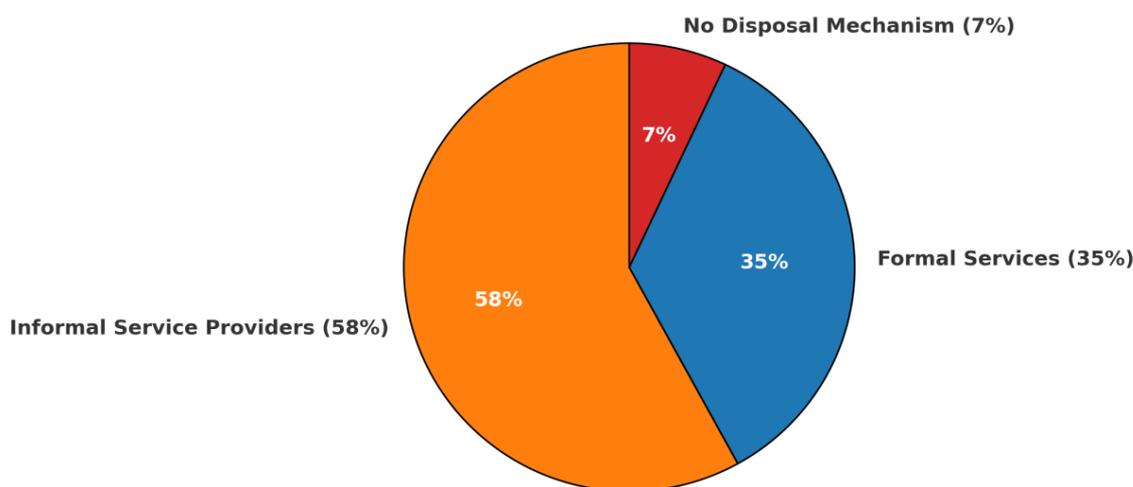


Figure 9: Illustrate the community response on garbage disposal mechanism in the area

These findings highlight critical gaps in water access, quality assurance, infrastructure, and waste management in the surveyed communities, underscoring the urgent need for improved public services and sustainable solutions.

2.2. Community Engagement and Mobilization

A participatory approach was at the core of the project, ensuring that local communities were actively involved as stakeholders throughout its lifecycle. Recognizing that sustainable water management and hygiene practices require community ownership and engagement, the project emphasized inclusive decision-making and capacity building. One of the key initiatives was the formation of Water User Committees (WUCs), which acted as representative bodies to oversee the planning, implementation, and monitoring of water supply systems. These committees were instrumental in fostering a sense of responsibility and accountability within the communities. Alongside this, targeted capacity-building sessions equipped WUC members and local water operators with the technical and managerial skills required for the effective operation and maintenance (O&M) of water supply infrastructure. Additionally, the project prioritized community mobilization campaigns to raise awareness about safe water practices, hygiene, and sanitation. These campaigns engaged local residents, particularly women and youth, as agents of change to promote behavioral shifts and ensure the long-term sustainability of project outcomes. By empowering communities and placing them at the center of interventions, the project not only enhanced access to clean water but also cultivated a culture of collective responsibility for health and hygiene.

2.2.1. Formation of Water User Committees (WUCs)

These committees were established to ensure community ownership, facilitate decision-making, and manage water supply systems in Pak Colony (SITE Town) and Damba Goth (Gadap Town). By engaging residents directly, the project emphasized the importance of collaboration and local capacity-building for the long-term sustainability of water and sanitation interventions.

The formation of WUCs followed a systematic and inclusive methodology to ensure representation, equity, and effectiveness. The process began with a series of visits to the targeted communities of Pak Colony and Damba Goth by the project's social mobilization team. During these visits, a transect walk activity was conducted to identify the catchment areas and their boundary limits. In Pak Colony, sub-areas such as Hasrat Mohani Colony, Zubairi Colony, Wilayatabad, and Asif Colony were mapped, while in Damba Goth, the boundaries of the community were similarly delineated.

After identifying the catchment areas, the mobilization team conducted both small-scale and detailed community meetings to provide an orientation on the project objectives. These meetings highlighted the critical role of community involvement in ensuring the success and sustainability of the interventions.



Community Meetings regarding formation of WUC in the targeted areas

Key criteria for WUC membership were established to ensure that members were credible, capable, and representative of the local population. Members were selected based on the following criteria:

- They had to be local residents of the respective areas.
- They needed to be available during the daytime to actively participate in WUC activities.
- Prior experience in charity or social work was preferred to ensure familiarity with community engagement.
- They had to be socially acceptable and trusted by the broader community.
- Each WUC aimed to include a diverse mix of members, such as young, energetic individuals, social activists, teachers, aged and notable persons, and religious leaders such as imams.

Four male and four female WUCs were formed, comprising a total of 64 members. This gender-inclusive approach ensured that the unique perspectives and needs of all community members were addressed, fostering greater inclusivity and ownership.

Once the WUCs were established, the mobilization team focused on building their capacities to effectively manage water supply systems and promote hygiene practices. Regular monthly meetings were held with each WUC, and the minutes of these meetings were documented to maintain transparency and accountability. Training sessions were conducted to educate WUC members on key topics, including:

- **Water safety:** Best practices for ensuring the provision of clean and safe drinking water.
- **Environmental sanitation:** Education on managing domestic solid waste and promoting community-based cleaning activities.
- **Operation and maintenance (O&M):** Developing mechanisms for the proper functioning and upkeep of the filtration plant and water supply systems.

Various models for the sustainability of the filtration plant were discussed with the community. One of the key proposals involved fixing a cost per liter for safe drinking water to cover operation and maintenance expenses. This participatory decision-making process ensured that the community was directly involved in establishing a workable and sustainable system.



Community awareness sessions in the targeted areas of Pak Colony, Karachi

2.2.2. Community Mobilization for Safe Water and Hygiene Practices

In Damba Goth, encompassing the areas of Konakar and Kharkharo, it was initially observed that residents were consuming contaminated water, resulting in widespread waterborne diseases, particularly among children. A lack of awareness about safe drinking water practices and the broader WASH context exacerbated the problem. Recognizing these challenges, PCRWR initiated a comprehensive community mobilization process aimed at addressing the root causes of these issues and empowering local residents to adopt healthier practices.

The mobilization began with a series of meetings conducted by the PCRWR team with community members to gain insights into their drinking water challenges and to introduce the concepts of safe water handling and hygiene. These sessions served as platforms for meaningful dialogue, where residents could voice their concerns, understand the risks of consuming unsafe water, and learn about the benefits of adopting WASH practices.

To ensure sustainable engagement and shared responsibility, WUCs were formed based on the WUC formation guidelines. Two WUCs were established, each comprising eight male and female members from the community. The inclusion



Community Mobilization Session being held at Damba Goth, Karachi

of both genders ensured that the diverse needs of the community were addressed while fostering collective ownership of the solutions. These committees were entrusted with the responsibility of overseeing safe water usage, promoting hygiene practices, and serving as liaisons between the community and PCRWR for future interventions.

Through its community mobilization efforts in Damba Goth, PCRWR not only addressed immediate issues related to contaminated water but also initiated a cultural shift towards better water and hygiene practices. The establishment of WUCs and the active participation of residents, including women and youth, created a strong foundation for ongoing behavior change and long-term community involvement. By prioritizing education, inclusivity, and shared responsibility, these efforts have set the stage for healthier and more sustainable living conditions for the residents of Konakar and Kharkharo.



Community mobilization for Safe water health & Hygiene in Damba Goth

2.3. Development and Rehabilitation of Water Supply Systems

The primary objective of the project was to ensure sustainable access to clean drinking water by developing and rehabilitating water supply systems for targeted communities, educational institutions, and healthcare facilities, thereby delivering long-term benefits. This goal was achieved through a systematic approach that included the establishment of new water supply systems and the rehabilitation of existing WASH (Water, Sanitation, and Hygiene) facilities, particularly in schools and colleges, to promote overall improvements in water, sanitation, hygiene, and environmental conditions.

The initiative was implemented in two main phases: the installation of Reverse Osmosis (RO) and Ultra Filtration (UF) systems and the rehabilitation of WASH facilities within educational institutions. These efforts contributed to creating a healthier and more supportive environment in schools and colleges, fostering better educational outcomes and positive psychological impacts on students.

Comprehensive technical assessments, meticulous planning, and ongoing monitoring ensured that the systems addressed the specific needs of the communities while adhering to sustainability principles. This structured and community-focused approach reinforced the project's commitment to delivering meaningful, lasting improvements in water accessibility and quality.

2.3.1. Water Supply System Development

2.3.1.1. Installation of Containerized Reverse Osmosis Plant (50,000 GPD) at Pak Colony

In collaboration with WaterAid Pakistan and with funding support from PepsiCo, the PCRWR initiated the establishment of a comprehensive water supply system in Pak Colony, situated within the DMC SITE area of District Keamari, Karachi. The initiative aimed to deliver safe and clean drinking water to approximately 15,000–20,000 residents daily. To address the community's needs effectively, a containerized Reverse Osmosis (RO) plant with a production capability of 50,000 gallons per day (GPD) was installed, ensuring a reliable and consistent supply of potable water.

Additionally, a tube well was drilled to a depth of 400 feet to secure a reliable feed water supply for the RO system. Due to the inadequacy of initial water sources in meeting demand, the development of a new bore well became essential to ensure a consistent and sustainable water supply for the filtration system. The selection of the bore well site involved extensive coordination with local government authorities and Water Users Committees (WUCs), prioritizing a location that would optimize the system's functionality and effectively serve the community's needs.



Inauguration of Water Filtration System at Pak Colony, DMC SITE, Kemarai by Mr. Eugene Willemssen, Chief Executive Officer, PepsiCo for Africa, Middle east and South Asia

Key Activities:

i. Installation of Reverse Osmosis Plant

The reverse osmosis (RO) filtration system was thoughtfully designed to address the water requirements of the local community. It was strategically installed at a central location, ensuring sufficient space for residents to conveniently collect water from the filtration dispensing point. Special consideration was given to accessibility, with the construction of a dedicated ramp to accommodate individuals with disabilities, enabling them to collect water with ease and dignity.



Containerized Water Filtration System



Development of Ramp

ii. Communal water collection points:

In addition to the main central water collection point at the reverse osmosis (RO) filtration plant, three separate water dispensing stations were established to provide convenient access for the community to collect water from the nearest point. These communal stations were directly connected to the central filtration system, ensuring a consistent supply of clean water. The decentralized collection points were designed to alleviate crowding at the central location, minimizing the risk of secondary contamination to the filtered water. Strategically situated in Willayat abad, Yasin Zubairi, and Hasrat Mohani colonies, these stations were positioned to enhance accessibility and ensure equitable water distribution across the community.



Communal water collection points

iii. Installation of Tube Well for RO Plant

A new bore well, drilled to a depth of 400 feet, was purposefully designed to provide the necessary feed water for the Reverse Osmosis (RO) plant. A comprehensive survey was conducted to identify the optimal location, ensuring the water source would meet the RO system's technical and quality requirements. The bore well's location and water quality were carefully monitored to guarantee the long-term sustainability of the filtration plant. An Electric Resistivity Survey (ERS) was carried out to identify a suitable aquifer for bore well construction. Additionally, water samples were collected and analyzed from nearby bore wells in the area to assess groundwater quality and ensure its compatibility with the filtration system.



Construction Bore well for RO System at Pak Colony

iv. Arrangement of Sustainable Power Supply:

The sustainability of filtration plants remains a significant challenge in the province and across Pakistan. Despite the installation of over 2,000 filtration systems in Sindh, many have become nonfunctional due to issues with repair and maintenance (R&M) and the inability to cover operational costs, particularly electricity bills (Lok Sujag, 2023., Eco-Business, 2023). These challenges highlight the need for sustainable solutions to ensure the continuous operation of water filtration systems. Recognizing this issue, the teams from WaterAid and PCRWR took proactive steps to secure an electric connection through K-Electric's Corporate Social Responsibility (CSR) program through local government department Sindh. This effort proved successful, marking a pivotal milestone in ensuring the sustainability of the filtration system. By reducing reliance on external financial support, the connection enables the community to independently manage the system's operation and maintenance, fostering long-term resilience and access to clean water.

A significant advancement was achieved in Damba Goth, situated in Gadap Town, District Malir, Karachi. While this area relied on surface water from the K-I water supply scheme, the water quality was compromised by microbial contamination despite its non-saline nature. To address these challenges, a state-of-the-art Ultra Filtration (UF) system with a capacity of 70,000 gallons per day (GPD) was designed and installed. The system effectively removes turbidity, suspended solids, and microbial contaminants, ensuring safe and reliable access to clean drinking water for the community.

Recognizing the frequent electricity shortages in the area, a solar-powered UF plant was selected to guarantee sustainable and uninterrupted operation. "Ultra Filtration (UF) technology, widely utilized globally for drinking water treatment, is highly efficient in removing bacteria and viruses (Shannon et al., 2008; Madaeni, 1999). This advanced system is known for its ease of operation, low maintenance, and production of high-quality water, making it an ideal solution for addressing the community's water challenges (Hirani et al., 2010; Van der Bruggen et al., 2003)."

The solar-powered UF plant was innovatively housed within a prefabricated structure, avoiding the need for traditional heavy civil construction. The plant utilizes surface water sourced from existing Public Health Engineering Department (PHED) underground storage tanks located near the filtration site. Solar energy was chosen as a sustainable and renewable power source, ensuring the filtration system remains operational without relying on conventional electricity, thereby enhancing its resilience and environmental sustainability.

2.3.1.2. Installation of Ultra Filtration Plant (70,000 GPD) at Damba Goth

Key Activities:

i. Installation of Ultra Filtration Plant

The UF system was designed specifically to address the microbial contamination present in the water sourced from the K-I scheme. The installation of this system was followed by the construction of four communal water collection points in Damba Goth to facilitate water distribution. These points were strategically placed in areas with high foot traffic to ensure equitable access for residents.



Ultra Filtration (UF) Water treatment system developed at Damab Goth, Gadap



Multiple communal water collection points connected with Centralized UF plant

ii. Solarization for Sustainability

The adoption of solar power for the UF system was a critical decision, as it ensured that the filtration plant could operate independently of the region's unstable electricity supply. The solar-powered system has proven to be highly effective in providing continuous water filtration, enhancing the overall sustainability of the project.



Glimpses of Solar System Installed at UF Plant, Damba Goth, Karachi

2.3.2. Water Supply Monitoring and Maintenance

2.3.2.1. Installation of Flow Meters

To ensure the optimal functionality and continuous monitoring of the water filtration systems, flow meters were installed at the outlet points of both the Reverse Osmosis (RO) and Ultra Filtration (UF) plants. These devices accurately measure the outflow of filtered water and provide real-time performance data, enabling precise assessment of the filtration systems' efficiency.

The data collected by the flow meters empowers local operators and caretakers to monitor water output effectively, ensuring the plants consistently meet the communities' water demands. Additionally, these meters play a critical role in identifying potential performance issues, facilitating timely interventions to maintain system reliability and water quality.

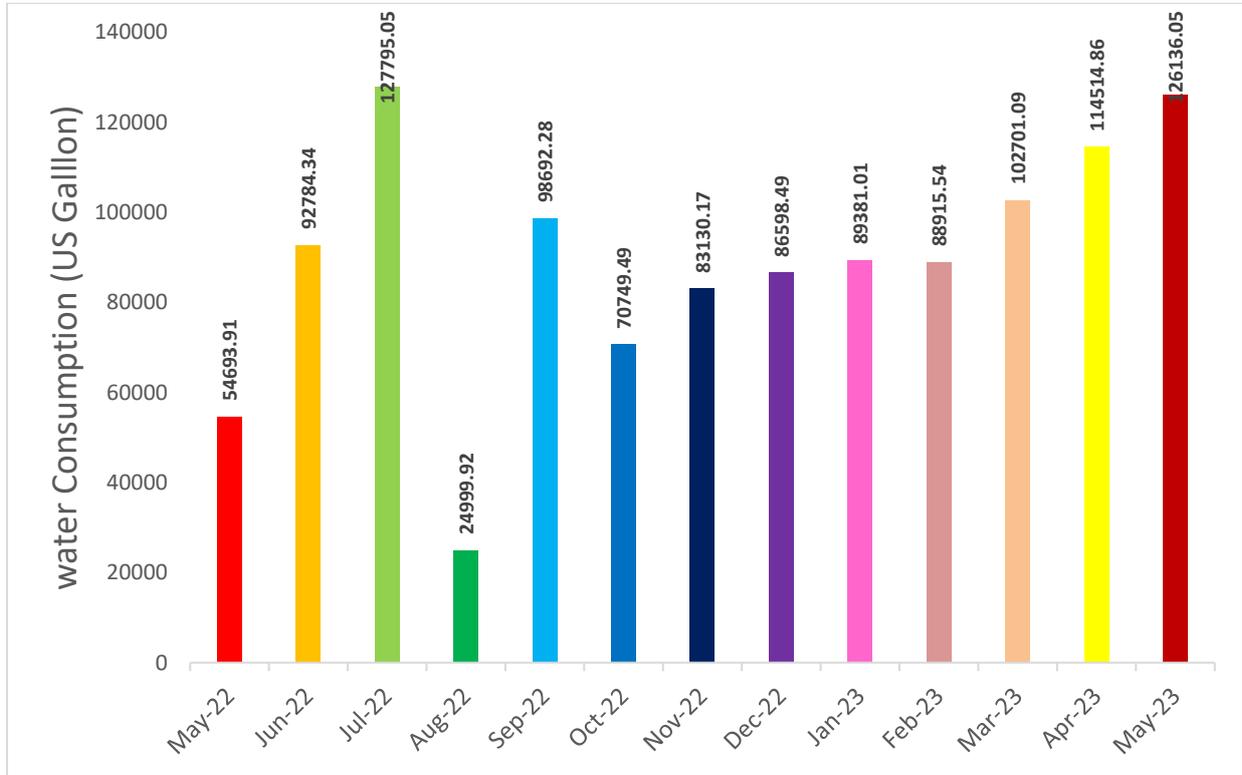


Figure 10: Graph of Product Water Consumption (US Gallons) at RO Plant, Pak Colony, Karachi (May 2022 – May 2023)



Flow meters installed on outlets of RO and UF Systems

2.3.2.2. Ongoing Monitoring and Maintenance

Continuous monitoring and maintenance are essential to ensuring the uninterrupted operation of water supply systems and the provision of safe drinking water. Regular water quality testing was conducted to verify compliance with the National Drinking Water Quality Standards (NDWQS). Any issues identified with the filtration system or water quality were promptly addressed to maintain service reliability.

The Pakistan Council of Research in Water Resources (PCRWR) will continue to provide ongoing support to local water operators and caretakers. This includes offering technical guidance, capacity-building initiatives, and ensuring the long-term sustainability of the water supply systems.

2.3.2.3. Outcomes and Impact

i. Improved Access to Clean Drinking Water

The installation of RO and UF plants and the rehabilitation of WASH facilities in schools and colleges have significantly improved access to clean drinking water for thousands of residents and students. The project has reduced the reliance on unsafe and contaminated water sources, leading to better health outcomes.

ii. Efficiency of RO and UF Plants in Water Quality Improvement

Water quality testing is conducted monthly to evaluate the effectiveness of the RO and UF plants in removing contaminants and ensuring safe drinking water. The comparison between the bore water (feed water) and the treated potable water of test results for the month of Decemeber 2024 demonstrates a significant improvement in water quality:

a) Microbiological Safety Improvement

- The bore water sample contained 75 CFU/100ml of Total Coliform, making it unsafe for drinking.
- After treatment, the RO water showed 0 CFU/100ml of Total Coliform and E. coli, meeting the WHO and National Drinking Water Standards of Pakistan (NSDWQ-2010).

This confirms the complete removal of microbial contamination, ensuring safe drinking water.

b) Reduction in Total Dissolved Solids (TDS) and Other Contaminants

- Before Treatment: Bore water had a TDS of 10,490 ppm, far exceeding the permissible limit of 1,000 ppm.
- After Treatment: The treated RO water had a TDS of 211 ppm, making it well within the safe drinking range.

c) Chloride Reduction:

- Bore water had 5,917 ppm of Chloride, which was significantly reduced to 115 ppm after filtration.

d) Turbidity and Hardness:

- Turbidity was 0.76 NTU in bore water, which was further improved to 0.17 NTU after treatment.
- Hardness levels were also reduced from 370 ppm to 30 ppm, making the water safer for consumption.

The test results demonstrate that the installed RO and UF plants are highly effective in removing harmful contaminants, reducing microbial and chemical impurities, and making water safe for consumption. The improvements in TDS, microbial load, and physical parameters confirm the success of the project in providing clean and safe drinking water to the community.

iii. Health Benefits

The availability of safe drinking water has resulted in a noticeable decline in waterborne diseases within the target communities. According to the end-line survey conducted by a third-party organization, there has been a significant reduction in cases of waterborne illnesses following the installation of RO and UF plants.

Additionally, a survey in Pak Colony, home to approximately 20,000 residents, revealed that many respondents reported improved health conditions, stating that they no longer fell sick as frequently after the RO plant was installed in their area. This positive impact has contributed to better overall health and reduced absenteeism, particularly among students, who are now less likely to miss school due to waterborne diseases.

The availability of safe drinking water has led to a decrease in the incidence of waterborne diseases in the target communities. This has contributed to better overall health and reduced absenteeism, particularly among students, who are now less likely to miss school due to waterborne illnesses.

iv. Sustainability

The project has not only addressed immediate water access challenges but also established a foundation for long-term sustainability. By training local operators and caretakers in the operation and maintenance of the water systems, and providing solar-powered filtration systems, the project ensures that the improvements will continue to benefit the communities in the years to come.

Through these efforts, the project has made a lasting impact on public health, education, and community development in the targeted areas, improving the living conditions and creating a more sustainable future for the residents of Karachi.

2.3.3. Rehabilitation of WASH Facilities in Educational Institutions

The project also focused on improving the water, sanitation, and hygiene (WASH) facilities in selected schools and colleges. These institutions were identified based on the urgent need for improved infrastructure and their capacity to benefit from upgraded water and sanitation systems. The rehabilitation aimed to provide clean drinking water, enhance sanitation systems, and promote hygienic practices among students and staff.

Selected Institutions:

- I. **KMC Boys/Girls Secondary School Yasin Zubairi** (SITE Town, District Keamari). This school has over 200 girls and 80 boys enrolled and was in dire need of clean water and improved sanitation systems.
- II. **Government Boys Secondary School Hasrat Mohani** (Pak Colony, SITE Town, District Keamari) With over 1,600 students enrolled, this institution faced challenges related to inadequate water and sanitation facilities.
- III. **Government Girls College, Pak Colony** (SITE Town, District Keamari) This institution was selected to be part of the rehabilitation efforts due to its strategic location and the urgent need for improved water and sanitation facilities.
- IV. **Government Boys Secondary School Asif Abad** (Pak Colony, SITE Town, District Keamari)

Key Activities:

1. Provision of Clean Drinking Water

At all three institutions at Pak Colony Karachi, new clean drinking water systems were installed, featuring multi-stainless steel taps and dedicated storage tanks. These systems ensured an uninterrupted supply of safe drinking water for students, staff, and teachers. Prior to installation, the water quality was rigorously tested by project engineers to ensure it met safety standards.

Additionally, awareness sessions were conducted with institutional staff, including teachers, principals, and maintenance teams, to highlight the importance of clean water and educate them on the operation and maintenance (O&M) of the newly installed systems. This training ensures the sustainability of the project by equipping local stakeholders with the knowledge to manage and maintain the facilities effectively.

i. Health Savings

- According to the end-line survey, there has been a noticeable reduction in waterborne diseases in the target communities and students.
- Lower incidence of illnesses has led to reduced medical expenses for families and decreased burden on local healthcare facilities.

ii. Educational and Productivity Gains

- Improved access to clean drinking water has contributed to better student attendance, as fewer waterborne illnesses which mean fewer missed school days.
- Staff and teachers also benefit from better health, resulting in increased productivity and fewer sick days.

iii. Sustainability and Cost Efficiency

- The drinking water points has been designed for long-term operation with minimal recurring costs.
- Training of local operators ensures proper maintenance, extending the system's lifespan and reducing the need for frequent repairs.

iv. Economic Justification

- Given the health and educational benefits, the long-term return on investment (ROI) is expected to be substantial.
- The reduction in absenteeism and medical costs, combined with improved educational outcomes, provides significant socio-economic advantages to the School.

Through this initiative, the project has improved public health, education, and overall well-being, ensuring a sustainable and healthier future for the beneficiaries.



Drinking Water Points installed at Schools and College at Pak Colony, Karachi

2. Sanitation System Rehabilitation

Extensive rehabilitation was carried out at KMC Boys/Girls Secondary School Yasin Zubairi. This included the repair and replacement of broken sanitation facilities, installation of new washbasins, and improvements to the drainage systems. Furthermore, general infrastructure improvements were made, such as distemping walls, oil painting, pipe fitting, and electrical work. These efforts aimed to create a hygienic, functional, and safe environment for students and staff. Hygiene awareness programs were also implemented, and plantation and cleanliness drives were conducted within the school premises to reinforce good hygiene practices.



Whitewash/ distemping of Walls ar KMC Yasin Zubairi School



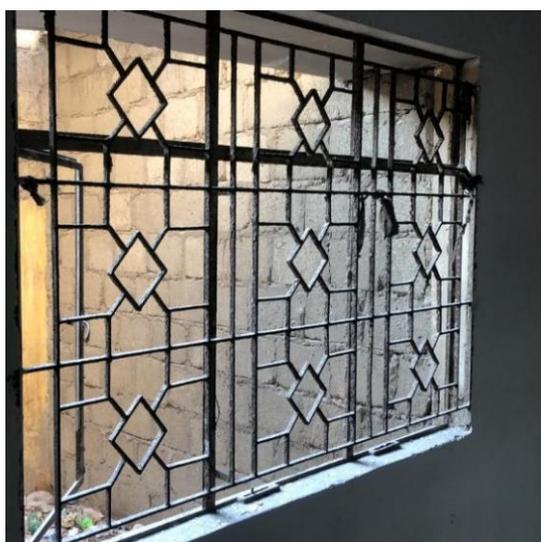
Rehabilitation work of sewerage lines for proper sanitation

3. Protection of School Children from Weather Hardships

During the environmental and hygiene improvement activities conducted at DMC Yasin Zubair Schools, students and teachers highlighted a pressing challenge: the lack of window shelters in classrooms. This issue exacerbated environmental, health, and hygiene concerns, particularly during extreme weather conditions.

In the winter months, students endured cold winds blowing through the classrooms, often resorting to fastening fabric over the windows in an attempt to block the drafts. Additionally, the absence of proper window shields left classrooms exposed to mosquitoes, resulting in significant health risks, including a rise in cases of malaria among students.

To address these concerns, all classroom windows were fitted with iron window shields. This intervention aimed to protect children from harsh weather conditions and minimize mosquito exposure, fostering a healthier and safer learning environment for students.



Before Intervention

After intervention

4. Capacity Building and Handover

Once the installations and rehabilitation activities were completed, capacity-building workshops were held with institutional staff to provide detailed O&M plans for the new facilities. These plans outlined roles and responsibilities for the maintenance of water supply systems, sanitation facilities, and hygiene practices. The rehabilitated infrastructure was formally handed over to the respective schools and colleges, ensuring that the institutions would continue to benefit from the improvements in the long term.



Glimpses of Capacity Building and Handing Over of Plant

2.4. Promotion of Hygiene and Sanitation Practices

Recognizing the critical role hygiene plays in preventing waterborne diseases, the project prioritized hygiene promotion as a key component of its interventions. This focus was designed to address the gaps in knowledge and practices around personal, household, and community hygiene, which are directly linked to improved health outcomes and the sustainable use of water and sanitation facilities. A comprehensive approach was adopted, integrating awareness-raising, capacity-building, and behavioral change initiatives to promote hygiene at multiple levels. Key activities included:

2.4.1. Community-Level Awareness Sessions

As part of its commitment to fostering healthier communities, PCRWR conducted a series of community-level awareness sessions to educate residents about safe water storage, handwashing, and sanitation practices. These sessions were designed to engage local communities, particularly at the household level, in understanding the principles of WASH. The initiative aimed to provide practical knowledge on maintaining clean drinking water, preventing water contamination, and promoting hygienic practices within households and the broader community.

The PCRWR social mobilization team organized a total of 87 awareness sessions, engaging both male and female participants in the targeted project intervention areas. Among these, 38 sessions were specifically conducted with women, reaching 687 females. The sessions provided tailored information to women, focusing on household hygiene, safe water storage, and methods to safeguard their families against waterborne diseases. Similarly, 49 sessions were conducted with men, engaging 934 male participants. These discussions emphasized the role of men in ensuring community-wide water conservation and hygiene practices, as well as their responsibility in supporting family health.



Glimpses of Community Hygiene Awareness Sessions at Targeted Areas



Glimpses of Community Hygiene Awareness Sessions at Targeted Areas

To supplement the in-person sessions, PCRWR distributed informative leaflets and brochures to further raise awareness about cleanliness, personal and environmental hygiene, safe drinking water practices, and water conservation. These materials were designed to serve as practical guides, enabling individuals to adopt and sustain healthy habits in their daily lives. The brochures were disseminated across a wide audience, including students in educational institutions, community members, and residents of the project intervention areas. They provided step-by-step instructions on practices such as water purification, proper handwashing techniques, and methods to prevent water contamination. By equipping people with these resources, PCRWR sought to reinforce the behavioral changes necessary to ensure cleaner and safer environments.

کراچی کے شہری علاقوں میں پینے کے صاف پانی تک رسائی کو بہتر بنانا

پانی، صحت و صفائی، سرسبز اور آلودگی سے پاک

حفظ صحت

اچھی صحت کے لئے ضروری ہے کہ بروقت ناخن تراشیں اور روزانہ پر مشل کریں۔
 کھانا کھانے سے پہلے اور بستر میں اپنے ہاتھوں کو صابن سے دھوئیں۔
 لیٹرین کے استعمال، حباور کو چھونے اور چھینکنے کے بعد سبھی بھی صابن سے اچھی طرح ہاتھ دھوئیں۔
 کھانا پکانے سے پہلے ہاتھوں کو اچھی طرح دھوئیں۔
 سبزوں اور پھلوں کو دھو کر استعمال کریں۔

گھریلو پانی کا استعمال

پانی کو منافع ہونے سے بچائیں اور صفائی ستھرائی کے دوران غیر ضروری شے بند رکھیں۔
 پانی ذخیرہ کرنے کے برتن روزانہ دھوئیں اور کیمیکیل والے کین میں پانی محفوظ کرنے سے گریز کریں۔
 غسل کے دوران صابن لگاتے وقت ناکا بند رکھیں۔
 گاڑی دھونے یا پوچھا لگانے کے لئے پانی ہائی میں استعمال کریں۔
 لان / باٹھیچے کو بروقت ضرورت نوارے کے ساتھ پانی دیں۔
 ٹینکی کو اوورفل ہونے سے بچائیں اور پانی کے لیول کی نشاندہی کے لیے آواز دینے والا الارم لگوائیں۔

ماحولیاتی اصول صحت

درختوں، پودوں کا خیال رکھیں اور اپنے گھسروں کے ارد گرد ماحول کو سرسبز بنائیں۔
 صفائی کا خیال خیال رکھیں، کھپرا مخصوص کردہ کھپرا کسٹری میں ڈالیں اور کوڑے کو آگ نہ لگائیں۔
 کیمیکیل والے کین پینے کے پانی کو ذخیرہ کرنے کے لیے استعمال نہ کریں۔
 ایک شدہ شل، ہانپ، فلٹس کے پرزہ صحت سبھی حسدنی یا مرمت کرنا ہیں۔
 کلیں میں پانی جمع نہ ہونے دیں اور پانی کی بروقت نکالی کو یقینی بنائیں۔

پاکستانی تحقیقاتی ادارہ برائے آبی وسائل
حکومت پاکستان

WaterAid

PCRWR

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2.4.2. Celebrating Global Events: World Water Day and Global Handwashing Day

To emphasize the critical importance of hygiene, sanitation, and water conservation, PCRWR, in collaboration with WaterAid Pakistan, organized celebrations for global events like Global Handwashing Day and World Water Day. These events were thoughtfully designed to engage and educate local communities, particularly students, through demonstrations, interactive activities, and competitions. The primary aim was to foster awareness and inspire behavioral change in the community regarding clean water and hygiene practices. The celebrations not only focused on building knowledge but also cultivated a sense of responsibility among participants for maintaining healthier lifestyles and sustainable water practices.

2.4.2.1. Celebrating Global Handwashing Day 2021

The Global Handwashing Day 2021, themed "Our Future is at Hand – Let's Move Forward Together," was celebrated at Government Boys Secondary School Hasrat Mohani Campus in Pak Colony, SITE, District Keamari, Karachi. The event aimed to raise awareness about the importance of handwashing in preventing diseases and promoting hygiene. Over 110 participants, including students, teachers, community representatives, and government officials, attended the event, making it a vibrant and impactful gathering.

The Chief Guest, Mr. Asif Khan, Special Assistant to the Chief Minister Sindh, along with dignitaries such as Mr. Azizullah Odho (District Education Officer, Keamari), Mr. Ibrahim Umrani (Director Education, DMC Keamari), and Ms. Raheema Panhwar (Provincial Coordinator, WaterAid Pakistan), graced the occasion. The program began with Quranic recitation and a Naat performance, followed by a warm welcome from Project Coordinator Manzoor Ali, who highlighted the day's objectives.



Picture of Chief Guest taken during its welcoming remarks at Pak Colony, Karachi

Students from schools like GBSS Hasrat Mohani, Yasin Zubairi, and Asifabad actively participated in activities such as drawing and painting competitions, which focused on themes of handwashing, hygiene, clean water, and environmental protection. Through speeches, students like Jahanzaib and Naz Fatima emphasized the critical role of hygiene in health, while Zeeshan and Naz Anma spoke on water scarcity and clean drinking water. A tableau performance titled "Lunch Time" creatively demonstrated proper handwashing steps and left a lasting impression on attendees.

Notable guests delivered impactful speeches addressing the importance of hygiene, water conservation, and sustainable practices. Community representative Mr. Himayat Ali highlighted water scarcity challenges in Sindh, while Mr. Azizullah Odho and Mr. Ibrahim Umrani emphasized the Islamic teachings of cleanliness and the socio-economic impact of water issues in regions like Sanghar. Dr. Ghulam Murtaza, Regional Director of PCRWR Karachi, outlined the collaborative efforts of PCRWR and WaterAid Pakistan, emphasizing the community's role in sustaining water-related projects, especially the maintenance of RO plants. Similarly, Ms. Raheema Panhwar stressed the importance of community ownership in ensuring the success of WASH initiatives, and Chief Guest Mr. Asif Khan assured full governmental support for the project.

The event concluded with an award ceremony recognizing the creativity and efforts of student participants. Guests also visited a project gallery showcasing students' work, which received widespread appreciation. A Pledge Wall invited participants to leave colorful handprints as a symbolic commitment to hygiene and clean environments. Shields were presented to notable guests in acknowledgment of their contributions, reinforcing the spirit of collaboration that defined the celebration.



Pictures taken during Celebration of Handwashing Day at Pak Colony, Karachi

2.4.2.2. Celebrating World Water Day 2022

World Water Day 2022 was celebrated at the PCRWR Regional Office Karachi in partnership with the Society of Economic Geologists and Mineral Technologists (SEGMITE), Sindh Environmental Protection Agency (SEPA), Pakistan Science Foundation (PSF), and WaterAid Pakistan. This event focused on raising awareness about the importance of groundwater, an essential but often overlooked resource.

Students from Government Girls High School Yasin Zubairi, Wilayatnabad, Pak Colony, Karachi, participated in poster-making, project presentations, and speech competitions. Experts from various organizations shared insights on sustainable groundwater management and its significance for Pakistan's water security. The event underscored the urgent need for collective efforts to address groundwater depletion and ensure sustainable use for future generations.

These celebrations of global events highlighted the transformative impact of community engagement in addressing water and hygiene challenges. By inspiring behavioral change and fostering collaborative action, they marked significant steps toward building healthier and more sustainable communities.



Pictures taken during Celebration of World Water Day at PCRWR, Karachi

2.4.3. Clean Drive Campaigns in Project Areas

A series of clean drive campaigns were organized in various communities of Karachi to address the critical issue of sanitation and promote awareness regarding cleanliness and hygiene. These campaigns were aimed at fostering a sense of responsibility among residents, creating a healthier living environment, and mitigating health risks caused by poor sanitation. Each drive was conducted with structured planning, active participation of community members, and support from various stakeholders, ensuring their effectiveness and sustainability

Objectives and Importance

The primary objectives of these clean drives were:

- To instill a sense of ownership and responsibility among community members for maintaining cleanliness.
- To spread awareness about the importance of hygiene and its direct impact on health and well-being.
- To reduce environmental pollution and improve the overall sanitation of underserved communities.
- To engage community stakeholders, including schools, local leaders, and government officials, in sustainable cleanliness practices.

Poor sanitation and waste disposal in these communities had led to unhygienic living conditions, posing severe health hazards, especially for children and vulnerable populations. By addressing these issues, the campaigns aimed to create cleaner and healthier environments while empowering residents to sustain these improvements.

2.4.3.1. Campaign 1: Clean Drive at Pak Colony, SITE Town (22nd-29th October 2021)

The campaign was inaugurated by Mr. Asif Khan, Special Assistant to the Chief Minister Sindh, and attended by key stakeholders, including education officers, school principals, teachers, students, and representatives from PCRWR, WaterAid, and local Water User Committees. The event began with an awareness walk, where participants appealed to residents to take part in the drive and maintain cleanliness in their surroundings.

Activities

i. Distribution of Safety Kits:

- Safety kits comprising long safety shoes, gloves, safety jackets, goggles, masks, and hand sanitizers were distributed to 80 sanitary workers to minimize occupational hazards.

ii. Community and School Clean-Up:

- Over 650 participants, including men, women, and children, engaged in cleaning streets, schools, and healthcare facilities.

- Dirty and garbage-prone areas were identified, and awareness sessions were conducted on hygiene benefits before the clean-up activities.
- Bio-safety protocols were followed, ensuring participants used protective equipment during the activities.



Pictures Taken during Clean Drive Activity by Community Members at Pak Colony, Karachi

iii. School Participation:

Students from classes 6 to 10 of GBSS Hasrat Mohani and KMC B/GSS Yasin Zubairi actively participated in cleaning their school premises and surrounding areas. Teachers and school management supervised the activities and guided the students.



Pictures Taken during Clean Drive Activity by Students at Pak Colony, Karachi

iv. Installation of Communal Dustbins:

As part of the project's commitment to improving environmental sanitation and promoting hygiene, communal dustbins were strategically installed in key locations, including Hasrat Mohani Colony, Yasin Zubairi Colony, Wilayat abad, and Asifabad. This intervention aimed to address the pressing issue of improper waste disposal, which contributes to environmental degradation, water contamination, and the spread of diseases in densely populated areas.



Installation of Communal Dustbin at Pak Colony, Karachi

The campaign concluded on 3rd November 2021 with a ceremony at GBSS Hasrat Mohani. Participants shared their experiences, and community members committed to maintaining cleanliness. Notable attendees distributed shields and trophies among the participants, recognizing their efforts.



Picture taken during Closing Ceremony of Clean Drive Campaign at Pak Colony, Karachi

2.4.3.2. Campaign 2: Clean Drive at Pak Colony, SITE Town (1st – 8th February 2022)

This second campaign was inaugurated by Mr. Himayat Ali, Head of the Water User Committee, and attended by teachers, social activists, and local community members. The project team briefed the attendees on the project's goals and the community's role in sustaining cleanliness efforts.

Activities

i. Community Awareness and Clean-Up:

- Over 745 participants joined in cleaning garbage-prone areas, including streets in Yasin Zubairi and Hasrat Mohani colonies.
- Awareness sessions were conducted to highlight the importance of cleanliness, followed by clean-up activities where participants enthusiastically cleaned streets and public spaces.



Pictures taken during 2nd Campaign , Clean Drive Activities at Pak Colony, Karachi

ii. Installation of Communal Dustbins:

- Additional communal dustbins were installed to encourage residents to dispose of waste properly, reducing reliance on informal dumping sites.



Installation of Communal Dustbins at Pak Colony Karachi

The campaign concluded on 8th February 2022, with participants reflecting on their experiences and lessons learned. Community members pledged to sustain the cleanliness efforts, and mementos were distributed to active participants, including members of the Water User Committees.

2.4.3.3. Campaign 3: Clean Drive at Damba Goth, Gadap Town (30th December 2021 – 6th January 2022)

The campaign was inaugurated by Mr. Fayaz Palari, a local notable, and attended by school staff, healthcare representatives, social activists, and community members. The project team highlighted the role of the newly installed Ultra-Filtration Plant in improving water quality and the community's responsibility for maintaining hygiene.

Activities

i. Community Awareness and Clean-Up:

- More than 710 participants, including residents of Khaskheli Para, Bhutto Para, the main bazaar, and the Nadi side area, joined the week-long drive.
- Garbage-prone areas were identified, and awareness sessions were conducted before the cleaning activities began. Participants followed bio-safety protocols and worked together to clean their streets.



Pictures taken during 3rd Clean Drive Campaign, Cleaning Activities at Pak Colony, Karachi

ii. School and Healthcare Facility Participation:

- Local schools and healthcare staff actively participated in the campaign, cleaning their premises and educating others on the importance of hygiene.



Pictures taken during 3rd Campaign Closing Ceremony at Pak Colony, Karachi

The campaign concluded on 10th January 2022. Participants shared their experiences, and shields were awarded to notable contributors. The community pledged to sustain the cleanliness initiatives and continue efforts to improve their living environment.



Pictures Taken During Inauguration of Long Week Clean Drive Campaign at Damba Goth, Karachi

2.4.4. Clean Drive Campaigns in Schools

The Clean Drive Campaigns were designed and implemented in various schools to create awareness about cleanliness, hygiene, and environmental sustainability. The campaigns involved activities like cleaning, coloring, painting, and drawing competitions, and were conducted in collaboration with school management, teachers, students, and support staff. Below are the details of each campaign:

2.4.4.1. Clean Drive Campaign in GBSS Asifabad – 25th November 2021

The campaign aimed to engage students and teachers in cleanliness and environmental awareness. Key activities included cleaning, coloring/painting, and awareness sessions on health, hygiene, and waste management. More than 70 participants, including students, teachers, support staff, and project staff, actively participated.

Activities

i. Cleaning Activity

- **Girls' Group:** Girls from ninth and matric classes cleaned classrooms and corridors under the supervision of a female teacher. Tasks included picking up wrappers, sweeping floors, and organizing a friendly competition to determine the cleanest classroom. Dustbins were placed in corridors for waste disposal.



Glimpses during Girl's Group Cleaning Activities at Pak Colony, Karachi

- **Boys' Group:** Boys cleaned the playground and plantation areas under the guidance of the Head Teacher. They removed waste, cleaned tree leaves, and organized the waste dump area with the support of school staff.

Students were motivated to maintain cleanliness, and the school environment was significantly improved with the active participation of all stakeholders.



Glimpses during Boy's Group Cleaning Activities at Pak Colony, Karachi

ii. Coloring or Painting Activity

Students enthusiastically participated in refurbishing their school environment by painting rusty desks and beautifying the play areas with fresh and lively colors. This hands-on activity not only instilled a sense of ownership and pride among the students but also enhanced the overall learning atmosphere. Alongside the painting activity, a drawing competition was organized, where students showcased their artistic talents by creating inspiring works on themes such as hygiene, water conservation, and environmental protection. The event fostered teamwork, creativity, and awareness, leaving a lasting impact on the students and their school community.



Pictures taken during Drawing and Painting Activities at Pak Colony, Karachi

2.4.4.2. Clean Drive Campaign in GBSS Damba Village Campus – 16th December 2021

GBSS Damba Village Campus is the only government school in the village, with over 1,500 students enrolled. During the need assessment for an ultra-filtration plant, the school management facilitated the project team, which later decided to conduct a Clean Drive Campaign to raise WASH awareness.

Activities

More than 500 participants directly or indirectly engaged in the activities. Students developed a sense of responsibility for maintaining cleanliness and appreciated the improved school environment.

i. Cleaning Activity

Awareness sessions were conducted with students about keeping the school clean. Dustbins were provided, and students were involved in picking up scattered waste from the school ground. Class teachers were briefed to focus on personal hygiene and the school's clean environment.



ii. Coloring or Painting Activity

Six groups of students painted 22 rusted school desks and five green boards, which were previously in rough condition. Desks were brought to the playground for painting, and students were guided to complete the tasks efficiently.



Glimpses during Cleaning and Painting Activities at Damba Goth, Karachi

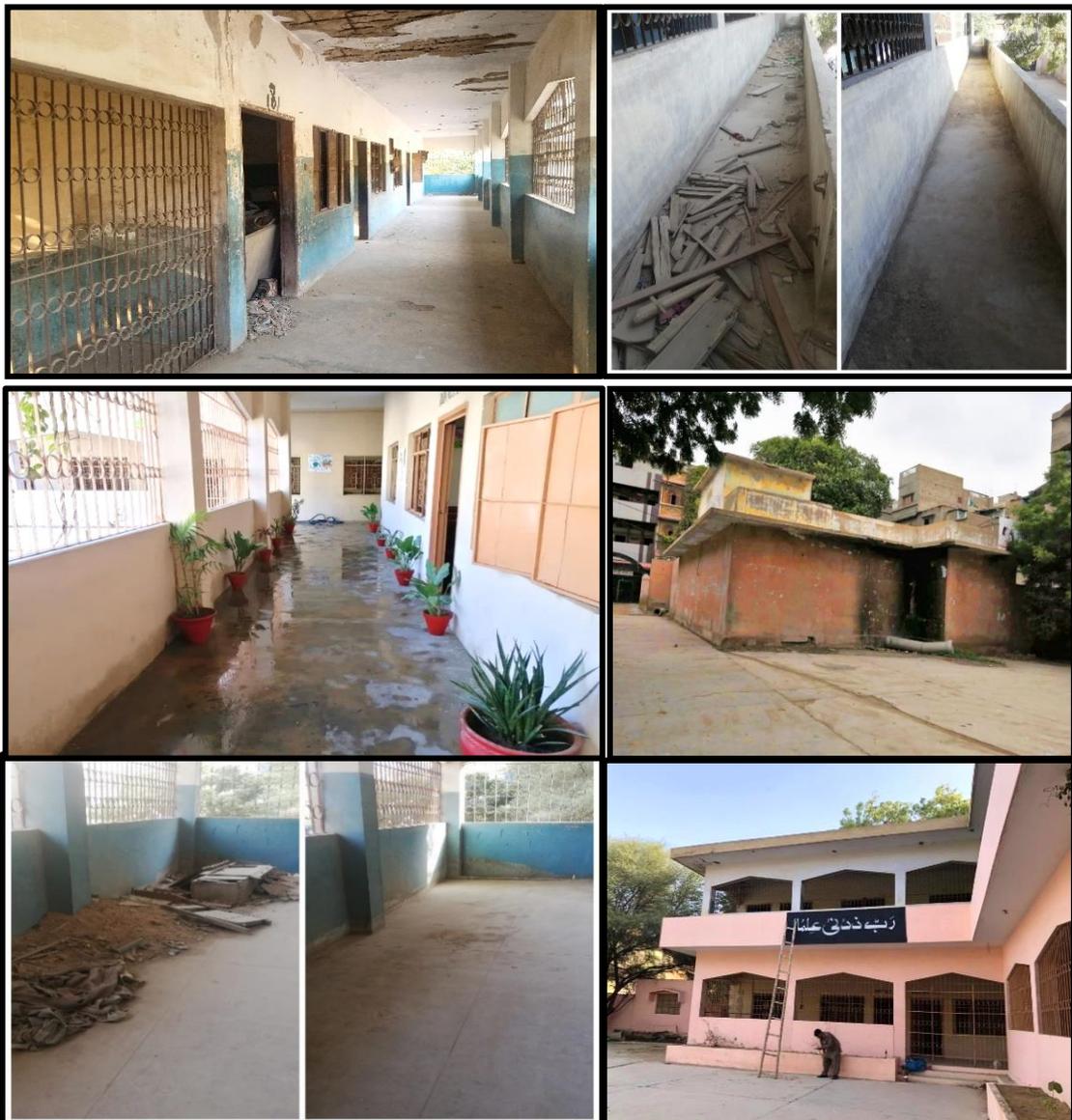
2.4.4.3. Clean Drive Campaign in KMC Boys/Girls Secondary School Yasin Zubairi – 17th December 2021

KMC BGSS Yasin Zubairi has over 700 students in morning (girls) and evening (boys) shifts. The school requested assistance from PCRWR for building renovation and enabling a better learning environment. PCRWR and Water Aid management collaborated to identify and address the school's needs.

Activities

i. Cleaning Activity

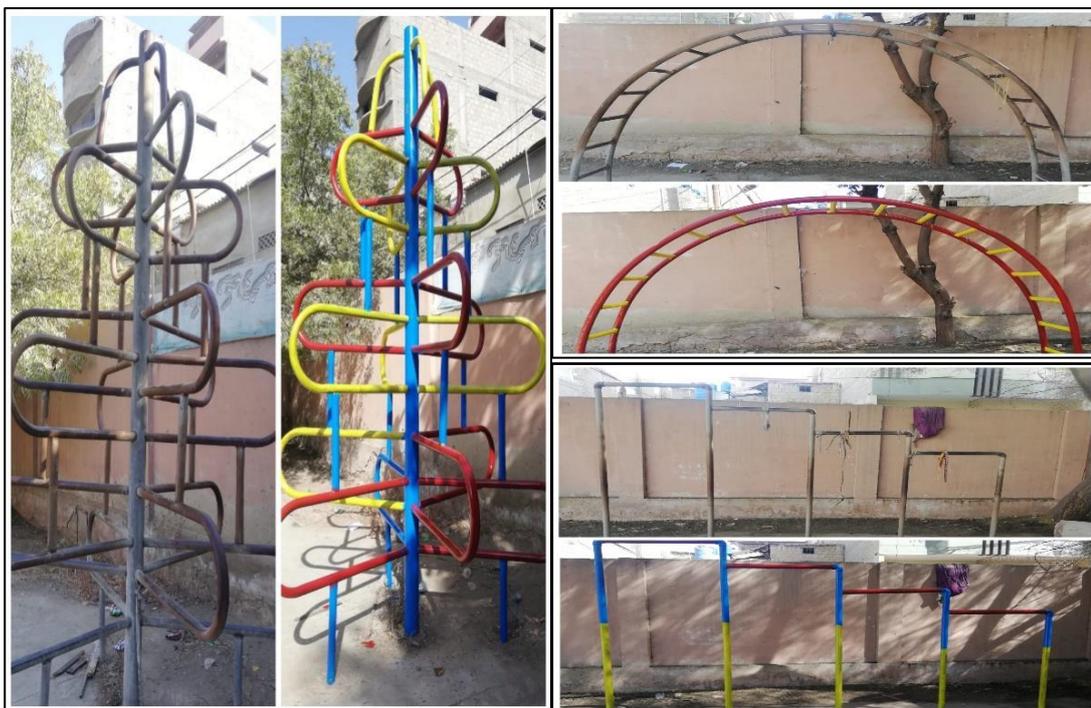
Coordination meetings with the Sindh Solid Waste Management Department and Deputy Director Health ensured adequate resources for cleaning the school. Three classrooms, a science lab, and the first-floor corridor were cleaned of rubble and debris that had accumulated for years.



Pictures of Pak Colony's School being Cleaned and debris being removed

ii. Coloring or Painting Activity

- Male students painted 20 school desks, while girls and boys painted monkey bars in the playground with vibrant oil paint colors.



Pictures taken during Cleaning Activity at Pak Colony, Karachi School

iii. Drawing Competition Activity

- Girls' students participated in drawing competitions, creating art on flip charts with themes such as water conservation, health, hygiene, and nutrition. Students received guidance from project staff and demonstrated creativity and enthusiasm.



Pictures taken during Painting and Drawing Activity at Pak Colony, Karachi



Pictures taken during Painting and Drawing Activity performed by Students at Pak Colony, Karachi

iv. Appreciation

Participants were awarded trophies for their efforts, while shields were presented to the school management and teachers. Motivational speeches encouraged students to maintain a clean and green school environment.



Pictures taken during prize distribution ceremony at Pak Colony, Karachi

The campaign transformed the school into a cleaner and more organized space. The drawing competition fostered creativity and awareness among students, and the painted desks and playground equipment enhanced the school's aesthetic appeal.

2.4.5. Collective Impact of Clean Drive Campaigns in Educational Institutes

The Clean Drive Campaigns in GBSS Asifabad, GBSS Damba Village Campus, and KMC Boys/Girls Secondary School Yasin Zubairi successfully:

- Engaged over 1,500 students and school staff.
- Raised awareness about WASH (Water, Sanitation, and Hygiene).
- Fostered a sense of responsibility and ownership among students.
- Enhanced the physical environment of the schools through cleaning and painting activities.
- Motivated participants with awards and appreciation.

These campaigns not only improved the cleanliness and functionality of the schools but also instilled lifelong values of hygiene, sustainability, and environmental stewardship among the participants.

2.5. Institutional Strengthening

Institutional strengthening was a key component of the project aimed at ensuring the sustainability and long-term impact of water, sanitation, and hygiene (WASH) interventions. By empowering institutions with the tools, knowledge, and frameworks necessary for effective management, the project sought to create a robust foundation for improving WASH facilities and practices at both community and institutional levels. This included fostering a culture of accountability, enhancing technical capacities, and formalizing systems to ensure the efficient operation and maintenance of water supply systems. Recognizing the critical role of schools and local institutions in driving behavioral change and community engagement, targeted initiatives were implemented to build their capacity and enable them to lead WASH efforts within their respective spheres. The following activities were carried out to achieve these objectives:

2.5.1. Institutional Strengthening through Adoption of SOPs for Improved WASH Facilities

As part of the project's focus on institutional strengthening, efforts were made to enhance WASH (Water, Sanitation, and Hygiene) infrastructure and ensure the sustainability of these improvements within schools, healthcare facilities, and communities. Facilities were rehabilitated or newly developed to provide access to clean drinking water, proper sanitation, and hygiene amenities. To maintain the efficiency and longevity of these interventions, Standard Operating Procedures (SOPs) were developed and adopted for the operation and maintenance of water supply systems at both institutional and community levels.

2.5.1.1. Development and Implementation of SOPs

The SOPs were designed to standardize the practices for operating and maintaining water supply systems, ensuring their efficient and sustainable use. Key aspects of the SOPs included guidelines for regular water quality testing, preventive maintenance schedules, and steps to address potential system failures. To further strengthen the institutional framework, the responsibility for ongoing water testing and maintenance was gradually transitioned to relevant departments and institutions. This ensured that schools and healthcare facilities had a long-term mechanism in place to oversee the operation and upkeep of their WASH infrastructure.

2.5.1.2. School WASH Clubs

In schools, WASH clubs were established and trained to play an active role in monitoring the use and maintenance of drinking water facilities. These clubs, comprised of students and teachers, were capacitated to act as champions for clean water, sanitation, and hygiene practices. By engaging students directly, the project fostered a sense of responsibility and ownership among the younger generation, helping to embed a culture of sustainable WASH practices within educational institutions.

The WASH clubs were also tasked with promoting awareness among their peers about the importance of hygiene, water conservation, and the proper use of WASH facilities. Their involvement ensured that the improved infrastructure not only served immediate needs but also became a platform for long-term behavior change.

2.5.1.3. Institutional Impact

The adoption of SOPs and the establishment of WASH clubs significantly contributed to the institutional strengthening goals of the project. Schools and healthcare facilities were better equipped to manage their WASH systems independently, ensuring that the benefits of clean water, sanitation, and hygiene reached a wider population. By transferring the responsibility for operation and maintenance to the relevant institutions, the project laid the foundation for sustainable WASH interventions, reducing dependency on external support.

2.5.2. Training and Capacity Building for Water Operators and Caretakers on Operation, Maintenance, and Water Quality Management

To strengthen the capacity of water operators and caretakers, a comprehensive two-day training program on the operation and maintenance (O&M) of clean drinking water facilities and water quality (WQ) management was organized at the PCRWR Regional Office in Karachi. The training aimed to equip participants with essential technical skills, foster sustainable management practices, and enhance awareness of water hygiene and quality.

The program was attended by 19 participants, including water operators, members of Water User Committees (WUCs), representatives from DMC SITE, PCRWR staff, and the Water Aid project team.

Day 1: Orientation on RO Plant Operations and Maintenance

The first day of the training focused on theoretical knowledge, delivered through presentations and interactive discussions. Participants were introduced to the reverse osmosis (RO) plant's key components, its operational workflow, and maintenance requirements. Emphasis was placed on troubleshooting techniques, preventive measures, and the role of each stakeholder in ensuring the facility's sustainability.

Day 2: Practical Training and Plant Visit

On the second day, participants were given a hands-on experience through a guided visit to the RO plant. They observed the entire water treatment process, from the boring point to distribution points, and received detailed briefings on each stage of operation. This practical session reinforced their understanding of the plant's functionality and their responsibilities in managing the system effectively.



Glimpses of Capacity Building of Community Members and Plant Operators and practical field visit

2.5.3. Community-Based Trainings in Damba Goth, Gadap Town

In addition to the sessions at Karachi, targeted trainings were conducted for local participants in Damba Goth, Gadap Town. These sessions focused on the operation and maintenance of an Ultra Filtration Plant and other drinking water facilities specific to the community. Tailored to the local context, the training provided participants with the knowledge required to manage these facilities independently.

Awareness-raising activities were also integrated into the program, emphasizing water quality, hygiene, and the importance of community participation in maintaining clean drinking water systems. This initiative underscored the critical role of capacity-building in ensuring the sustainability of drinking water facilities. By empowering school staff, healthcare workers, water operators, and community members with technical and operational skills, the training contributed to long-term water security and improved public health outcomes. Continuous follow-up and support were highlighted as essential for maintaining the momentum and effectiveness of these efforts.

2.6. Knowledge Management and Sharing

To ensure the sustainability and replication of the project's outcomes, a comprehensive knowledge management and sharing strategy was implemented, led by WaterAid Pakistan (WAP). The aim was to document the transformative impact of the project, highlight lessons learned, and engage sector stakeholders in meaningful dialogue to foster adaptation and scalability of successful approaches in urban WASH interventions.

2.6.1. Capturing Human-Interest Stories and Case Studies

WaterAid Pakistan captured two human-interest stories as part of this activity. These stories documented the real-life experiences of individuals and communities, showcasing the profound changes brought about by the project. By narrating the challenges faced, the interventions implemented, and the resulting improvements in health, hygiene, and livelihoods, these stories humanized the data and emphasized the critical need for WASH initiatives in underserved urban areas.

2.6.2. Project Conclusion and Knowledge Sharing Event

A knowledge-sharing event was organized by WaterAid Pakistan in Islamabad to conclude the project and disseminate its findings. The event provided a platform for presenting the project's achievements, best practices, and lessons learned to sector stakeholders, including government officials, community representatives, development practitioners, and donors. The discussions emphasized the replicability of the project's approach in addressing water and hygiene challenges in other urban settlements. The event underscored the importance of engaging local communities, adopting innovative solutions, and ensuring the sustainability of WASH systems.

Through these targeted activities, WaterAid Pakistan facilitated the dissemination of project insights, enabling broader discussions on urban WASH challenges and solutions while fostering collaboration and advocacy for future initiatives.

2.7. Monitoring and Evaluation (M&E)

A comprehensive monitoring and evaluation (M&E) framework was established to track the progress and ensure the effectiveness of interventions. Monitoring activities were conducted at both the national and regional levels to assess the project's progress against its goals. PCRWR's head office in Islamabad, along with the regional office in Karachi, played crucial roles in project oversight. The regional office conducted monthly review meetings to assess the project's outputs, while quarterly review meetings with the national office provided updates to the national team on the overall progress in line with the project plan.

The Project Coordinator was directly responsible for sharing monthly progress reports in accordance with the WaterAid M&E reporting mechanism. Reporting templates were provided to the PCRWR team for submitting regular reports. Furthermore, WaterAid's Programme Quality Team conducted regular monitoring and provided technical support, ensuring that the project's implementation was on track. They also carried out inventory monitoring, focusing on the provision of WASH services at the community level, and provided orientation to partners on inventory management, ensuring that data collection and monitoring were robust.

Quarterly Progress Review Meetings between WaterAid and PCRWR enabled detailed assessments of the project's progress, fostering collaborative problem-solving and course corrections when needed. Monthly and quarterly reports on the project were produced and shared with WaterAid to ensure timely reporting and transparency.

In line with the financial reporting mechanisms of WaterAid, monthly financial reports were submitted to ensure that the project was within budget and adhered to financial guidelines. Regular site visits and follow-ups were carried out to assess the functionality of water supply systems and adherence to hygiene practices. A systematic approach was followed for collecting and analyzing data from these visits, including the use of standardized checklists to improve data accuracy. Follow-up actions from site assessments were documented and tracked effectively. Additionally, an integrated feedback mechanism from community beneficiaries was implemented to gather valuable insights into the performance of water supply systems and hygiene practices, further strengthening the M&E process.

3. Project Exit Strategy

The project has a clear roadmap for transitioning and effectively concluding its initiatives, focusing on sustainability, proper handover, and continued monitoring.

i) **Monitoring and O&M of RO Plant:**

The Reverse Osmosis (RO) system will be regularly monitored by PCRWR Karachi for pre- and post-water quality at the source and consumer end (water points), conducted twice a month. This will ensure the continued functionality of the system and the quality of water supplied. Additionally, the quality of water at the points in schools and colleges will be regularly assessed for physicochemical and microbiological parameters. The maintenance of these water points will also be routinely monitored.

ii) **Sustainability:**

Sustainability is a core component of the project. Effective collaboration has been fostered through active community involvement and proper mobilization, ensuring the smooth handover of operations to the relevant municipal authorities (DMC). PCRWR continues to play a role in regular monitoring to ensure the project's long-term viability. Local Government Karachi, including Karachi Municipal Corporation and Karachi Water and Sewerage Board (KWSB), are integral stakeholders. The project established partnerships with these departments from the outset and engaged them in joint planning to ensure all parties were aligned. The sustainability plan emphasized the continuity of the infrastructure even after the system was handed over to the communities of Damba Goth and Pak Colony. Women from these areas were involved through Water User Committees (WUCs), ensuring inclusive ownership and management.

iii) **Business Management of Filtration Scheme:**

A Business Management Plan was developed for the operation and maintenance (O&M) of the Reverse Osmosis (RO) and Ultra Filtration (UF) plants. A cost structure was established for per-gallon water charges to cover the O&M expenses, ensuring that the facilities remain financially sustainable.

a. **Proposed Operating Mechanism/Financial Management of Filtration Plants:**

- The operational hours were determined by the Water User Committee (WUC) members.
- A joint bank account was opened by the WUC for O&M funds.
- Point operators are tasked with collecting water charges, while the WUC head manages the cash book on a daily basis.

- All collected amounts are verified by the WUC head and deposited into the O&M bank account the following day.
- Water facilities at schools are strictly for drinking purposes, and no charges are levied during holidays or vacation periods.
- The management of water distribution points in schools falls under the responsibility of the school management.
- Monthly income and expenditure statements are shared with committee members to ensure transparency.
- Payments are made via crossed cheques to ensure financial transparency.
- The main WUC is responsible for managing O&M expenses using income generated from water charges.
- PCRWR, through the Regional Office Karachi, will continue to ensure the quality of product water and provide technical support.
- Service charges are displayed at water dispensing points for public awareness.
- A complaint/suggestion system is available at the filtration plant to improve service delivery.

iv. Handing Over of the Water Supply Scheme (WSS):

Once the water supply scheme becomes operational, an MOU is signed between PCRWR, WaterAid, Local Municipal Government, and the Water User Committee. This MOU outlines the roles and responsibilities of each partner. Upon the scheme's successful operation, it is handed over to the Water User Committee and local government, complete with O&M management plans. Training for water operators and caretakers on the O&M of clean drinking water facilities and regular follow-ups on Water Quality (WQ) testing are incorporated into the plan. O&M training sessions have been organized for both community members and government staff, ensuring the long-term sustainability of the water supply system.

This structured approach ensures that the project can exit smoothly, with a clear transition plan that includes the handover of operational responsibilities, continued monitoring, and capacity-building initiatives for all stakeholders. Through this, the project's impact will continue long after its official conclusion, ensuring ongoing access to clean water and maintenance of hygiene standards in the targeted communities

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Annexure-I

Overall Project Result Framework

Outcomes and Activities	Targets & Milestones (Expected Outputs)	Actual Project Outputs
Project impact: Reduction in waterborne diseases in targeted communities through improved access to clean drinking water in urban settlement of Korangi, SITE, Pak colony, Karachi	12,000 people (women, men and children) have improved access to clean drinking water through construction/ rehabilitation of clean drinking water points	data of filtration plant/ drinking water supply points, constructed and rehabilitated/ WQ reports/Project reports/& pictures were provided Data of 20,000 people provided Contact details of water user committees
Activity 1.1.1:Rapid assessment study to assess situation of clean drinking water targeted communities of Karachi	1 Report to be prepared and shared with WaterAid Pakistan	Rapid assessment report of the target areas prepared and shared.
Activity 1.1.2:Formation of Water User Committees (WUC) in targeted urban informal settlements	6 WUC to be formed in the target area (3 female & 3 male) each having 4 members from the community 10 meetings organized with 6WUCs (one meeting with each WUC on monthly basis) 48 members (24 female and 24 male) of the WUC sensitized on water safety and environmental sanitation	8 WUC formed in target areas (4 male and 4 female WUC) each having 8 members from the community Target achieved of monthly meetings and sensitizing on water safety and environmental sanitation
Activity 1.1.3:Clean drinking water supply systems developed/ rehabilitated in target location	2 Technical assessments conducted and WQ pre-testing and BOQs developed for installation of 2 clean drinking water filtration system 2 clean drinking water (reverse osmosis) systems developed 7 follow up meetings (one meeting with each WUC on monthly basis) with 6 WUCs conducted to ensure proper O&M and WQ testing is being done	2 Technical assessments conducted and WQ pre-testing and BOQs developed for installation of 2 clean drinking water filtration system MoU with WUC, WAP, PCRWR and local government of Sindh. Completion & Handing over reports 2 clean drinking water (reverse osmosis and ultra-filtration) systems developed Target achieved of follow up meetings
Activity 1.1.4:Training of water operators and caretakers on operation & maintenance (O&M)of clean drinking water facilities and follow ups on Water Quality	Training sessions to be conducted for water filtration plant operators	2 training session organized for each filtration plant having around people 25 people attended training including Water Operators, members of WUCs, representatives of DMC SITE, staff of PCRWR, and the Water Aid project team

(WQ)		
Activity 1.1.5: Community sessions on hygiene promotion and clean drinking water practices at household level	75 Sessions (45-60 minutes duration) organized in the target community attended by 600 women and 525 men	87 sessions in total conducted. 38 sessions were conducted with females where 687 females were reached. With male group total 49 sessions were conducted where 934 males were reached.
Activity 1.1.6: Celebrating Global Handwashing, World Toilet, World Water Day and World Environment Day at target locations and demonstration of models	<ul style="list-style-type: none"> • 1 Event to be organized for the key influencers of targeted community and the stakeholders (2-3 hour activity involving key stakeholders) participated by 50 individual from the above mentioned stakeholders • 3 Events to be organized in the targeted community (2-3-hour activity involving female, male and children) participated by 180 people from community including men, women and children 	Global Handwashing Day 2021 was celebrated at GBSS Hasrat Mohani campus where more than 110 participants included government officials, political leaders, members of WUCs, teachers and students who strongly participated in the event. World Water Day on 22 March 2022 at PCRWR regional office Karachi was organized by PCRWR jointly with Society of Economic Geologists and Mineral Technologists (SEGMITE), Sindh Environmental Protection Agency (SEPA), Pakistan Science Foundation (PSF) and WaterAid Pakistan
Activity 1.1.7: Clean Drive Campaign in communities	Three clean drive campaigns launched and participated by 2000 women, men and children from the targeted communities 200 sanitary workers are provided with safety kits including gloves masks and jackets	Three Clean Drive campaigns were organized at Pak Colony and Damba Goth in which more than 2000 people including men, women and children's participated from targeted communities. sanitary workers are provided with safety kits including gloves masks and jackets
Activity 1.1.8 Training on social mobilizers on project approach, social mobilization and Water Quality aspects as well as WASH aspects)	Two-day training and one day field activity for 10 project staff on project approach and implementation. One follow-up half day orientation 10 male /female/ project staff	Orientation was done in the month of July for project staff including social mobilizer and project coordinator
Activity 2.1.1: Development of clean drinking water points in 02 schools/college, 01 HCF.	Technical assessment conducted and WQ pre-testing and BOQs developed for 3 clean drinking water systems Developed 3 clean drinking water systems 3 (2 in schools and one in health care facility) clean drinking water in schools (connections & cooling system) 3 newly developed/ rehabilitated clean drinking water systems handed over to the department for O&M responsibility	Technical assessment conducted and WQ pre-testing and BOQs developed for 3 clean drinking water systems at schools and College Developed 3 clean drinking water systems with connections from filtration plant (2 in schools and one in College) 3 newly developed clean drinking water systems handed over to the School administration for O&M and responsibility.

Activity 2.1.2: Adoption of SOPs for improved WASH facility's Operation and Maintenance at institutions and community level	One SOP document developed/updated	Finalized SOP document
Activity 2.1.3: Clean Drive Campaign in schools, college and healthcare facilities	03 clean drive campaigns launched participated by 400 children and 25 staff members from the targeted institutions in each drive	Clean drive campaigns were organized at GBSS Asifabad, GBSS Damba Goth Campus and KMC GBSS Yasin Zubairi. More than 670 participants took part in the activities including students (both girls and boys), Ex-students, teachers, support staff of the school, and project staff.
Activity 3.1: Capturing of human-interest stories and case studies (To be led by WAP and budget kept for WAP)	2 human interest stories captured	Done by WAP
Activity 3.2: Project conclusion and knowledge sharing event in Islamabad	1 Project conclusion and knowledge sharing event organized involving project and sector stakeholders	Done by WAP

About PCRWR

Pakistan Council of Research in Water Resources (PCRWR) is a premier national organization under the Ministry of Water Resources, dedicated to conduct research in all aspects of water resources for sustainable water resource management in Pakistan. PCRWR plays a pivotal role in addressing the country's water-related challenges through innovative research, policy support, and community-based solutions. One of its core mandates is the provision of safe and clean drinking water to communities across the country. The Regional Office Karachi, as an integral arm of PCRWR, actively contributes to this mission by implementing water quality monitoring programs, assessing drinking water sources, promoting water treatment technologies, and raising public awareness about water safety. The Regional Office Karachi plays a vital role in ensuring access to safe drinking water in urban and peri-urban areas of Sindh through regular water testing, technical assistance to local bodies, and community engagement initiatives aimed at improving public health and water security.



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