

Promoting Climate-Resilient Sanitation in Flood-Prone Areas of Pakistan

SUMMARY

Pakistan is ranked eighth globally in countries most affected by climate risks and is the fourteenth most water-stressed country, projected to face absolute water scarcity by 2025.^{1,2,3} The country is vulnerable to multiple climate hazards including floods, droughts, heatwaves, cyclones, landslides and sea level rise.

To reduce the impact of climate events and climate change on sanitation services and to support the sustainability of open defecation free (ODF) status, UNICEF Pakistan promoted the elevation of latrines in flood-prone districts as part of the Pakistan Approach to Total Sanitation (PATS) and the Accelerated Sanitation and Water for All (ASWA) II project. Between 2018 and March 2022, UNICEF Pakistan supported 65,858 people with access to climate-resilient sanitation in Punjab's flood-affected Jhang District. During these four years, the majority of these latrines have remained accessible and functional during and after annual floods.

The ASWA II project also involved demand creation and provision of resilient sanitation facilities in households, schools and health-care facilities. Importantly, UNICEF Pakistan supported the integration of climate-resilient water, sanitation and hygiene (WASH) priorities in national documents, such as in the Nationally Determined Contributions (NDCs), and capacity-building for communities and the private and public sectors. Furthermore, UNICEF Pakistan is initiating a country-wide climate risk assessment to inform future sanitation programming and infrastructure interventions in collaboration with the Ministry of Climate Change.

Based on lessons learnt so far, UNICEF Pakistan is prioritizing climate-resilient water and sanitation in its next country programme (2023–2027) to scale up climate-resilient WASH services across the country. Proposed activities include strengthening the sector's capacity to assess and mitigate risks, mainstreaming climate-resilient design elements and principles in water and sanitation services, and integrating climate resilience into national and regional policies for sustainable access to water and sanitation services.

¹ World Resources Institute, '17 countries, home to one-quarter of the world's population, face extremely high water stress', 2019. [Link](#).

² Ministry of Climate Change, Government of Pakistan and UNICEF, 'Water, Sanitation and Hygiene in Nationally Determined Contributions', 2021. [Link](#).

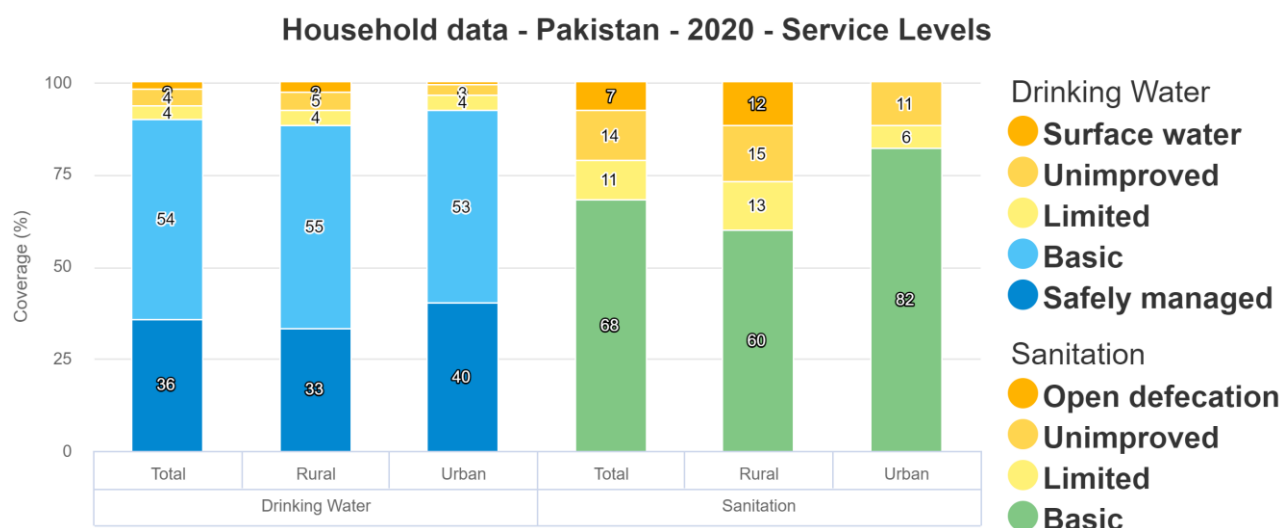
³ GermanWatch, 'Global Climate Risk Index 2021', 2021. [Link](#).

Introduction

With a population of 221 million growing by 2 per cent annually, Pakistan is the fifth most populated country in the world.^{4,5} More than one-third of this population relies on a maximum of US\$3.20 daily purchasing power parity.⁶ Pakistan's youth are vulnerable to this poverty and to rural–urban disparities; 35 per cent of Pakistan's population is under the age of 14, and 63 per cent of Pakistan's population live in rural areas.^{7,8} Of Pakistan's population, 90, 68 and 80 per cent have

household access to at least basic drinking water, sanitation and hygiene (WASH) services, respectively.⁹ Figure 1 shows rural and urban disparities for drinking water and sanitation services in households. Only 58 per cent of schools have access to at least basic drinking water services.¹⁰ For children, this inadequate access to WASH services directly results in high mortality rates, stunting (45 per cent of children aged under 5 in Pakistan are considered stunted) and interruptions to education.¹¹

Figure 1: Drinking water and sanitation service access for households, 2020



Source: WHO/UNICEF Joint Monitoring Programme

Pakistan is ranked eighth globally in countries most affected by climate risks based on extreme weather events between 2000 and 2019.¹² Flooding in the north caused by glacial melting of the Hindu Kush and Himalayas and flooding along the Indus River during monsoon season affect Pakistan annually.¹³ Furthermore, Pakistan is the

fourteenth most water-stressed country and will face absolute water scarcity by 2025.^{14,15} Other projected climate changes are increased variability of monsoons; increased frequency and severity of riverine and flash floods, heatwaves, landslides, cyclones and droughts; sea level rise;

⁴ World Bank, 'Data – Population total – Pakistan', 2021. [Link](#).

⁵ World Bank, 'Data – Population growth (annual %) – Pakistan', 2020. [Link](#).

⁶ World Bank, 'Data – Poverty headcount rate at \$3.20 a day (2011 PPP) (% of population) – Pakistan', 2018. [Link](#).

⁷ World Bank, 'Data – Population ages 0-14 (% of total population) – Pakistan', 2020. [Link](#).

⁸ World Bank, 'Data – Rural population (% of total population) – Pakistan', 2020. [Link](#).

⁹ WHO/UNICEF JMP, 'Household data – Pakistan', 2020. [Link](#).

¹⁰ WHO/UNICEF JMP, 'School data – Pakistan', 2019. [Link](#).

¹¹ Ministry of Climate Change, Government of Pakistan and UNICEF, 'Water, Sanitation and Hygiene in Nationally Determined Contributions', 2021. [Link](#).

¹² GermanWatch, 'Global Climate Risk Index 2021', 2021. [Link](#).

¹³ UNDP, 'Climate Change Adaptation – Pakistan', 2022. [Link](#).

¹⁴ WRI, '17 countries, home to one-quarter of the world's population, face extremely high water stress', 2019. [Link](#).

¹⁵ Ministry of Climate Change, Government of Pakistan and UNICEF, 'Water, Sanitation and Hygiene in Nationally Determined Contributions', 2021. [Link](#).

and higher temperatures.^{16,17} Coastal communities, infrastructure and water resources are especially vulnerable to these extreme climate events and to long-term impacts, such as salinization.¹⁸ A 1.8°Celsius increase in the average daily temperature is projected by 2059 under RCP 4.5;¹⁹ the projected temperature rise in Pakistan is expected to be higher than the global average.^{20,21}

Climate events such as floods, heavy rainfall and cyclones damage non-resilient sanitation systems, resulting in environmental contamination, recurrent repair costs and disruption to sanitation access, even for higher levels of service. The environmental contamination caused by these climate changes increases exposure to waterborne diseases and is projected to lead to an additional 5,639 diarrhoeal-related deaths in children by 2030 in Pakistan.²² Cholera, for example, emerged after the extreme floods in 2010 and 2014.²³ These climate-related impacts to sanitation services are especially dangerous for women and girls; when climate events destroy sanitation facilities, they are forced to seek privacy, often at a distance from their household, putting them in danger. This occurs with increasing frequency due to climate change, aggravating the already high proportion (79 per cent) of Pakistani women who are unable to manage menstruation hygienically.²⁴

During periods of drought, heat stress, flooding and other natural disasters, women and children in Pakistan are particularly vulnerable, and become more malnourished and food insecure.²⁵

¹⁶ UNDP, 'Climate Change Adaptation – Pakistan', 2022. [Link](#).

¹⁷ IFRC, 'Climate change impacts on health and livelihoods – Pakistan assessment', 2022. [Link](#).

¹⁸ UNDP, 'Climate Change Adaptation – Pakistan', 2022. [Link](#).

¹⁹ Representative Concentration Pathway (RCP) 4.5: intermediate scenario in which radiative forcing is stabilized at approximately 4.5 W m⁻² after 2100.

²⁰ ADB / World Bank, 'Climate risk country profile – Pakistan', 2021. [Link](#).

²¹ IFRC, 'Climate change impacts on health and livelihoods – Pakistan assessment', 2022. [Link](#).

²² Ibid.

²³ Ibid.

Women disproportionately reside in rural areas and are therefore disproportionately vulnerable to climate impacts in rural areas and on agricultural livelihoods (women represent 48 per cent of the overall population but 64 per cent of the rural population in Pakistan).²⁶ In a country where 42 per cent of the population is employed by agriculture, the projected short- and long-term climate changes can be devastating.²⁷ Furthermore, the Government of Pakistan recognizes that women do not have equal authority, decision-making power nor resources needed to adapt to climate change.²⁸ Climate events and climate change are projected to further intensify gender inequities in Pakistan as climate catastrophes result in displacement, resource scarcity, income and safety loss, and unrest, all of which exacerbate gender discrimination and gender-based violence.^{29,30}

Programme description

Following severe floods in 2010, UNICEF Pakistan adopted the following strategies to mainstream climate resilience in its sanitation programming:

- Promotion of elevated latrines for safe and resilient sanitation, community and WASH sector capacity-building and development of guidance manuals on climate-resilient sanitation as part of the ongoing Pakistan Approach to Total Sanitation (PATS) Programme and the Accelerated Sanitation and Water for All (ASWA) II project; and

²⁴ Ministry of Climate Change, Government of Pakistan and UNICEF, 'Water, Sanitation and Hygiene in Nationally Determined Contributions', 2021. [Link](#).

²⁵ IFRC, 'Climate change impacts on health and livelihoods – Pakistan assessment', 2022. [Link](#).

²⁶ Ministry of Climate Change, Government of Pakistan, 'Mainstreaming gender into NDCs', 2020. [Link](#).

²⁷ Ibid.

²⁸ IFRC, 'Climate change impacts on health and livelihoods – Pakistan assessment', 2022. [Link](#).

²⁹ The Express Tribune, Pakistan, 'Climate change impact on women', 2022. [Link](#).

³⁰ Ibid.

- Integration of climate-resilient WASH in national policies and plans such as in the Nationally Determined Contributions (NDC), and in district and WASH sector development and status reports.

This climate-resilient sanitation programming prioritizes women-headed households and flood-prone districts which practice open defecation. Punjab's Jhang District was selected for the ASWA II project due to its high prevalence of open defecation (38 per cent), high stunting rate in children (37 per cent), high rate of underweight children (37 per cent), high rate of childhood deprivation of sanitation facilities (30 per cent), high prevalence of floods and lack of allocated funds for WASH since 2013.³¹

After the ASWA II project's successful implementation of the open defecation free (ODF) programme in the Jhang District, the Government of Punjab selected the following 10 districts to replicate the climate-resilient sanitation programming; these districts were selected based on their high vulnerability to flood risk and to the effects of poverty: Rajanpur, D.G.Khan, Rahim Yar Khan, Bahawalnagar, Jhang, Chiniot, Bhakkar, Bahawalpur, Khushab and Lodhran.

Description of intervention

Elevated latrines in flood-prone areas

Pakistan's climate-resilient sanitation programme focused on promoting the use of and constructing elevated latrines in flood-prone areas as a healthier, safer and more sustainable alternative to open defecation. To do so, UNICEF supported (1) the development of climate-resilient latrine designs, (2) the integration of climate-resilient WASH concepts and approaches in sanitation-related training materials used across Pakistan and (3) the capacity-building of communities and

the private and public sectors to promote and construct climate-resilient latrines.

First, UNICEF provided technical support to the Government of Pakistan to develop several climate-resilient latrine designs to promote in different conditions, such as a design best fit for soils in riverine conditions and a design suited for wheelchair access. Community and mason feedback was incorporated into the latrine designs. These designs were distributed to sector stakeholders for use across Pakistan. The climate-resilient criteria of the promoted latrine designs, an example of which is shown in Figure 2, include:

- Latrines use sealed, honeycombed, brick-lined double soakage pits to reduce the risk of sewage flow laterally into the surrounding environment as well as seepage downward to aquifers.
- Septic tanks are sealed and elevated to the flood levels experienced in 2010, which are the highest known to date, as documented by community markers and remnants of water damage.
- The maximum feasible distance between latrines and drinking water supplies is maintained.³²
- Aquifer depth was considered for the soakage pit depths to reduce the risk of sewage seepage downward to aquifers.

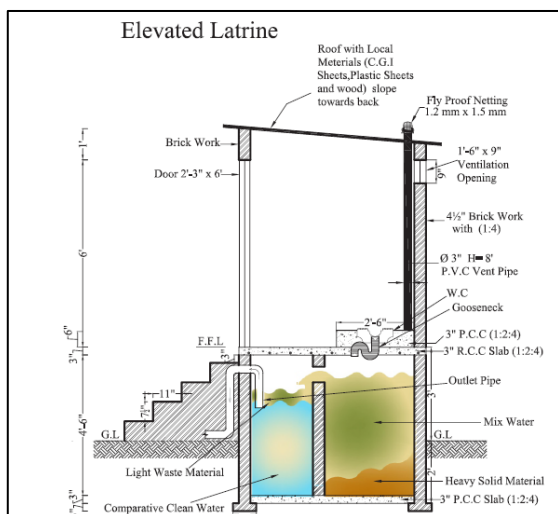
Latrine superstructures are brick to withstand strong winds and high humidity.

³¹ Punjab Provincial Disasters Management Authority, 'DRR Strategy Provincial Disaster Response Plan', 2018. [Link](#).

³² Latrine siting was advised by HUD&PHED and Village WASH Committees (VWCs) for households (with households

making the final siting decision), by school management for schools, and by the Department of Health for health-care facilities.

Figure 2: Elevated latrine design, Manual for Masons³³



UNICEF provided financial support for implementation of the elevated latrines in communities, in particular through construction of demonstration latrines and material provision. Village WASH Committees (VWCs, described in the following section) developed criteria and identified the poorest households to receive support for latrine installation from NGO implementing partners through a process managed by Pakistan’s Housing & Urban Development and Public Health Engineering Department (HUD&PHED). Additionally, 159 climate-resilient latrines were installed in schools and health-care facilities selected by Pakistan’s School Education Department and Department of Health with technical and financial support from NGO implementing partners and UNICEF under the ASWA II project.

Climate-resilient guidance

Next, UNICEF integrated sections and content describing climate risks on the WASH sector and

³³ Roofs are either left open or enclosed with girder beams, T iron bars and slab or brick. CGI sheets are typically not used due to safety in high wind conditions and to heat entrapment.
³⁴ Includes context-specific mobilization strategy and UNICEF in-kind support to tribal and desert areas for constructing and using climate-resilient latrines and best hygiene practices.
³⁵ MAT motivates and enables communities to engage in ODF behaviours using their existing capacities and resources so that communities can adapt behaviours to any particular moment, and uses triggers specific to varying audiences.

steps to mitigate those risks, with specific guidance on climate-resilient sanitation in flood-prone areas, in national sanitation-related documents. These documents recommend immediate action and are used within and outside of the ASWA II project area as the go-to manuals for the sector. These documents (available [here](#)) include:

- Open Defecation Elimination Strategy for Punjab³⁴
- PATS/PATS + Activity Charts, Strategy and Motivation Ability and Triggering (MAT) Model³⁵
- PATS Guiding Booklet for the Social Organiser
- PATS Manual for Masons
- Punjab WASH Sector Development Plan (SPD), 2014–2024³⁶
- Punjab WASH Sector Status Report, annual
- PATS Clean Green Pakistan Movement and Drinking Water and Sanitation Policy, 2019³⁷

UNICEF supported extensive efforts to incorporate climate science and the importance and urgency of climate-resilient WASH services in these documents to establish a basis of understanding in Pakistan’s sanitation sector of why and how climate-resilient sanitation services are necessary. This capacity-building served as the foundation for Pakistan’s WASH sector to begin to think about what can be expected for

³⁶ In 2021, a mid-term review of SPD 2014–2024 and regional studies identified the impacts of climate change on WASH inequities. Districts were ranked according to socioeconomic, climatic and service access vulnerabilities.

³⁷ Includes sensitization of parliamentarians on climate change impacts on WASH and proposes actions to mitigate relevant risks. Promotes five key behaviours for emergency preparedness and climate resilience in WASH strategies.

sanitation services in the future and how to build in resilience, not only by elevating latrines, but also with other options as resources allow.

Importantly, the integration of climate-resilient WASH topics in these guidance materials resulted in a learning outcome for Pakistan's WASH sector to prioritize and mitigate climate impacts. The guidance documents explain how climate affects sanitation services and consequently health and well-being; and intensity and severity of climate change and its impact. Guidance was also provided on how communities can be protected from these impacts through building resilient systems, and possible solutions on climate-resilient sanitation such as promotion of elevated latrines in flood-prone areas.

Capacity-building

Subsequently, climate-resilient sanitation and Disaster Risk Reduction (DRR) concepts, design options and the aforementioned supporting documents were shared with communities in flood-affected areas during awareness-raising sessions. During these sessions, communities were also guided to develop Community Action Plans (CAPs) to identify sanitation-related issues and risks and to seek local, low-cost, resilient and environmentally friendly solutions, and to practice best hygiene behaviours. CAPs were used to mobilize households to construct climate-resilient latrines.

VWCs were formed and, through capacity-building sessions, were trained to implement and regularly follow-up on DRR best practices. Community Resource Persons (CRPs) were established and trained by NGO implementing partners to assess the service level and resilience of sanitation services at the household level, to initiate communication with households to trigger demand for climate-resilient sanitation services and to share key disease prevention guidance to households.

Figure 3: PATS community capacity-building, 2017



UNICEF supported the implementation of the elevated latrine design by developing a comprehensive *Manual for Masons* on how to construct the different versions of the elevated latrine design with informative images and descriptions. Local masons were trained using the *Manual for Masons* on the construction of low-cost climate-resilient latrines. Latrine elevation is recommended in coordination between VWCs and masons for each household based on their respective local knowledge and construction experience. Each household decides the construction height based on this recommendation, local experience, preferences and resource availability.

Figure 4: Construction of elevated latrine, Rajanpur 2011



Also, local entrepreneurs were trained on cost-effective marketing solutions to promote and to make available climate-resilient sanitation services and associated sanitary items and

construction materials in their respective Union Council and village regions.

National priorities

At a national policy level, UNICEF worked alongside the Government of Pakistan and its Ministry of Climate Change to integrate climate-resilient WASH concepts and the recognition of climate risks on WASH services in the 2021 Nationally Determined Contributions (NDCs), the 2012 National Climate Change Policy and revision, the Hand Hygiene for All (HH4A) road map, the 2012 National DRR Policy, the flagship Clean Green Pakistan programmes and the National Adaptation Plan (NAP) currently in development. For example, the 2021 NDCs call for fast-tracking progress towards climate-resilient WASH services, improving community resilience through improved development outcomes in the WASH sector, and for building resilience into water resources management.³⁸

Using its positive relationship and ongoing communication with the Ministry of Climate Change, UNICEF Pakistan advocated for national strengthening of an enabling environment for climate-resilient WASH. The Ministry of Climate Change was receptive to UNICEF's advice and collaborated with UNICEF to integrate evidence of climate risks to WASH services and to outline mitigating actions in key climate documents.

With UNICEF technical support, the Ministry of Climate Change generated this evidence by conducting a WASH Climate Risk Assessment and a Bottleneck Analysis for WASH using a Risk-Informed WASH Bottleneck Analysis Tool. This analysis was also used for public sector capacity-building during provincial workshops in the Joint Sector Review (JSR) process, laying the foundation for a Climate Rationale for WASH, and feeding into UNICEF's planned shift to climate-resilient WASH in its new country programme.

³⁸ Government of Pakistan, 'Updated NDC', 2021. [Link](#).

Outcomes

The climate-resilient sanitation programme in Pakistan has contributed to reduced slippage in open defecation and supported transitioning to at least basic sanitation facilities within and outside of the ASWA II project area. These climate-resilient sanitation facilities were constructed by the communities themselves and have remained functional and accessible during and after several severe floods, as confirmed by annual monitoring³⁹ and by site visits post construction and post floods in the last four years. In 2021, UNICEF Pakistan supported 65,858 people with access to climate-resilient sanitation through this programme. Since 2018, 9,978 elevated latrines have been constructed for households, and 159 elevated latrines have been constructed for schools and health-care facilities. All elevated latrines were built to achieve and sustain ODF status across the 10 flood-prone districts in Punjab. The estimated cost increase to add climate resilience to each latrine is 50 per cent; this cost includes materials, labour and price inflation.

The programme has created demand at the national level for climate-resilient sanitation through the construction and demonstration of climate-resilient latrines, the integration of climate-resilient WASH concepts in training documents and capacity-building of communities and the private and public sectors. Communities are now knowledgeable of best hygiene practices and use of elevated latrines for sustainable access to on-site sanitation, including during and after flood events. The private sector was mobilized to provide climate-resilient sanitation products, and to provide installation and operation and maintenance services to rural communities through the entrepreneur and mason trainings

³⁹ FCDO third party Internal Monitoring Verification (IMV) post construction in 2018; annual monitoring by local governments, UNICEF or NGO implementing partners in 2019 through 2022.

and through wider consultations with the Sanitary Manufacturers' Association.⁴⁰

Figure 5: Elevated household latrine, Jhang District



Challenges

Challenges in implementing climate-resilient sanitation in Pakistan include:

- Limited finances constrained whether households could afford to elevate latrines sufficiently.
- Limited technical capacities and knowledge of options of sector partners to integrate climate resilience in sanitation projects either in development programmes or in emergency response constrained the expansion of climate-resilient sanitation;
- Limited community awareness of climate-resilient concepts resulted in the perception of climate-resilient sanitation as a localized solution only for historically flood-affected areas;
- Limited technical capacities and data for design criteria development constrained

⁴⁰ In 2019, a sanitation marketing workshop was held with entrepreneurs to coordinate the supplies of sanitary items and

the extent to which climate resilience was built into latrine infrastructure; and

- Limited funding constrained the number of districts in which climate-resilient sanitation programming could be implemented by the Government of Pakistan and NGO implementing partners.

Lessons learned

Lessons learned in implementing climate-resilient sanitation in Pakistan include:

- Communities, through VWCs, were willing to cross-subsidize latrines for women-headed and the poorest households.
- The economic shock during the COVID-19 pandemic exacerbated the need to support communities to construct sustainable latrines.

Next steps

The following next steps can support the scaling up of climate-resilient sanitation in Pakistan:

- Use climate risk assessments and climate science and generate more evidence to strengthen the national climate rationale and to inform the implementation of climate-resilient sanitation.
- Support WASH sector stakeholders in identifying, advocating for and mobilizing climate finance and other domestic resources for climate-resilient sanitation.
- Strengthen community and private and public sector capacities to plan for climate risks to sanitation services and to increase resilience.

sanitation construction materials for the projected increase in demand for sanitation as a result of PATS.

- Monitor the effectiveness and use of the climate-resilient latrine designs and identify further improvements for particular conditions, including identifying strategies for making climate-resilient sanitation more affordable.
- Promote climate-resilient sanitation across Pakistan through national and regional climate and WASH strategies, community demonstrations, stakeholder partnerships, and in emergency and development WASH programming.
- Develop and implement vulnerability mapping and effective early warning systems at community, district and provincial levels, with surveillance systems for WASH-related climate-sensitive diseases.

Figure 6: Best hygiene practices in schools, 2016



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