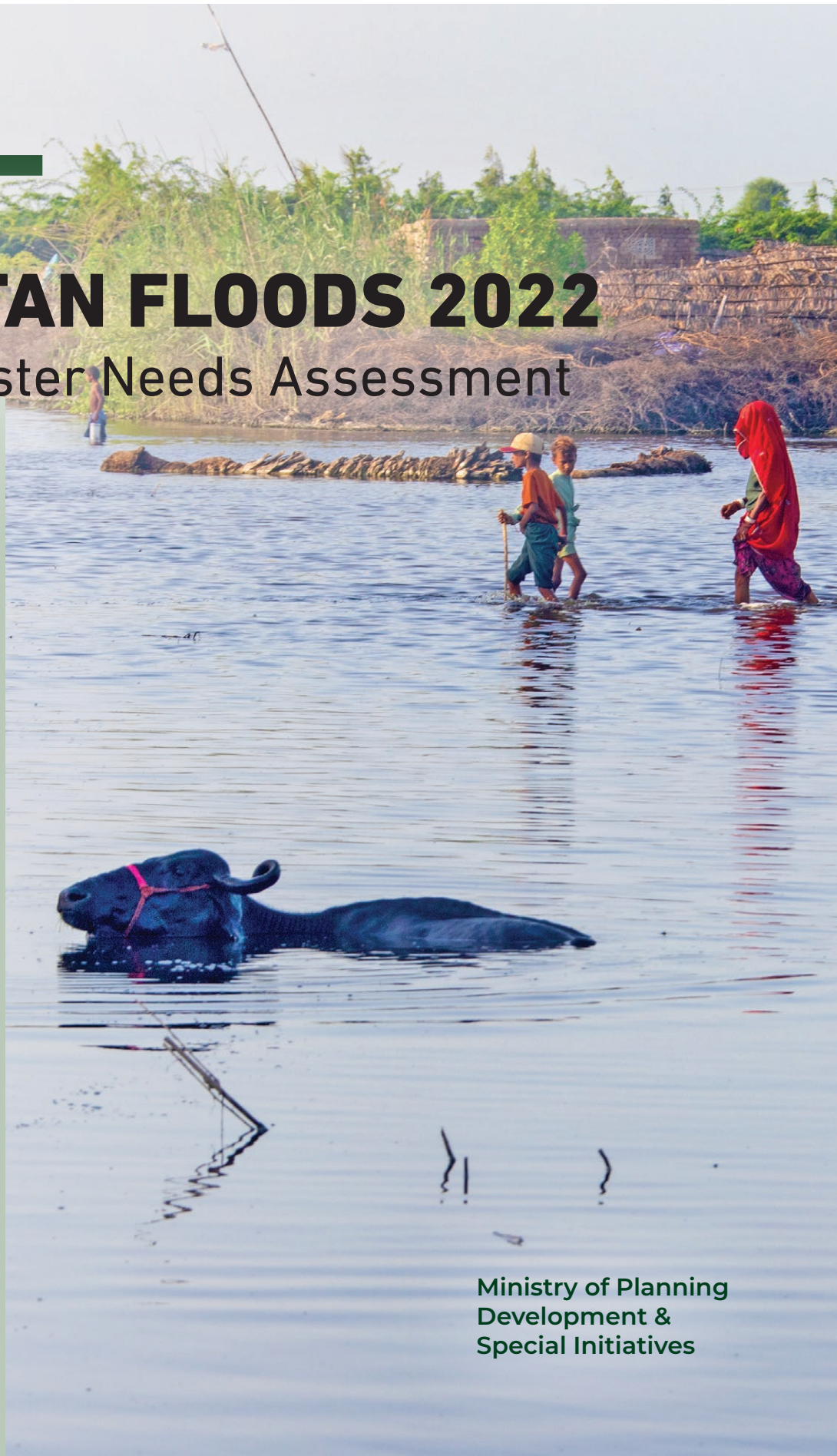
PAKISTAN FLOODS 2022

Post-Disaster Needs Assessment

SUPPLEMENTAL REPORT



Ministry of Planning
Development &
Special Initiatives

PAKISTAN FLOODS 2022

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The Pakistan Post-Disaster Needs Assessment is a product of the Government of Pakistan, prepared with the support of the Asian Development Bank, the European Union, and United Nations Agencies with technical facilitation by the United Nations Development Programme and the World Bank. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the partner organizations, their Board of Executive Directors, or the governments they represent. The organizations do not guarantee the accuracy of the data included in this work.

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Cover photo: UNDP

Disclaimer

This report presents the sector-specific findings of the Post-Disaster Needs Assessment that took place in Pakistan following the floods of 2022. The report is based on data collected between September and mid-October 2022. Although all efforts have been made to improve the accuracy of the information that was collected and analyzed, the assessment was produced in a quick timeframe to ensure the relevance of the estimations. Given the ongoing nature of the disaster and lack of access to inundated areas at the time of publication, remotely sourced data has been triangulated and validated where possible against ground-based information obtained from the Government of Pakistan, local agencies, and international partners.

Based on these constraints, the authors of the report cannot guarantee the accuracy of the data used in this work. It provides an overall picture of the effects of the floods on population, physical assets, infrastructure, and service delivery.

The report uses the exchange rate US$1 = PKR 214.8.[1] All monetary estimates are rounded off to nearest whole number and may not add up to the totals.

1 The average exchange rate during the time of floods, based on the values issued by the State Bank of Pakistan as of the first working day of each month, from June to September 2022.

Acknowledgements

This report has been prepared under the leadership of the Ministry of Planning, Development and Special Initiatives through its Flood Coordination Cell, supported by the Asian Development Bank, the European Union, the United Nations agencies with technical facilitation by the United Nations Development Programme, and the World Bank with financial and technical support from the Global Facility for Disaster Reduction and Recovery. It also benefited from the valuable inputs of bilateral and multilateral partners. This report has benefited from the guidance and inputs of many government agencies and departments including, at the federal level, the Planning Commission, the Economic Affairs Division, the National Disaster Management Agency, and the Space and Upper Atmosphere Research Commission. The report has also been guided and informed by provincial and district governments, including the Planning and Development Departments and Provincial Disaster Management Agencies. The team gratefully acknowledges the hard work of everyone who contributed to produce this document, which will guide the efforts of all those involved in responding to the 2022 Pakistan floods. The PDNA is structured as two reports: the (i) Main Report titled Pakistan *Floods 2022: Post-Disaster Needs Assessment (PDNA) - Main Report,* published on October 28, 2022, including estimations on damage, loss, and needs, methodology overview, resilient recovery strategy, macroeconomic and human impacts, and a summary of sector assessments; and this (ii) Supplemental Report, expanding on those findings with full sector assessment reports, detailed methodology. A full list of contributors can be found at the end of the report. Photographs used in this publication were taken by development agencies and partners unless stated otherwise. The team would like to express their deepest thanks and appreciation to all the contributors.

Photo credit: UNDP

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Acronyms

ADR .....Alternative Dispute Resolution
AGP .....Auditor General of Pakistan
ARIs .....Acute Respiratory Infections
ASER.....Annual Status of Education Report
AWD .....Acute Watery Diarrhea
BBB .....Build Back Better
BISP .....Benazir Income Support Program
BMI.....Body Mass Index
CAR .....Capital Adequacy Ratio
CBDRM.....Community-Based Disaster Risk Management
CCT.....Conditional Cash Transfer
CD.....Communicable Diseases
CDCs .....Community Development Councils
CDD .....Community-Driven Development
CDPs .....Community Development Plans
CJS.....Criminal Justice System
CPI.....Community Physical Infrastructure
CPI.....Consumer Price Index
CPPA-G.....Central Power Purchase Agency
CPR .....Contraceptive Prevalence Rate
DALYs.....Disability Adjusted Life Years
DDMA .....District Disaster Management Authority
DGA-E&CC.....Director General Audit-Environment and Climate Change
DHQ.....District Headquarter Hospitals
DISCOs.....Power Distribution Companies
DMAs .....Disaster Management Authorities
DRF .....Disaster Recovery Framework
DRM.....Disaster Risk Management
DRR ..... Disaster Risk Reduction
DSL.....Digital Subscriber Line
DTP3 .....Diphtheria-Tetanus-Pertussis
DTS .....Department of Tourist Services
E&S .....Environment and Social
ECW.....Education Cannot Wait

EIA.....Environmental Impact Assessment
EmONC .....Emergency Obstetric and Neo-natal Care
EPI.....Expanded Program of Immunization
ESWG.....Education Sector Working Group
FAO.....Food and Agriculture Organization of the United Nations
FFC.....Federal Flood Commission
FIES.....Food Insecurity Experience Scale
FMD.....Foot and Mouth Disease
FTTH/X.....Fibre to The Home
GBV .....Gender-Based Violence
GDP .....Gross Domestic Product
GPE .....Global Partnership for Education
GRMs.....Grievance Redress Mechanisms
H&N.....Health & Nutrition
HCI.....Human Capital Index
HIES .....Household Integrated Economic Survey
HIV.....Human Immunodeficiency Virus
ICH.....Intangible Cultural Heritage
IEC.....Information, Education and Communication
ILO.....International Labour Organization
IMR.....Infant Mortality Rate
INGOs.....International Nongovernmental Organizations
IPC.....Integrated Food Security Phase Classification
IPCC .....Intergovernmental Panel on Climate Change
IUCN.....International Union for Conservation of Nature
KE.....Karachi Electric
KP.....Khyber Pakhtunkhwa
LEA .....Law Enforcement Agency
LFS.....Labour Force Survey
LOIs.....Letters of Intent
MCH.....Maternity & Child Health
MFBs.....Microfinance Banks
MFIs .....Microfinance Institutions
MHPSS.....Mental Health and Psychosocial Support
MICS.....Multiple Indicator Cluster Survey
MoFE&PT.....Ministry of Federal Education and Professional Training
MPI.....Multidimensional Poverty Index
MSRNA.....Multi-Sectoral Rapid Needs Assessment
NAB.....National Accountability Bureau
NCDs .....Non-Communicable Diseases
NDMA.....National Disaster Management Authority
NDMP .....National Disaster Management Plan
NDRMF.....National Disaster Risk Management Fund
NFC .....National Finance Commission

NFPP-IV.....National Flood Protection Plan IV
NGO.....Non-Government Organisation
NPLs.....Non-Performing Loans
NSER.....National Socio-Economic Registry
NTDC.....National Transmission & Despatch Company
OTP.....Outpatient Therapeutic Programs
P&D.....Planning & Development
PAR.....Portfolio at Risk
PDMA.....Provincial Disaster Management Authority
PDNA.....Post-Disaster Needs Assessment
PEDO.....Pakhtunkhwa Energy Development Organization
PFC.....Provincial Finance Commission
PFM.....Public Financial Management
PHED.....Public Health Engineering Department
PKR.....Pakistan Rupee
PLGAs.....Provincial Local Government Acts
PMD.....Pakistan Meteorological Department
PPP.....Public-Private Partnership
PSLM.....Pakistan Social and Living Standards Measurement Survey
PTA.....Parent-Teacher Association
PTA.....Pakistan Telecommunication Authority
RISE.....Research on Improving Systems of Education
RMNCAH.....Reproductive, Maternal, Neonatal, Child & Adolescent Health
RNA.....Rapid Needs Assessment
SBP.....State Bank of Pakistan
SC.....School Council
SDGs.....Sustainable Development Goals
SIA.....Social Impacts Assessment
SMART.....Standardized Monitoring and Assessment of Relief and Transitions
SMC.....School Management Committee
SME.....Small and Medium Enterprise
SOPs.....Standard Operating Procedures
T&T.....Travel and Tourism
TA.....Technical Assistance
TDPs.....Temporarily Displaced Populations
THQ.....Tehsil Headquarter Hospitals
TLC.....Temporary Learning Centre
TVET.....Technical and Vocational Education and Training
UCCN.....UNESCO's Creative Cities Network
UHC.....Universal Health Coverage
UNDP.....United Nations Development Programme
UN HRP.....UN Humanitarian Response Plan
UNITAR.....United Nations Institute for Training and Research
VBDs.....Vector Borne Diseases

VIIRS .....Visible Infrared Imaging Radiometer Suite
WAPDA.....Pakistan Water and Power Development Authority
WASH.....Water, Sanitation, and Hygiene
WTTC .....World Travel and Tourism Council
YLDs.....Years Lived With Disability
YLLs.....Years Of Life

Photo credit: UNDP

Introduction

The Pakistan Post-Disaster Needs Assessment (PDNA) analyzes the impact of the 2022 floods on the country's population, physical assets, and service delivery. Led by the Government of Pakistan and supported by the Asian Development Bank, the European Union (EU), the United Nations (UN), and the World Bank, the PDNA provides an initial estimate of damages, losses, and needs resulting from the disaster in the short-, medium-, and long-term. The PDNA follows a globally established and recognized damage, loss, and needs assessment methodology jointly developed by the EU, the World Bank Group (WBG), and the UN. The PDNA is structured as two reports: the (i) Main Report,[2] which includes estimates of damage, loss and needs, an overview of methodology, recovery strategies, macroeconomic and human impacts, and a summary of sector assessments; and the (ii) Supplemental Report, which includes full sector assessments, and a full list of contributors and credits.

This Supplemental Report provides further analysis of the human impact assessment and the full 17 sector assessment reports. The geographic coverage of the PDNA is limited to 94 calamity-hit districts as of October 11th, 2022, across the four provinces of Balochistan, Khyber Pakhtunkhwa, Punjab, and Sindh. The analysis also includes estimates for Special Regions and at a cross-provincial level.[3] The data were collected from September to mid-October 2022. The PDNA analysis and recommendations focus on the impact and recovery and reconstruction needs following the floods. Damage, loss, and needs calculations were therefore made relative to a pre-flood baseline.

2 Pakistan Floods 2022 Post-Disaster Needs Assessment Main Report. October 2022. The Government of Pakistan, Asian Development Bank, European Union, United Nations Development Programme, World Bank. *https://thedocs.worldbank.org/en/doc/4a0114eb7d1cecbbbf2f65c5ce0789db-0310012022/original/Pakistan-Floods-2022-PDNA-Main-Report.pdf*

3 Special regions include districts outside of the four main provinces that have been affected by the floods and declared "calamity-hit." Cross-provincial includes assets that affect more than one province or are calculated at the national level (e.g., railways, roads, telecommunications).

Photo credit: Afad Tuncay/Shutterstock.com

Human Impact Assessment[4]

4 This chapter focuses the analysis on three core indicators of the Human Impact Assessment Methodology: (i) Income and Poverty; (ii) Living Conditions and Multidimensional Poverty (including conditions of drinking water, sanitation, housing, energy access, asset ownership, health, and education); and (iii) Food Security and Nutrition. The remaining two dimensions, Gender and Social Inclusion, are addressed by the Social Sustainability, Inclusion, and Gender sectoral report.

Monetary Poverty

The 2022 floods will have a profound negative impact on lives and livelihoods. The flood-affected districts are already affected by higher monetary and non-monetary deprivations, especially among households in rural areas.[5] The latest available figures from the national Household Integrated Economic Survey (HIES) suggest that 21.9 percent of the population (around 50 million people) lived below the national poverty line in 2018/19.[6] Beyond the national average, rural poverty was more than twice as high as urban poverty (28.2 percent compared to 10.9 percent), and four out of five poor households lived in rural areas. Households in calamity-hit districts were more impoverished than the national average (31.4 percent compared to 21.9 percent), and poverty rates for many flood-affected districts in Sindh and Balochistan were much higher.[7] Out of the 25 of the poorest districts in the country, 19 were declared calamity-hit; and poverty rates in flood-affected districts are higher than in the country as a whole (see Table 1). Satellite and survey data suggest that even within tehsils, poorer areas were more likely to be affected by the floods. In two-thirds of flood-affected tehsils, areas that flooded had lower levels of relative wealth compared to sites that were unaffected.[8]

5 Estimates in this chapter are based on the Pakistan Social and Living Standards Measurement Survey (PSLM), HIES, and the Multiple Indicator Cluster Survey (MICS) and relate to 75 calamity-hit districts in Punjab, Sindh, Balochistan, and Khyber Pakhtunkhwa (KP) provinces.

6 Poverty is measured using data from HIES 2018/19 and is based on the national poverty measurement methodology, with a poverty line of PKR 3,741 and PKR 3,769 in 2018–19 urban and rural prices, respectively.

7 While poverty estimates from the national household survey HIES 2018/19 are only available at the national and provincial level (urban/rural), small area estimates of poverty can be calculated at the district level by combining data from the HIES 2018/19 and the PSLM 2019/10. The definition of calamity-hit districts follows the communication by the National Flood Response Coordination Center and the National Disaster Management Authority (NDMA).

8 The relative wealth index predicts the relative standard of living within countries using a combination of high-resolution remote sensing data trained on household data; the index predicts the living standards using de-identified connectivity data, satellite imagery, and other non-traditional data sources. The data is provided for 93 low and middle-income countries at 2.4-kilometer resolution. Variation in living standards within districts and tehsils is estimated using the relative wealth index produced in: Chi, Guanghua, Han Fang, Sourav Chatterjee, and Joshua E. Blumenstock. 2022. "Microestimates of Wealth for all Low- and Middle-income Countries." Proceedings of the National Academic of Sciences 119 (3): e2113658119.

TABLE 1. MONETARY POVERTY IN PAKISTAN: PROVINCE AND DISTRICT LEVEL ESTIMATES

Province	Poverty Rates Among All Districts	Poverty Rates Among All Districts		Poverty Rates Among Calamity-hit Districts	Poverty Rates Among Calamity-hit Districts	
		Minimum	Maximum		Minimum	Maximum
Balochistan	42.7	19.9	75.8	44.1	26.3	75.8
KP	29.5	5.6	70.6	30.2	13.7	57.1
Punjab	16.2	4.4	36.0	28.2	6.4	36.0
Sindh	24.1	4.3	60.8	29.3	15.0	53.4
National	21.9	4.3	75.8	31.4	6.4	75.8

Source: District level poverty estimates are based on small area estimates of poverty using HIES 2018-19 and PSLM 2019-20 surveys.

Note: Poverty rates are reported as percentages of the respective population.

Higher poverty rates in calamity-hit districts reflect lower productivity and more limited resilience arising from sociodemographic and socioeconomic characteristics of households and individuals. Moreover, higher rates of stunting—an irreversible condition that impedes children's physical and cognitive growth—in these districts undermined progress toward better development outcomes and inclusive growth; and areas affected by the floods showed some of the highest stunting rates in the country. Stunting is worse in rural areas and among poor households that lack adequate water and sanitation facilities. Stunting rates differ substantially across provinces and districts, and there is also substantial variation between calamity-hit districts and the rest of the provinces (see Table 2). The floods will likely exacerbate these inequities by increasing food insecurity and fostering the spread of waterborne diseases.

TABLE 2. STUNTING RATES IN PAKISTAN: PROVINCE AND DISTRICT LEVEL ESTIMATES

Province	Stunting Rates Among All Districts	Stunting Rates Among All Districts		Stunting Rates Among Calamity-hit Districts	Stunting Rates Among Calamity-hit Districts	
		Minimum	Maximum		Minimum	Maximum
Balochistan	49.7	10.1	78.6	48.7	10.1	78.6
KP	36.7	24.9	63.0	38.2	28.7	63.0
Punjab	31.5	20.0	47.4	42.2	27.1	47.4
Sindh	50.2	25.1	72.7	55.0	37.5	72.7

Source: MICS 2020 (Balochistan); MICS 2019 (KP); MICS 2018 (Sindh); MICS 2017 (Punjab).

Note: Stunting rates are reported as percentages of the respective population.

Preliminary estimates suggest that, as a direct consequence of the 2022 floods, the national poverty rate will increase by 3.7 to 4.0 percentage points, pushing between 8.4 and 9.1 million people into poverty (see

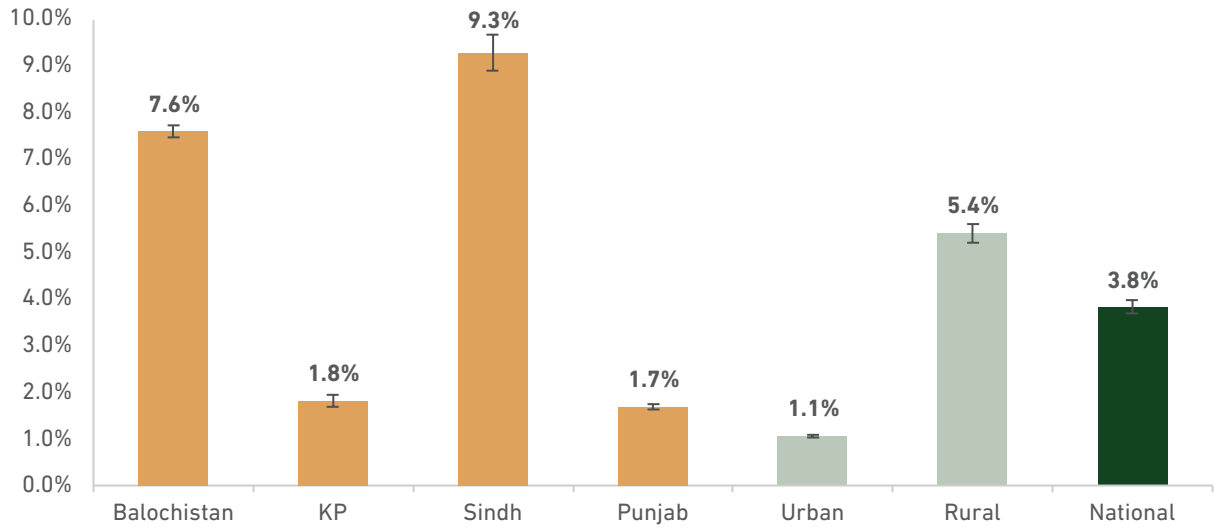
Figures 1 and 2). Estimates focus on the short-term impact. Depending on the location and design of relief and reconstruction, the impact may vary. The methodology is summarized in Appendix 1.

The poverty estimates account for losses as reported by data collected by the National Disaster Management Authority (NDMA) in calamity-hit districts.[9] They include damages to livelihoods in agriculture, industry, and services, as well as the loss of key assets such as livestock and housing. As a robustness check, damages based on the extent of flood exposure observed using satellite data were also calculated, which produced similar results (see Appendix 1). Error bars were calculated by repeating the simulation 500 times.

Beyond the national average, poverty in Sindh would increase by between 8.9 and 9.7 percentage points, and in Balochistan by between 7.5 and 7.7 percentage points. Moreover, the depth and severity of poverty will increase for households that were already poor prior to the floods. The poverty gap has substantially increased, with the number of extremely poor people living more than 20 percent below the poverty line increasing from 18 to 25–26 million (see Figure 3). Those working in the agricultural sector will be the worst affected (see Figure 4).

Beyond the increase of monetary poverty, the 2022 floods will have a detrimental impact on human development outcomes. Some groups will likely experience disproportional losses, potentially deepening existing inequities across households and individuals. The floods will trigger substantial losses to human capital (education and health) with increased incidence of stunting and learning losses, which will have a long-lasting impact on productivity and resilience unless addressed during the rehabilitation phase. These poverty estimates do not account for impacts on certain vulnerable groups, including refugees and displaced persons from Afghanistan, since they are inadequately covered in national household surveys.

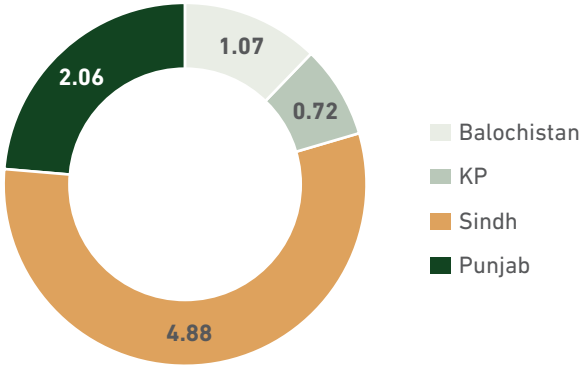
FIGURE 1. SIMULATED CHANGES IN THE NATIONAL POVERTY RATE (PERCENTAGE POINTS, POINT ESTIMATES)



Source: World Bank staff calculations.
Note: See Appendix 1 for methodology.

9 Updated reports on the flood situation including official damage estimates are available on *http://cms.ndma.gov.pk/*

FIGURE 2. NUMBER OF ADDITIONAL POOR (MILLIONS)



Source: World Bank staff calculations.

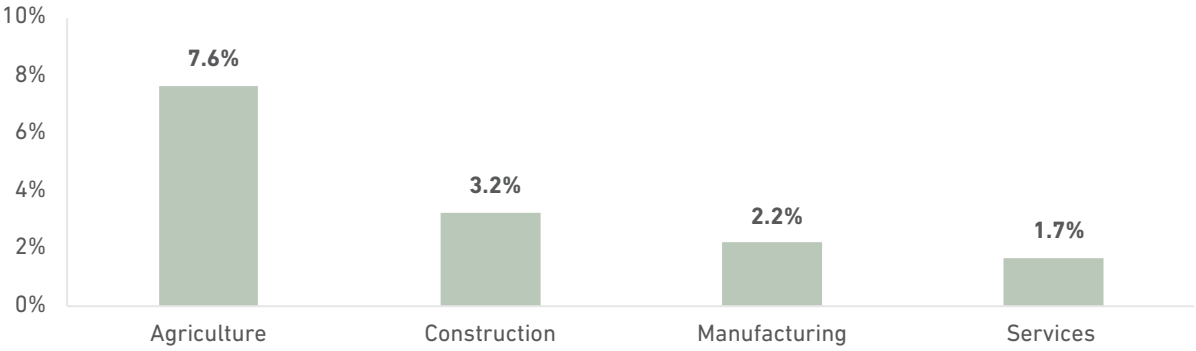
Note: See Appendix 1 for methodology; based on 2022 estimated population.

FIGURE 3. NUMBER OF PEOPLE LIVING MORE THAN 20 PERCENT BELOW THE POVERTY LINE (MILLIONS)

Source: World Bank staff calculations.

Note: Poverty gap calculated as difference between own consumption and the national poverty line.

FIGURE 4. SIMULATED CHANGES IN THE NATIONAL POVERTY RATE BY SECTOR OF EMPLOYMENT OF HOUSEHOLD HEAD (PERCENTAGE POINTS)



Source: World Bank staff calculations.

Living Conditions and Multidimensional Poverty

According to the Pakistan Social and Living Standards Measurement Survey (PSLM) 2019–20 data, 37.8 percent of the population (12.3 million households) were living in multidimensional poverty prior to the floods.[10] Balochistan, Punjab, KP, and Sindh provinces showed an incidence of poverty above the national average at 70.2 percent, 47.6 percent, and 44.7 percent, respectively. In addition, gendered analysis of multidimensional poverty suggests that female-headed households are poorer than male headed households.[11] Deprivations in education were the largest contributor to multidimensional poverty, followed by living standards and health.[12]

Prior to the floods, less than half of the population had adequate health care coverage, with Balochistan the least covered. At the national level, the percentage of women availing postnatal care was only 33 percent, the under-five mortality rate was 74 deaths per 1,000 live births, the infant mortality rate was 62, and the neonatal mortality rate was 42. Close to 22 million children aged 5 to 16 years were out of school during 2019/20, with the highest rates in Balochistan, Sindh, and KP. Literacy rates (10 years and older) remained stagnant at 74 percent.[13]

The impact of the floods on households has been immediate and profound. The disaster has led to a deterioration of living conditions, mainly through widespread disease triggered by damaged sanitation systems and contaminated drinking water, as well as through loss of access to health facilities and education services, damage to houses, and loss of livestock. This is exacerbated by limited social assistance schemes and services to support the loss of income and protection needs.

As a result, estimates indicate an increase in multidimensional poverty from 37.8 percent to 43.7 percent, meaning that an additional 1.9 million households (around 12.1 million people) will be pushed into multidimensional poverty in calamity-hit districts.[14] These individuals and households will experience significantly increased deprivations around access to adequate health, sanitation, quality maternal care, electricity, and loss of assets (see *Appendix 2* for detailed methodology). The number of additional households falling into non-monetary poverty will be highest in Sindh (4.8 million households), followed by KP (4.6 million households), and Punjab and Balochistan (both with an additional 1.2 million households). However, poverty rates will be highest in Balochistan (81.1 percent), followed by KP (60.6 percent) and Sindh (54.9 percent). Rural households are likely to be the most affected given their dependence on agriculture

10 UNICEF Pakistan Country Office calculations based on PSLM 2019–20 data: Government of Pakistan. 2021. "Pakistan Social and Living Standards Measurement Survey 2019–20." Pakistan Bureau of Statistics, Islamabad. *https://www.pbs.gov.pk/sites/default/files/pslm/publications/pslm_district_2019-20/PSLM_2019_20_District_Level.pdf*. The analysis of non-monetary districts covers 71 calamity-hit districts. The analysis does not include areas from Special Regions and PSLM 2019–20 does not cover four calamity-hit districts from Balochistan: Jhal Magsi, Musakel, Panjgur, and Zhob.

11 Siddique, Muhammad, and Misbah Nosheen. 2021. "Gender Poverty Gap: A Comparative Analysis of India and Pakistan." *Review of Economics and Development Studies* 7 (2): 287–298. *https://reads.spcrd.org/index.php/reads/article/view/364/322*.

12 Multidimensional Poverty in Pakistan, National MPI Report, Federal Ministry of Planning, Development and Special Initiatives (MPDSI), OPHI, UNDP (2016).

13 Government of Pakistan. 2021. "Pakistan Social and Living Standards Measurement Survey 2019–20." Pakistan Bureau of Statistics, Islamabad. *https://www.pbs.gov.pk/sites/default/files/pslm/publications/pslm_district_2019-20/PSLM_2019_20_District_Level.pdf*.

14 Estimates are based on PSLM 2019–20 survey data and, relate to 71 calamity-hit districts in Punjab, Sindh, Balochistan, and KP. The PSLM 2019–20 did not cover four districts from Balochistan: Zhob, Panjgur, Jhal Magsi, and Musa Khel.

as their primary economic activity. With limited access to physical infrastructure and services, they are unable to access alternate means of livelihoods. The most devastating long-term consequences of the floods will be experienced by the poorest households that have next to no savings and limited access to support systems.

Analysis on multidimensional poverty at the national level indicates an increase from 11.3 percent to 15.5 percent of the population in calamity-hit districts will be deprived of access to an improved source of water, representing an additional 1.5 million households. Limited access to safe drinking water will increase the risk of waterborne and communicable diseases and infections, thus placing more pressure on overstretched health services, perpetuating a vicious cycle of disease and poverty. Productivity losses due to illness and morbidity will be inevitable.

The percentage of the population deprived of access to adequate sanitation will increase from 17.9 percent to 21.4 percent, corresponding to an additional 1.2 million households in calamity-hit districts. In these affected districts, the highest increase will be in KP (7.6 percentage points) followed by Sindh and Balochistan (6.3 percentage points each). Open defecation will increase the risk of fecal contamination of groundwater, thereby compromising the quality of drinking water. These impacts extend beyond immediate concerns of widespread disease and will have long-term consequences for the community, household livelihoods, and the environment. Women will be disproportionately impacted by deprivations around water and sanitation, given their role as water and solid waste managers at the household level and as caregivers.[15] The floods will likely aggravate the burden of women's unpaid work and increase their vulnerability in terms of both health and personal safety.

The damage to health facilities has resulted in disruption to essential health services. The proportion of the population deprived of access to health facilities will increase from 31.4 percent to 34.9 percent at the national level, corresponding to an additional 1.2 million households in calamity-hit districts. At the provincial level, Balochistan has the highest proportion at 58.9 percent, followed by KP with 40.3 percent and Sindh with 33 percent. As a result, an additional 1.9 million households[16] with children under five in calamity-hit districts will not be fully immunized, leaving children at risk of deadly and preventable diseases. Furthermore, an additional 2.8 million households with newborns will be deprived from antenatal check-ups and postnatal care. This situation threatens to reverse recent gains in infant and maternal health and undermine efforts to reduce poverty and achieve the Sustainable Development Goals (SDGs) by 2030.

The floods have caused severe disruption to education services in calamity-hit districts. An additional 1.2 million households with children between six and 11 years of age will be prevented from attending school. At the provincial level, the share of households is highest in Balochistan (39.0 percent), followed by Sindh (31.6 percent), and KP (30.1 percent). The potential losses that have accrued in learning for today's young generation, and for the development of their human capital, are hard to fathom. In addition to learning loss, school closures impact children's mental health, reduce their access to a regular source of nutrition, and increase their risk of abuse. This further exacerbates young girls' vulnerabilities and chances of unintended pregnancy and early and forced marriages.

The focus of recovery should shift from general emergency distribution to targeted services aligned with the specific needs of different population groups, this should include participation in the design

15 Women already spend 10 times the hours as men in unpaid care work. See: United Nations Development Programme. March 12, 2021. "Womenomics: Women Empowering the Economy." Special Edition Report, Development Advocate Pakistan. *https://www.undp.org/pakistan/publications/womenomics-women-powering-economy-pakistan.*

16 The Pakistan Floods 2022-- Post-Disaster Needs Assessment (main report) reported this statistic as 5.5 million households. The updated and revised figure is 1.9 million households as stated in the above text.

and delivery of services. Particular attention should be given to the pregnant women, lactating mothers, newborns, children under five, immuno-depressed persons, and patients with chronic diseases, including the people with disabilities and the elderly, whose pre-existing conditions are further aggravated (or whose drug adherence was compromised) by the lack of access to drugs and health services during the floods. In addition, specific measures related to protection require to be established around domestic violence exploitation and abuse, including the prevention of child labor.

Food Security and Nutrition

The 2022 floods have led to shortages of food due to lost production and rising food prices. According to the Multi-Sectoral Rapid Needs Assessment (MSRNA), 48 percent of households reported having lost their stored cereal stocks, with higher shares in Sindh and Balochistan (57 percent), followed by Punjab (49 percent) and KP (29 percent).[17] Expected delays in the sowing of *rabi* crops[18] will further reduce food availability and increase prices during coming months. This will particularly impact low-income groups in hard hit areas, with significant implications for food security. Estimates suggest that an additional 7.6 million people will face food insecurity at the national level, increasing from 7 million to 14.6 million.[19] Alongside the increased deprivations on access to drinking water and sanitation facilities, food shortages will increase the likelihood of stunting, with profound consequences for long-term development and inclusive growth.

Food insecurity and malnutrition were already of concern prior to the floods. Furthermore, levels of food insecurity in calamity-hit districts were higher than national levels. At the national level, around 16 percent of households (38.2 million people) were estimated to be moderately or severely food insecure and 1.8 percent of households (around 4.2 million people) to be severely food insecure.[20] Prevalence of food insecurity ranged between 14.4 percent in KP to 23.4 percent in Balochistan.[21] In addition, nearly 22 percent of children born in Pakistan had low weights, 23 percent of children under five remained underweight, 38 percent were stunted, and 7 percent were wasted.[22]

In calamity-hit districts, analysis of pre-floods data indicates that, on average, 20 percent of households (7 million people) were moderately or severely food insecure. The distribution by provinces shows that 56 percent of households (3.9 million people) were moderately or severely food insecure in Sindh, 23 percent of households (1.6 million people) in Balochistan, 9 percent (0.6 million people) in KP, and 12 percent (0.8 million people) in Punjab.

17 The MSRNA was conducted in 35 calamity-affected districts of Balochistan, Punjab, KP, and Sindh during August and September 2022. *https://reliefweb.int/report/pakistan/pakistan-2022-multi-sector-rapid-needs-assessment-flood-affected-areas-khyber-pakhtunkhwa-punjab-and-sindh-september-2022; https://reliefweb.int/report/pakistan/rapid-need-assessment-flood-emergency-balochistan-and-kp-aug-2022*.

18 Rabi crops are agricultural crops that are sown in winter and harvested in spring.

19 Estimates in this sub-section on Food Security and Nutrition are based on Food Insecurity Experience Scale (FIES) data from the PSLM 2019–20, Integrated Food Security Phase Classification (IPC) analysis, and data from the Multi-Sectoral Rapid Needs Assessment (MSRNA) and relate to 84 calamity-hit districts in Punjab, Sindh, Balochistan, and KP provinces.

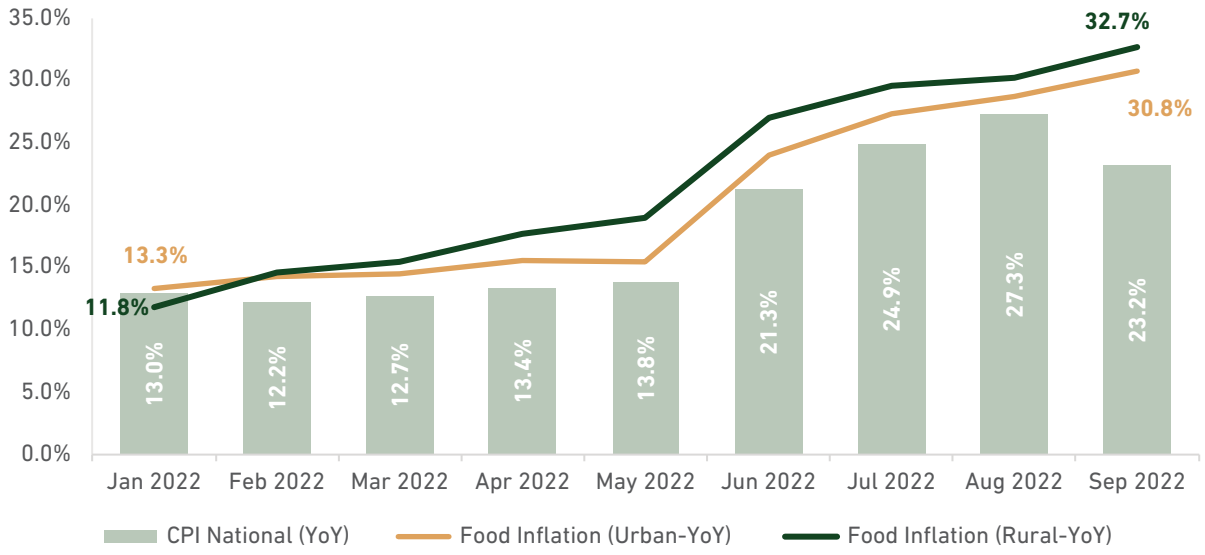
20 Government of Pakistan. 2021. "Pakistan Social and Living Standards Measurement Survey 2019–20." Pakistan Bureau of Statistics, Islamabad. *https://www.pbs.gov.pk/sites/default/files/pslm/publications/pslm_district_2019-20/PSLM_2019_20_District_Level.pdf*.

21 Calculations used projected population 2021.

22 Pakistan Demographic Health Survey 2017.

Prior to the floods, Pakistan experienced high levels of inflation. Food price inflation was especially high, hence ongoing flood-related price rises are particularly impactful for economically vulnerable groups. The Consumer Price Index (CPI) inflation data released by the Pakistan Bureau of Statistics in August 2022 shows that general CPI inflation in Pakistan increased by 27.3 percent in July 2022 compared to the same month last year—the highest since 1975.[23] When comparing the pre- and post-flood food CPI, increasing trends are observed from June to September 2022, proportionally higher in rural areas (33 percent) than urban areas (31 percent) on a year-on-year basis.

FIGURE 5. CPI TRENDS, JANUARY TO SEPTEMBER 2022



The prices of essential food items, such as wheat flour, rice, cooking oil, pulses, milk, and meat, have spiked since January 2022, with a sharp rise occurring during the floods in July to September 2022. As the poorest households (lowest 20 percent wealth status) in Pakistan spend, on average, 47 percent of household income on monthly food expenditure,[24] the rising food prices will have a significant impact on their purchasing power and ability to access food. This may lead to undesirable coping strategies such as consuming less nutritious food and/or skipping meals, which can have severe implications for their food security and long-term nutrition outcomes.

Estimates indicate that the food-insecure population will increase from 7 million to 14.6 million people in the calamity-hit districts. The methodology is summarized in Appendix 4. The additional number of people in need of food assistance is highest in Sindh (4.3 million), followed by KP (1.7 million), Punjab (0.9 million), and Balochistan (0.8 million). The most impacted population groups include marginalized poor people who are dependent on informal labor/agriculture wage labor, persons with disabilities, and smallholders who cannot afford to buy agricultural inputs to resume their farming activities. Expected delays in the sowing of *rabi* crops, particularly wheat, is likely to further exacerbate the already precarious food security situation.

23 CPI Monthly Review, September 2022. (pbs.gov.pk).
24 Government of Pakistan. "Household Integrated Economic Survey 2018–19." Pakistan Bureau of Statistics, Islamabad.

Food shortages and widespread disease associated with increased deprivations on access to safe drinking water and sanitation will have a significant impact on stunting rates in the long term. According to the nutrition database, prevention and curative nutrition interventions were discontinued in the calamity-hit districts, depriving essential nutrition services to 4.9 million children under five (2.5 million girls and 2.4 million boys) and 2.6 million pregnant and breastfeeding mothers.

The floods have further compounded the burden of malnutrition and the need for nutrition services, especially among vulnerable population groups who face ever-greater challenges in accessing nutritious and affordable diets. Moreover, the nutrition challenges in calamity-hit areas will result in higher levels of acute and chronic malnutrition such as wasting and stunting. Children with stunted physical and mental development are more likely to hold low-wage jobs which may impact their prosperity as adults.

To address the risks of increased food insecurity and the deterioration of children's nutrition status, the following recovery strategies may be considered:

- Develop context-appropriate guidelines and standard operating procedures for the continuation of nutrition services and programs to ensure all children receive optimal nutrition that will promote their growth and development.
- Provide early recovery assistance to meet the basic food, nutrition, and livelihood needs of flood-affected communities and strengthen long-term resilience (immediate food and nutrition needs of the affected population through in-kind and Cash-based transfers (CBT) support linked with climate change adaptation; and income-generating activities).
- Provide capacity support to the government for emergency preparedness and response infrastructure, systems, and services to enable communities at higher risk of vulnerability to disasters to meet their food, nutrition, and basic needs (including forecast-based financing and the government's early warning systems).
- Provide technical assistance to the government and the private sector for a strengthened supply chain and market system for fortified and other nutritious food including food systems value addition; and food handling to minimize food losses. This includes reforms for small landholders.
- Provide capacity strengthening to provincial and federal governments to enable them to improve safety net design and delivery, including through hybrid modalities, inclusive targeting, enhanced food security and nutrition monitoring, and data analysis.
- Provide skills development, access to assets, links to agriculture, financial inclusion, and risk financing to strengthen the livelihoods of communities at higher risk of vulnerability (including climate sensitive recovery and resilient activities using a watershed management approach; institutional and capacity building of government and communal early warning systems; develop capacity of small farmers; social enterprise strengthening considering a lens of integration with social safety nets).
- Prepare and update the food security and nutrition policies of federal and provincial governments, including the need to increase investment in nutrition.

Sector Reports

Photo credit: UNDP

Social Sectors

Photo credit: Thomas Koch/Shutterstock.com

Housing

Pre-floods Context and Baseline

State of Sector Prior to Disaster: Typical houses in the rural affected districts consist of one or two rooms, with animal sheds, storage areas, silos for grain, space for cooking, and a latrine and washing area (which are generally without roof), with 4–5 feet high walls. Individual houses or groups of houses are enclosed by boundary walls in many areas, providing a secure and private household living space. The average size of a housing unit varies across the country—between an average of 1.5 rooms in rural Sindh and 3.2 rooms in urban KP. The average household size ranges from 5.6 in Sindh to 7.8 in KP. In affected districts, 57 percent of houses are categorized as *katcha* (non/semi-permanent, covering a wide range of local or traditional materials such as stone with mud mortar, adobe brick, mud, wood/bamboo framed, and other construction types); and 43 percent of are categorized as *pucca* (conventional permanent construction using burnt brick or concrete block and sand cement mortar). This proportion varies significantly across and within provinces, from 88 percent *katcha* prevalence in affected districts of Balochistan to 17 percent in affected districts of Punjab. While *katcha* houses are more prevalent type in rural areas, *pucca* houses are more common in urban areas. Urban households have greater access to electricity, piped water and sanitation services, while facilities in rural areas are rudimentary.

Between 87 percent and 91 percent of the households in the flood-affected rural areas are owner-occupiers, urban areas have a higher share of tenants (18–31 percent). Female-headed households are a small share of the owned units in affected provinces, ranging between 4 percent in rural Balochistan to 11 percent in urban Sindh. While house ownership is higher in rural areas, housing with unclear ownership status is also higher in proportion.[25] Many with insecure tenure status experience complex socioeconomic disadvantages and housing vulnerabilities.

Baseline Housing Stock: The number of pre-flood baseline housing stock for the affected districts has been estimated by applying district-wise inter-censal (1998–2017) housing growth rates to the housing stock as reported in the 2017 census data.[26] The baselines were disaggregated into *katcha* and *pucca* categories using the district-level *katcha*/*pucca* housing proportion from the 2017 census. There are approximately 10.3 million housing units in the 94 flood-affected districts. Of these, 4.5 million units are *pucca* and 5.8 million units are *katcha*.

Formal housing finance for house purchase or construction only accounts for 5.4 percent of the private sector financing portfolios of commercial and microfinance banks. Housing finance also remains concentrated in urban areas and among relatively wealthy households. In the affected districts, houses are built as personal resources allow, usually incrementally and through informal savings groups and loans. Most of the households impacted by the floods fit this profile of excluded households.

25 These statistics are based on the 2017 Population Census.
26 Two percent was applied across KP and Balochistan as a number of districts have changed since the 2017 census.

The affected area covers a wide range of climate zones with cold winters and snow in north KP, and other provinces, and intense heat in long summers in the lower plains of south KP, Sindh, and eastern Balochistan. The houses and settlements in affected areas are exposed to a variety of natural hazard risks (drought, heatwaves, floods, cyclones, windstorms, tsunamis, sea intrusion, and earthquakes), localized and widescale, at different levels and in different combinations.

Rural villages have traditionally mitigated flood risks by selecting high ground, raising a platform, constructing a protective bund, or increasing planting and drainage. Urban settlements have varying levels of drainage, flood management, and mitigation infrastructure, including some measures introduced after previous floods. The elevated main road networks play vital roles in economic linkages, market access, and refuge in the event of flooding.

Housing construction costs have risen sharply over the last decade, most acutely for conventional materials and transportation. Labor rate rises have increased the cost of all construction typologies.

Assessment of Disaster Effects: Damage and Loss Estimates[27]

The floods caused damages to more than 2 million housing units across the country, including 780,000 units completely destroyed[28] and more than 1.2 million partially damaged.[29] The damages were predominantly in rural areas. While only accounting for 57 percent of the pre-flood housing stock, *katcha* houses have made up 78 percent of the estimated units damaged fully or partially 663,000 and 931,000 respectively units). Among provinces, the housing stock in Sindh has been the worst affected, with about 1.7 million housing units completely destroyed or partially damaged, which is 28 percent of the total housing stock in the affected Sindh districts. By contrast, only 10 percent of the total *pucca* housing stock (460,000 housing units) has suffered damage, with about 118,000 being completely destroyed and 342,000 partially damaged.

The direct damage to housing amounts to US$5,586 million. Indirect losses including the cost of demolition, salvage and debris management, cost of providing temporary shelter support to affected households, and temporary rental loss (rental of six months) are estimated to be US$636 million.

27 Damage may be classified as **partially damaged** if less than 40 percent of the asset is damaged, structure is still sound; and repair costs would be less than 40 percent of the total asset value. Damage may be classified as **completely destroyed** if more than 40 percent of the asset has been damaged or if the replacement cost of the damages would be more than 40 percent of the total value of the asset.

28 This primarily includes completely washed away, fully collapsed, or structurally damaged houses with foundation failure or erosion of supporting walls.

29 This mostly includes cases of roof damage and repairable damage to walls, and rehabilitation of finishes and fittings.

TABLE 3. SUMMARY OF AFFECTED HOUSING STOCK

Province/Region	Katcha		Pucca		Total
	CD*	PD**	CD	PD	
Balochistan	65,542	117,432	3,450	6,181	192,605
KP	10,929	17,779	22,120	41,104	91,932
Punjab	16,048	26,065	6,878	11,171	60,161
Sindh	569,640	769,541	84,831	283,167	1,707,179
Special Regions	474	103	421	1005	2003
Total	**662,633**	**930,920**	**117,699**	**342,628**	**2,053,880**

*Note: * CD: Completely destroyed; ** PD: Partially damaged.*

Excessive rainfall has caused extensive damage to roofs, which may collapse and, in some instances, cause further damages. Damage to *pucca* roofs is generally minor and repairable, while many *katcha* roofs will require replacement. Molded mud walls are generally damaged beyond repair after protracted inundation. Burned brick walls have performed better with sand/cement or lime mortar in comparison to mud mortar. Certain *katcha* types, such as *loh kat* (framed and plastered construction), are repairable. All construction types demonstrate instances of foundation failure with subsidence of the ground under waterlogged foundations, resulting in a range of damage from minor cracking to full collapse.

High levels in watercourses in the north of the country swept away or partially eroded buildings constructed in close proximity. In mountainous areas, heavy rain also triggered landslides, which caused structural damage. In the plains, excessive rains, spillover of the river and canal banks, and breaches have inundated the settlements, undermined foundations, and, in some cases, sudden bank failures have caused flash flooding and localized housing damage. Flash flooding has scoured the base and corners of buildings, eroded foundations, and washed away walls, which has caused more damage to less durable materials. The level of damage caused by standing water is dependent on the height and duration of inundation and the durability of the building material construction.

Direct Damage Estimate: The damage costs for a typical house is dependent on the severity of the damage, the size of the house, the type of construction, and the age of the housing unit. The damage estimates are based on the average housing unit sizes across all affected districts in each province, derived from the average number of rooms reported for each district in the 2017 census. The cost of a typical *katcha* and *pucca* house has been estimated using unit material and labor costs collected from the field by the PDNA team (United Nations agencies). Household water and sanitation facilities/fixtures are included as part of the value. Damage to partially damaged houses is estimated to be 40 percent of the value of an equivalent completely destroyed *katcha* house, and 30 percent in the case of a *pucca* house. Damage to household goods and assets (furniture, bedding, clothing, kitchen items, storage, electronics and appliances, jewelry) is estimated as a proportion (25 percent in destroyed houses and 10 percent in partially damaged houses) of the value of the housing unit, which is triangulated with the estimated value of lost appliances based on the available statistics. Using this model, the total costs for direct damage for completely destroyed houses is estimated at US$3,052 million, for partially damaged houses at US$1,490 million, and for household assets, appliances, and fixtures at US$912 million, giving a total direct damage cost of US$5,454 million.

Loss Estimate: The value of losses cover: (i) costs of demolition, salvage and debris management, estimated at US$191 million; (ii) cost of provision of temporary shelter estimated at US$429 million; and (iii) temporary rental losses, estimated at US$1.1 million. The cumulative value of indirect housing sector losses is estimated at US$621 million.

TABLE 4. SUMMARY OF DAMAGES AND LOSSES TO THE HOUSING SECTOR

Province/ Region	Value of Housing Stock (PKR Million)			Value of Household Assets & Appliances (% method)	Total Damages (PKR Million)	Debris Management Costs	Temporary Shelter Costs	Rental Costs	Total Losses (PKR Million)
	CD	PD	Total						
Balochistan	49,900	33,102	83,002	15,785	98,788	2,681	7,336	34	10,051
KP	77,313	15,347	92,659	20,863	113,522	3,661	5,878	13	9,552
Punjab	34,219	9,705	43,924	9,525	53,449	1,527	3,021	22	4,570
Sindh	508,272	269,216	777,488	153,990	931,478	34,037	77,913	137	112,087
Special Regions	1,810	505	2,315	387	2,702	85	191	26	303
Total (PKR Million)	**671,514**	**327,875**	**999,389**	**200,550**	**1,199,939**	**41,991**	**94,340**	**232**	**136,562**
Total (PKR Billion)	**672**	**328**	**999**	**201**	**1200**	**42**	**94**	**0.2**	**136**
Total (USD Million)	**3,126**	**1,526**	**4,653**	**934**	**5,586**	**195**	**439**	**1**	**636**

Means of Validation: Primary data on damage to housing stock from the five provinces/regions have been provided and officially notified by the provincial/regional government entities. Government data was desegregated at the minimum at the district level and the tehsil/taluka level for Sindh, KP, and other provinces. Validation has involved various techniques for quantitative and qualitative rationalization including comparison across districts/tehsils with a similar level of flooding, estimation through a model, and comparison with independent data sources. Independent data sources for validation include flood inundation extent and depth, satellite imagery-based data, and field assessment reports, where available.

Determination of Damage to Katcha and Pucca Houses: The provinces of Sindh, KP, and other provinces provided the data disaggregated by *katcha* and *pucca* houses. Where *katcha* and *pucca* damage distribution was not available, the assumption was discussed with government counterparts and applied to the damaged stock, keeping the same ratio of completely destroyed and partially damaged houses as reported by the government. In Balochistan, 95 percent of damage is for *katcha* houses; in Punjab it is 70 percent.

Validation through Remote-sensing Data: Multiple sources of satellite imagery were used to provide data for triangulation, including the intensity, size, duration of the flood, and building footprints.[30] This data has been used to validate and rationalize damage estimates at a district level, and in some cases (particularly in Sindh, KP, and Balochistan) at the tehsil/taluka level.

Linking the Effects to the Human Impact

Damage or destruction of the family home is not only a loss of assets but traumatic for individuals and families. Uncertainty about prospects for recovery adds further distress. Protracted displacement, accommodation in temporary shelter, and delays in repair and reconstruction of housing places significant strain on the security, safety, privacy, family life, and health of vulnerable people. Makeshift arrangements for food storage and preparation and for washing and sanitation increases hygiene-related health risks and makes daily tasks especially difficult, the burden of which disproportionately falls on women and girls.

In rural areas, housing is directly related to agricultural livelihood. Residential construction work is normally undertaken according to the agricultural calendar, and labor is less available during planting and harvesting seasons. The house compound commonly incorporates accommodation for animals, storage of food and animal fodder, and secure open space to keep poultry and animals. Housing also supports home-based income generation activities by women, both in rural and urban areas, which is likely to be severely impacted by the floods.

Vast quantities of construction materials will be needed for reconstruction. Unless the material supply chain is rehabilitated and expanded and road networks restored, costs may rise and undermine affordability. Inflation in key material costs can significantly erode the value of financial assistance. High costs will disproportionately affect households in remote rural areas with added transportation costs. Increased demand may also lead to shortages and delays in reconstruction progress, unless the supply side is reinforced.

Recovery Needs and Strategy

The recovery needs are substantial and the pathway to housing recovery shall be informed by extensive experiences within Pakistan and with global good practices. Housing is largely a private good. The magnitude of losses in private investments in their homes accumulated over years (or decades) warrants strategic approaches to recovery and reconstruction. It is pivotal that the government play an enabling role in supporting families and communities to rebuild their houses and settlements according to disaster and climate-resistant standards.

Considering the affected area is prone to multiple hazard risks (floods, earthquakes, landslides, heat waves, etc.), the reconstruction of houses should be based on appropriate cost-effective, hazard-resistant standards as much as possible. While this multi-hazard resilient approach will increase initial reconstruction costs, it will constitute the most economically efficient solution when viewed over the full useful life of these investments, and in the context of the rising impacts of a changing climate. It is

30 Open Street Map and Microsoft AI derived building footprints were obtained on September 21, 2022.

recommended that the government require the adoption of multi-hazard resilient construction standards as a condition for the disbursement of housing reconstruction grants.

Mitigating flood risks will also need to involve rural and urban settlement level resilience measures, including ensuring proper natural resource management, adequate land use planning, and urban development control, as well as correcting inadequacies in pre-disaster infrastructure and services.

Housing Recovery/Reconstruction Needs: The reconstruction and repair needs for housing have been calculated from the perspective of the role of the government in enabling and catalyzing families to rebuild safer homes and stronger communities, over time, most efficiently and equitably.

The needs estimate is based on providing uniform subsidies for families whose houses were destroyed or partially damaged to be able to build back better. The subsidy for completely destroyed houses is costed as a "core home," with a core unit of 250 square feet covered area with a latrine, which meets multi-hazard-resistant standards (flood and earthquake resilience). The subsidy for partially damaged houses is costed at 40 percent of the value of the uniform subsidy for the "core home." Such reconstruction and repair subsidy provides for the optimal use of scarce public resources while ensuring adequate hazard resistance proportionate with the relative hazard risk exposure and structural vulnerability of houses in the affected districts. The costs are calculated based on currently prevailing prices of materials and labor.

Development of Unit Rates for Reconstruction: Since the damaged housing stock is spread across the country, considerable geographical variations were observed for types as well as prices of preferred construction materials. The estimation of unit reconstruction rates has involved the use of a unit cost housing model for self-construction rather than contractor-built reconstruction.

TABLE 5. COSTED RECONSTRUCTION AND REPAIR NEEDS

Province/Region	Reconstruction (PKR Million)	Repair (PKR Million)	Total Needs (PKR Million)
Balochistan	30,988	21,666	52,654
KP	15,864	11,306	27,169
Punjab	11,004	7,149	18,154
Sindh	295,308	198,326	493,634
Special Regions	430	213	642
Total (PKR Million)	**353,594**	**238,660**	**592,253**
Total (PKR Billion)	**354**	**239**	**592**
Total (US$ Million)	**1,646**	**1,111**	**2,757**

Considering the heterogeneity in terms of flooding risks, the subsidy can be reduced by PKR 40,000 per household for reconstruction, and PKR 16,000 per household for repair to reflect slightly lowered standards for lower-risks areas.

In areas that are prone to significant seismic risk, housing reconstruction must meet appropriate seismic-resistant standards.

Relocation: Multi-hazard assessment of locations at risk of floods will examine mitigation options but may determine some locations potentially unviable for reconstruction and continued habitation. In such cases, resettlement should be kept to a minimum, affected communities should be involved in site selection, and sufficient support should be provided over a sufficient period to mitigate and manage all social and economic impacts.

Building Safer Homes and Resilient Communities: The main driving principle in the reconstruction strategy is that the reconstruction should be an opportunity to build not just safer homes, but resilient communities. To achieve more sustainable post-disaster settlements, housing reconstruction should have a longer-term horizon and be supported by better planning, updated development regulations, coordinated infrastructure service delivery, and stronger capacity of communities and government institutions to cope with and manage disaster risks.

A community-based approach is recommended to support collective activities such as information sharing and training for housing reconstruction and to facilitate community-driven planning and implementation of integrated social, economic, and physical resilience measures.

At the housing level, the predominant form of suggested financial assistance is cash grants for owner-driven rebuilding and repair. This is well suited for rural inhabitants, who have been most affected in the floods, and has already been used by the government in past post-disaster reconstruction efforts. Cash grants are responsive to individual preferences and maximize the sense of ownership, thereby keeping expectations of, and demands on, government realistic. The objective of the reconstruction grants would be to support those households whose houses were completely destroyed to reconstruct their homes such that they meet multi-hazard resistant standards.

While the size of these grants cannot cover full replacement and repair in all cases, experience in Pakistan and indeed globally suggests that recipients will either start from a small durable unit and expand their homes as resources permit or add their own resources to build a larger house suiting their needs. Moreover, these grants add the most value in increasing resilience when grant releases are conditioned upon meeting the standards.

Widescale technical assistance is recommended to accompany financial assistance and where households are repairing and constructing with their own resources. Technical assistance, including information, training, and quality assurance, is necessary to create awareness among households and to develop the skill capacity needed to implement housing improvements and reconstruction that complies with the cash grant conditions.

Priorities for Recovery and Reconstruction: Given the massive scale of the damages, the fiscal space of the government, and the often-disjointed nature of international and local post-disaster support, it is critical to develop housing and settlement recovery and reconstruction policies, institutional arrangements, and capacities to coordinate stakeholders and available resources, and to plan and manage implementation. Experience suggests that affected households will not wait to reestablish their homes, hence the government and development partners need to act swiftly. Table 6 summarizes the prioritized sector recovery framework in the short, medium, and long term.

TABLE 6. PRIORITIZED HOUSING SECTOR RECOVERY AND RECONSTRUCTION FRAMEWORK/TIMEFRAME

Intervention/Activity	Short-term (12 months)	Intermediate (Up to 3 years	Long-term (Up to 5 years	Estimated Cost US$ Million
Recovery Phase				
Support transitional shelter (temporary shelter, winterization, emergency repairs)	x			30
Demolition, salvage and debris management	x			
Planning of reconstruction: Develop housing and settlement recovery and reconstruction policies, institutional arrangements and capacities to coordinate stakeholders, and to plan and manage implementation. Assessments and analyses needed to inform reconstruction programs: • Detailed damage assessments, including technical analyses and determination of eligibility for assistance • Analysis of land, settlement and risk issues related to housing recovery • Analysis of social, economic and cultural risk issues related to housing recovery • Prepare housing technology and design options for hazard and climate resilience, including household energy, water and sanitation • Prepare guidance for community-based settlement resilience	x			30
Develop financial management system for managing financial assistance	x	x		
Rehabilitate and develop housing construction material supply chain	x	x		
Reconstruction Phase				
Repair and retrofit damaged houses	x	x		2700
Reconstruct destroyed houses	x	x	x	
Provide financial assistance through cash transfers	x	x		Costed in Social Protection
Provide technical assistance including training, social mobilisation, communication on resilient housing reconstruction and rehabilitation, and quality assurance, monitoring and evaluation of reconstruction progress	x	x	x	To be costed in Disaster Recovery Framework (DRF).

Intervention/Activity	**Short-term** (12 months)	**Intermediate** (Up to 3 years	**Long-term** (Up to 5 years	**Estimated Cost** US$ Million
Support resilient settlement initiatives: • rural settlements: including community based local hazard mitigation • urban settlements: including strengthening planning and regulatory capacity, municipal hazard mitigation and urban community risk management, urban recovery frameworks for resilient urbanization	x	x	x	Costed in Community Infrastructure, would require further analysis to identify any gaps
Support relocation of households and communities from high hazard locations		x	x	Part of housing reconstruction support
Strengthen regulatory systems for resilient housing and settlements • Multi hazard risk mapping including flood zonation • Develop national urban policy and national housing policy addressing multi-hazard risk and climate adaptation • Strengthen planning and building regulatory mechanisms, enforcement and compliance to deliver safer and sustainable housing and settlements			x	Costed in DRR
Strengthen built environment sector capacity to plan, construct and manage resilient housing and settlements, including through tertiary curricula, professional bodies, research and development, private sector networks.			x	0.5
Improving access to sustainable housing finance for affected households		X	X	Costing Requires further analysis
Improving land administration systems and tenure security		X	X	Costing Requires further analysis

Limitations

Disaggregated ground data at the tehsil/taluka level and damages occurred in terms of the number of *katcha* and *pucca* were not available for all areas. Educated assumptions were made to fill these gaps.

Health

Pre-floods Context and Baseline

Public Healthcare system

In Pakistan, the public health system is decentralized to the provinces and has three layers for service delivery: primary healthcare facilities (rural health centers and basic health units), secondary healthcare facilities (district headquarters hospitals, Tehsil headquarters/Civil hospitals), and tertiary-level facilities (teaching hospitals). The national health infrastructure consists of 1,276 hospitals, 5,174 BHUs, 718 RHCs, 5,802 Dispensaries, 592 Maternity & Child Health (MCH) Centers, 8,632 public Expanded Program of Immunization (EPI) centers, 1,739 Dispensaries/ Medical Centers, 237 Tehsil Headquarter (THQ) Hospitals and 115 District Headquarter (DHQ) Hospitals; the number of beds in these facilities has been estimated at 146,053. There are 51 functional HIV treatment Centers mainly at tertiary care centers and DHQ hospitals. The number of essential health workers (physicians, nurses, and community midwives) in Pakistan is 1.45 per 1,000 people against the required threshold of 4.45 per 1,000 to achieve Universal Health Coverage (UHC). There are 266,430 registered doctors, 30,501 registered dentists and 121,245 registered nurses in Pakistan, but the skill mix is not adequate as the nurse to physician ratio in Pakistan is around 0.5:1 (the recommended ratio is 3:1).

The country has made some positive strides to improve the health of its people – but not all citizens have benefited, due to weak health systems, inadequate health funding and marked variations in levels of development of provinces. Moreover, the increasing number of humanitarian and climate-related crises have strained health systems. A major advance has been the development of UHC benefit packages which detail, prioritize and cost essential services and interventions in all areas of reproductive, maternal, neonatal, child & adolescent health (RMNCAH), communicable diseases (CD), non-communicable diseases (NCDs) and health systems. UHC interventions are being developed at all levels including the population (mass media campaigns for awareness, such as for polio) and community levels. The UHC benefit package can be used to cost and prioritize interventions during the recovery period.

Only half of Pakistan's population have access to essential health services[31]. While there has been considerable improvement in the UHC service coverage index, from 40 in 2015 to 49.9 in 2020, challenges remain as the country is far behind the global UHC Service Coverage Index target of 80+ by 2030. Out of pocket expenditure is still around 51.6 percent despite the network of primary, secondary, and tertiary health care systems. Equity and quality of care are two major hurdles. Disparities in coverage between provinces, districts and rural-urban areas mean that health care for some people is limited by access, availability, affordability, and quality.

The burden of disease has declined from 70,086 disability-adjusted life years (DALYs)[32] lost per 100,000 people in 1990 to 42,059 in 2019 due to decreases in CDs and significant improvements in maternal and child health; but the burden of NCDs has increased from 29.9 percent of the total burden in 2000 to 43.7

31 2021 Monitoring Report: Universal Health Coverage Pakistan *https://phkh.nhsrc.pk/sites/default/files/2022-08/Universal percent20Health percent20Coverage percent20Monitoring percent20Report percent20Pakistan percent202021.pdf*

32 Disability-Adjusted Life Years (DALYs), which measures the number of years of healthy life lost to premature death and disability. Hence, DALYs are the sum of years of life lost due to premature death (YLLs) and years lived with disability (YLDs)

percent in 2019. This shift in the burden of disease means that service delivery is now crucial for people with chronic conditions and NCDs such as cardiovascular diseases, Diabetes mellitus, hypertension, renal diseases and HIV (PLHIV).

Pakistan is one of only two countries currently classified as Poliomyelitis endemic, in spite of the nationwide Pakistan Polio Eradication Initiative. The Pakistan Polio Eradication Initiative has over 350,000 frontline workers who give house-to-house vaccinations in nationwide and subnational vaccination campaigns, and respond specifically to emerging epidemiology. In 2022 so far, there are 26 confirmed cases globally; 20 of these are from Pakistan, all of which are from the Southern districts of Khyber Pakhtunkhwa i.e. North Waziristan, South Waziristan and Lakki Marwat.

Vector Borne Diseases (VBDs) including malaria and dengue fever are also endemic in Pakistan, and are a leading cause of morbidity and mortality in the country. Between 1 January and 30 June 2022, 140,965 confirmed malaria cases were reported. Every year on average, 50,000 dengue fever cases are reported. VBDs are most prevalent in Sindh, Balochistan and Khyber Pakhtunkhwa, particularly in areas affected by the recent floods. Diarrheal diseases are common in Pakistan, including Acute Watery Diarrhea (AWD), and the country is prone to periodic diarrheal disease outbreaks, most seriously Cholera.

Although RMNCAH indicators have significantly improved, Pakistan remains the world's fifth most populous country, with a very high fertility rate (3.8 children per woman (2017–18) and very low contraceptive prevalence rate (CPR) with only 25 percent of currently married women using modern contraceptive methods (Pakistan Demographic and Health Survey 2017–18).

Maternal and neonatal health indicators show gaps in visits, inadequate care and limited access to life saving Emergency Obstetric and Neo-natal Care (EmONC) services for women and newborns with complications. This has resulted in high maternal and neonatal mortality and still births.

The EPI is the mechanism to reduce neonatal and under-five mortality, and steady progress has been evident since its introduction. The infant mortality rate (IMR) has declined from 105.9 (1995) to 61.2 (2017).[33] Diphtheria-tetanus-pertussis (DTP3) coverage grew from 59 percent in 2000 to 83 percent in 2021, while the first dose of measles vaccine coverage rose from 57 to 81 percent over the same period.[34]

Assessment of the Disaster: Damage and Loss Estimates[35]

An initial health needs rapid assessment by UNOCHA in the 25 worst affected districts in Sindh (13), Punjab (02) and KP (10) shows that at least one third of the population reported that health care was inaccessible, as the nearest health facility was non-functional; and, where functional, facilities lacked health workers (48 percent) and medicines (17 percent). The main health concerns reported were diarrheal diseases, malaria, skin diseases, and respiratory tract infections, and nearly half of respondents experienced psychological problems due to the floods. Population displacement and loss of access to health facilities have further compounded service delivery interruptions, which need urgent attention.

33 Government of Pakistan. (2022). (rep.). *2022 National Immunization Policy Pakistan* (pp. 1–30).
34 WHO Immunization Data Portal, WUENIC Estimates, accessed September 5, 2022.
35 Damage may be classified as **Partially Damaged** if less than 40 percent of the asset is damaged, structure is still sound and repair cost would be less than 40 percent of the total asset value. Damage may be classified as **Completely Destroyed** if more than 40 percent of the asset has been damaged or if the replacement cost would exceed 40 percent of the total value of the asset.

During and after the floods, monitoring of malaria and other VBDs showed a 3-fold increase in the number of suspected cases and screened patients. In 32 out of 62 malaria endemic districts, the malaria transmission rate has gone far beyond the outbreak threshold. Noting that transmission peaks in October and November, it is expected that this case incidence will continue or increase in coming weeks, particularly as flood waters stagnate.

Since early August 2022, trends in AWD increased in most flood-affected provinces. The risk of other diarrheal diseases, including Cholera, is very high. In the flood-affected districts, out of 8.3 million women of reproductive age, around 660,000 are pregnant. Expected deliveries per month are 73,231 and a large number will require C-sections, but many of them do not have 24/7 health facilities. Displacement from homes also adds to the need for clothing and blankets for newborns.

Marginalized and high-risk groups, including refugees, the elderly, pregnant women and children might need special attention. In a recent post floods rapid needs assessment conducted by UNOCHA, 16 percent of respondents in Sindh reported a lack of safe places for women and girls, with heightened risks of sexual violence, trafficking, and other types of violence. Most respondents did not know what GBV services are available to them in their area (Sindh: 85 percent; Punjab: 69 percent; KP: 82 percent).

Approximately 2.2 million children under 2 years of age and nearly 2 million pregnant women are the target for routine EPI[36]. A preliminary assessment by WHO and the Provincial EPI Program suggests that 738 of 8,632 (9 percent) EPI centers are damaged across 84 flood-affected districts; 223 (30 percent) are fully damaged, and the remaining 513 are partially damaged. In many areas, although buildings remain intact and have been classified as partially damaged, water has broken the cold chain, damaged medical supplies and furniture, and displaced staff. Under these conditions, nearly all immunizations (fixed and outreach vaccination, and disease surveillance) have stopped, but targeted campaigns have continued in the worst-affected districts.

The risk of vaccine-preventable disease outbreaks remains very high. Several districts in flood-affected provinces report increases in measles and diphtheria, and it is possible that outbreaks of other vaccine-preventable diseases may occur, and that polio may re-emerge. Of 51 HIV treatment centers, 11 have been damaged by floods and their services have ceased. Services and availability of medicines for chronic diseases including NCDs and HIV have been interrupted. Patient safety may be compromised by many factors, including the use of unsterile equipment or re-use of syringes.

From a health infrastructure perspective, the heavy rains and floods have resulted in total or partial destruction of 1,915 health facilities, most of which are primary health facilities in Sindh and Balochistan provinces. Province-wise, breakdown of the damaged health facilities includes 1,087 facilities in Sindh (165 fully damaged, 922 partially), 72 in Punjab (1 completely damaged, 71 partially), 157 in KPK (10 fully damaged, 147 partial), 586 in Balochistan (305 fully damaged, 282 partial), 12 in Special Regions (4 fully damaged, 8 partial). The table below summarizes this damage.

36 Government of Pakistan. (2022). (rep.). *2022 National Immunization Policy Pakistan* (pp. 1–30).

TABLE 7. DAMAGED HEALTH FACILITIES BY TYPE & PROVINCE

Damage by Type of Health Facility in Each Province / Area										
Province	Sindh		Punjab		KP		Balochistan		Special regions	
Type of Health Facility	Completely Destroyed	Partially Damaged	Completely Destroyed	Partially Damaged	Completely Destroyed	Partially Damaged	Completely Destroyed	Partially Damaged	Completely Destroyed	Partially Damaged
Teaching hospital	-	-	-	-	-	-	-	1	-	-
DHQ	1	15	-	-	-	3	0	3	-	-
THQ	6	44	-	-	-	5	0	2	-	1
CH	-	-	-	1	-	1	1	0	-	-
RHC	10	64	-	1	1	15	34	21	-	-
BHU	109	481	1	57	5	95	140	127	-	1
MCH	-	18	-	-	-	-	19	35	-	1
Dispensaries	38	297	-	12	4	28	111	93	4	5
Health Offices	1	3								
Pvt. Health Buildings	Data not available									
TOTAL	**165**	**922**	**1**	**71**	**10**	**147**	**305**	**282**	**4**	**8**

Consolidated Damage by Type of Health Facility			
DAMAGE by type of Health Facility	Completely Destroyed	Partially Damaged	Total
Teaching hospital	-	1	1
DHQ	1	21	22
THQ	6	52	58
CH	1	2	3
RHC	45	101	146
BHU	255	761	1,016
MCH	19	54	73
Dispensaries	157	435	592
Health Offices	1	3	4
Pvt. Health Buildings	Data not available		
TOTAL	**485**	**1,430**	**1,915**

Data reconciliation and costing were based on data from provincial planning & development (P&D) focal points. Losses were based on temporary resumption of services from prefabricated health facilities and mobile clinics for one year, inclusive of human resources, supplies and operations. Total cost of damages has been estimated at 23,484 million PKR (US$109.3 million), and losses are 7,386 million PKR (US$34.4 million).

TABLE 8. COST ESTIMATES OF DAMAGE AND LOSS BY PROVINCIAL PUBLIC SECTOR

PROVINCE	Infrastructure	Equipment	Furniture	Vehicles	Damage (PKR Million)	Loss (PKR Million)
BALOCHISTAN	1,406.20	24.50	156.01	32.30	1,619.01	3,387.51
KP	1,104.38	36.90	18.00	-	1,159.28	982.23
PUNJAB	58.50	5.51	2.83	-	66.84	216.16
SINDH	9,507.30	8,857.50	2,219.50	-	20,584.30	2,759.91
SPECIAL REGIONS	44.90	2.49	4.58	2.25	54.22	40.63
Total (PKR Million)	**12,121.28**	**8,926.90**	**2,400.91**	**34.55**	**23,483.63**	**7,386.43**
Total (PKR Billion)	**12**	**9**	**2**	**0.035**	**23**	**7**
Total (US$ Million)	**56.4**	**41.6**	**11.2**	**0.16**	**109.33**	**34.39**

Linking Effects to Impact

Disruption in essential healthcare services due to floods has impacted people's health, especially those from vulnerable groups (poor, pregnant women, malnourished children, etc.), and increased morbidity and mortality. This adds to an already high out-of-pocket health expenditure. The risk of outbreaks of dengue fever, measles, malaria, polio, and cholera is high, and patient safety may be compromised by diseases which spread through blood and contaminated equipment. Floods have raised the risks of infectious diseases, and people are also at risk from displacement, temporary shelters, overcrowding, lack of water and sanitation, lack of food, and stagnant water, all of which increase the threat of waterborne, respiratory and vector-borne infectious diseases, especially for HIV sufferers.

Pakistan is among the top ten countries with a large pool of un/ under-vaccinated children in the world and is home to over 600,000 zero-dose children. The recent flood has caused a significant drop in routine immunization services, especially in the affected districts. Major immunization interruptions have been reported in Balochistan and Sindh provinces.

For Measles 1, routine immunization has fallen by 24 percent from June–August 2022. A 47 percent fall in Balochistan has been reversed through outreach, but this has not been possible in Sindh because of water levels and access problems.

890 instances of damage to cold chain equipment, mostly to solar panels, have been reported in 84 flood-affected districts (609 completely and 291 partially). It is predicted that the zero-dose pool will significantly increase if immunization services are not restored quickly, and outbreaks of VPDS, especially Measles and Diphtheria may occur.

Nearly half of respondents in the rapid needs assessment reported psychological problems due to the floods, which also affected savings and household income due to unemployment, displacement, and increased out-of- pocket payments which push people further into poverty. As they persist, post-flood conditions will threaten the health of vulnerable people, worsen social and economic burdens, and retard progress towards sustainable development goals.

Recovery Needs and Strategy

Recovery and reconstruction costs, including immediate additional needs, are estimated at 40, 294 million PKR (US$187.6 million). Damages include infrastructure, equipment, furniture and vehicles. Within the infrastructure component of the needs, 20 percent was added for resilience, disaster risk reduction (DRR) and build back better (BBB) and 10 percent added for inflation.

Additional needs estimates were based on 6.4 million people under the UN Humanitarian Response Plan (UN HRP), which accounts for disease incidence/prevalence and adds 5 percent in cross cutting support for staff, capacity building, mental health & psychosocial support, lab & disease surveillance, and social behavioral change communication. The table below summarizes health & nutrition needs.

TABLE 9. RECOVERY AND RECONSTRUCTION NEEDS

PROVINCE			NEEDS (PKR Million)
BALOCHISTAN			5,428.37
KP			2,472.82
PUNJAB			300.55
SINDH			26,196.40
SPECIAL REGIONS			108.31
	Total	**(PKR Million)**	**34,506.45**
		(US$ Million)	**160.6**
Additional Needs from Cross Provincial Impacts			
Nutrition			**2,046.00**
Immunization (campaign)			**133.20**
MNCAH (Mother & Child Days)			1,477.44
Communicable Diseases			1,952.74
Capacity building, MH&PSS, Disease Surveillance			178.17
	Total Additional Needs	**(PKR Million)**	**5,787.55**
		(US$ Million)	**26.94**
	Grand Total Needs	**(PKR Million)**	**40,294**
		(PKR Billion)	**40**
		(US$ Million)	**188**

Based on the situation analysis and estimate of damage & loss in provinces, the following strategy is recommended:

Immediate Response Strategy – Short-term (up to 12 months)

To promote health in the immediate phase, key interventions are:

1. Service Provision:

- Provide essential services (Immunization, CDs including HIV/AIDS & STIs, NCDs, RMNCAH, psychosocial support, screening for nutritional disorders) from makeshift units and via mobile outreach.
- Strengthen surveillance and response systems by linking data sources and via health information management to detect disease outbreaks, employ case-based surveillance, and respond to vector- and water-borne, and vaccine preventable diseases.
- Outreach and mobile immunization services for the displaced; restore fixed site vaccination services (EPI and Polio centers).
- Deploy existing mobile health teams and provide additional mobile health units and delivery vans.
- Provide medicines/supplies/vaccines for vaccine preventable diseases, Acute Respiratory Infections (ARIs), skin diseases, AWD, malaria, dengue, leishmania and other common conditions.
- Establish referrals mechanism with attendant transport for complicated cases including pregnancy; equip destination facilities with staff, supplies and equipment.
- Strengthen health sector for integral response to psycho-social determinants of health and well-being, including Water and Sanitation, Nutrition, GBV, and mental health.
- Strengthen nutrition surveillance; manage severe acute malnutrition through supplementary outpatient therapeutic programs (OTP) and stabilization centres.

2. Governance / HMIS:

- Work at national and sub-national levels to coordinate and synergise health sector investments related to flood responses; coordinate with development partners to align support and avoid duplication.
- Recruit health workers, particularly women, for essential health services such as immunization and RMNCAH.
- Integrate surveillance and health information systems; link data to inform plans and responses to threats and service delivery challenges etc.

3. Managing Risks:

- Assess damage to health infrastructure and repair buildings.
- Review current contingency plans and assess their performance during the floods.
- Build better infrastructure and more resilient people-centered and integrated health systems.

Transition Phase – Short- & Intermediate-term (6 months to 3 years)

- Strengthening a resilient health system to improve availability, accessibility, and affordability of high quality integrated essential health services including through:
  - Repair and maintain primary, secondary and tertiary health facilities and EPI centers
  - Provide equipment and logistics in damaged facilities
  - Prioritise HR and build capacity to improve service delivery, and M&E

- Develop risk mitigation plan, with contingency planning exercises and simulations for operational readiness of health facilities, and build inter-district and inter-provincial coordination.
- Repaired and rebuilt facilities should fit risk profiles for their location.

TABLE 10. SUMMARY OF PRIORITIZED INTERVENTIONS TO ADDRESS HEALTH NEEDS

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)
1. Provide essential health services through makeshift units and mobile outreach services	X			1
2. Strengthen surveillance & response system	X	X		1
3. Outreach and mobile immunization services for displaced people	X	X		1
4. Integrated outreach through mobile health units	X	X		1
5. Provide essential medicines, supplies, and medical equipment to the health facilities	X	X		1
6. Establish strong referral mechanisms for complicated cases	X	X		1
7. Comprehensive response to related social determinants of health incl. WASH, GBV, mental health etc.	X	X		1
8. Strengthen nutrition surveillance and management of severe acute malnutrition	X	X		1
9. Enhance coordination at national and sub-national levels, including with development partners	X	X		1
10. Address shortage of health workforce	X	X		1
11. Integrated surveillance and health information system		X		2
12. Assess damage to health facilities to work towards safety in aftermath of floods	X			1
13. Review existing contingency plans and assess their effectiveness	X			1
14. Build resilient infrastructure and health systems		X		2
15. Refurbish and maintain affected primary, secondary and tertiary health facilities including EPI centers		X		2
16. Replenish equipment and logistics in damaged health facilities.		X		2
17. Bridge critical HR gaps and build capacity of health workforce		X		1
18. Develop a risk mitigation plan for operational readiness		X		2

Limitations

- The retrieval of data from the provinces was a cumbersome exercise. The data were received with some delays and in batches, and were initially incomplete and not disaggregated.
- The data sets provided by provincial health departments and provincial P&Ds did not corroborate each other.
- Standard units for calculating damage and losses for fully and partially damaged health facilities by type (primary, secondary & tertiary care) were not provided and hence the estimates provided by the provinces were accepted.
- Surveillance data from affected districts was not always available; only available data were used in this report.

Nutrition

Summary

Overall, the floods damaged 8.9 percent of nutrition sector operations, and affected nutrition facilities and services; anthropometric tools; equipment; therapeutic supplies; furniture; information, education and communication (IEC), materials, and medicines. The floods eliminated lifesaving nutrition services to an estimated 935,754 children of 6–59 months (477,235 girls and 458,519 boys) with acute malnutrition and destroyed nutrition supplies, tools, materials and records.

The nutrition sector aims to reestablish and scale up integrated malnutrition prevention, detection and treatment programmes in health facilities, camps and communities in flood-affected districts. The nutrition sector will strengthen linkages with other sectors including health, education, WASH, Food Security and Protection to support and protect 2.6 million pregnant and breastfeeding mothers; and prevent and treat malnutrition in 4.9 million under-5 children.

All costs arising from the effects, impacts and recovery needs for Nutrition have been captured withing the Health Sector summary table.

Pre-floods Context and Baseline

Prior to the floods, stunting and wasting rates among children were alarming at 40.2 percent[37] and 17 percent[38] respectively. Poor maternal nutrition, anemia and undernutrition contributed to low birth weights. An estimated 60 percent of the worst-hit communities were without essential nutrition services. Nutrition services were not integrated into community health systems, including many health facilities.

37 National Nutrition Survey 2018: *https://www.unicef.org/pakistan/media/3251/file/Evaluation percent20Report percent20-percent20United percent20Nations percent20Maternal percent20and percent20Child percent20Stunting percent20Reduction percent20Programme.pdf*)

38 National Nutrition Survey 2018

Based on National Nutrition Programme data, 1,674 out of 4,586 health facilities in the 84 affected districts provided some form of nutrition services, while 63 percent of these facilities did not provide nutrition services.

TABLE 11. PRE-FLOOD HEALTH FACILITIES

Province	Health facility	OTP	SC	TSFP
Balochistan	1,249	108	11	31
KP	890	295	17	44
Punjab	162	152	5	4
Sindh	1,764	943	24	9
Special Regions	521	-	-	31
Grand Total	**4,586**	**1,498**	**57**	**119**

The 2021 SMART (Standardized Monitoring and Assessment of Relief and Transitions) surveys in Sindh province reported acute malnutrition above the 15 percent GAM emergency threshold in all districts except Larkana, with 12.3 percent[39]. The 2021 IPC (Integrated Food Security Phase Classification) for Acute Malnutrition and IPC[40] Acute Food Insecurity analysis reports indicated high acute malnutrition and food insecure populations at crisis and emergency levels. The IPC analysis covered 25 districts from Balochistan, Pakhtunkhwa and Sindh, accounting for 8.6 percent of Pakistan's population. The key factors for acute malnutrition in children under five included food insecurity, inadequate food intake, low prevalence of exclusive breastfeeding, low birth weight, poor sanitation, high burden of diseases, poor diets, and suboptimal maternal, infant and young child feeding care and practices.

Assessment of Floods: Damage and Loss Estimates

The estimated flood-related damages affecting the nutrition programme in Pakistan amount to 155 million PKR (US$690,000). Overall, the floods damaged 8.9 percent of nutrition sector operations and affected nutrition facilities and services, anthropometric tools, equipment, therapeutic supplies, furniture, IEC materials and medicines. The floods had eliminated lifesaving nutrition services to an estimated 935,754 children of 6-59 months (477,235 girls and 458,519 boys) with acute malnutrition and destroyed nutrition supplies, tools, materials and records. These amounts are reflected in the overall summary table of the Health Sector, table 9 of this report.

39 Pakistan: Acute Food Insecurity Situation October 2021 - March/April 2022 and Projection for April/May - June 2022: https://www.ipcinfo.org/ipc-country-analysis/details-map/es/c/1155374/

40 Pakistan: Acute Food Insecurity Situation October 2021 - March/April 2022 and Projection for April/May - June 2022: https://www.ipcinfo.org/ipc-country-analysis/details-map/es/c/1155374/

TABLE 12. POST-FLOOD DAMAGE COSTS

Damage		Damage (PKR Million)
Balochistan	Infrastructure, equipment & tools	25.7
KP	Infrastructure, equipment & tools	N/A
Punjab	Infrastructure, equipment & tools	1.1
Sindh	Infrastructure, equipment & tools	128.2
Total		**155.0**

Linking Effects to Impact

Poor nutrition and lack of care has a greater impact on children, affecting the brain development of boys and girls aged less than two years. The floods caused multiple shocks, displacing people into camps and halting the provision of nutrition services in both health facilities and communities. The disaster created a greater need for urgent nutrition in emergency response.[41] Though nutrition services need scaling up, the response is still nascent and underway, but provides lifesaving interventions through static and mobile services to accessible health facilities, IDP camps and communities.

Childhood illnesses such as malaria, AWC, ARI and skin infections are leading to an increase in acute malnutrition. According to the nutrition database, prevention and curative nutrition interventions were discontinued in the 84 flood-affected districts, depriving 4.9 million children under-five (2.5 million girls and 2.4 million boys) and 2.6 million pregnant and breastfeeding mothers of services. The discontinuation of nutrition services increases morbidity and mortality rates among girls and boys under-five and worsens the preexisting high prevalence of acute and chronic malnutrition. The lack of nutrition services negatively affects the normal growth of boys and girls. Childhood malnutrition has far-reaching effects into adolescence and adulthood, worsening hardship, deprivation and psychosocial depression in households, and predisposing mothers to GBV, particularly sexual violence and exploitation. Displacements into camps and hardships faced by families lead to teenage pregnancies and early marriages, giving rise to undernutrition, low birth weights and neonatal deaths.

Nutrition Interventions

The UN Flash Appeal nutrition budget targets 34 out of 84 flood-affected districts. For the PDNA, the proposed consolidated nutrition interventions in the table below will target the remaining 50 districts. A nutrition budget of US$ 9.3 million per annum is required to implement the listed intervention.

41 Balochistan Province Rapid Needs Assessment (RNA) Report 2022: *https://www.unicef.org/pakistan/media/1951/file/Final percent20Key percent20Findings percent20Report percent202019.pdf*

TABLE 13. PROPOSED NUTRITION INTERVENTIONS

	Timeline[42]			
Intervention	**Short** (Up to 12 months)	**Intermediate** (Up to 3 years)	**Long** (Up to 5 years)	**Priority** (Rank 1-5)
Strengthen national and subnational nutrition coordination and leadership	X	X	X	1
Re-establish and scale up integrated nutrition services including early detection and treatment of childhood wasting in health facilities and communities	X	X	X	1
Strengthen malnutrition prevention, care and support for children, and pregnant and breastfeeding mothers at health facility and community levels	X	X	X	1
Strengthen data collection, analysis, and management of nutrition information	X	X	X	1

Recommendation: Inter-agency implementation of the above-listed interventions by the government, UN Agencies, and CSOs. The budget is for year 1 and an annual budget revision will be required to adjust for inflation. Preferably, nutrition funding should be multiyear for continuity of services, and to avoid stock shortfalls of lifesaving supplies. Multiple sources of funding from nutrition stakeholders and partners, including the government, UN Agencies, public and private donors is most effective and sustainable.

Assumptions: The cost to care for a child with severe wasting is estimated at US$400, severe wasting with medical complications at US$500, moderate wasting at US$25 per child and US$4.05[43] for comprehensive IYCF per pregnant and breastfeeding mother. The 2021 Nutrition Investment Case estimated annual funding per province at US$5 million to reduce the high prevalence of childhood wasting and stunting in Pakistan.

Limitations

Floodwaters did not subside in some areas, hampering the delivery of social services. Before the floods, nutrition services were inadequate and lacked nutrition data. The nutrition sector is challenged by the lack of flexible, adequate, and long-term funding to meet an urgently needed integrated nutrition response at all levels. Health will further deteriorate in the absence of, or delays in nutrition funding. Coordination of the nutrition response at the subnational level remains a challenge.

42 Short-term is defined here as up to 12 months, Intermediate as up to 3 years, and long-term as up to 5 years.
43 GAP Framework (Unpublished Costing Appendix) - *https://www.unicef.org/media/96991/file/Global-Action-Plan-on-Child-Wasting.pdf*

Education

Pre-floods Context and Baseline

Pakistan has taken significant steps to advance the right to education. Article 25-A of the Constitution legislates free and compulsory education for children ages 5–16. Curriculum and service delivery are provincial responsibilities, with the federal government providing broader guidelines on standards and curriculum, including on an inclusive, integrated, holistic, and comprehensive approach to curriculum development.[44] As of 2018,[45] the country had 305,763 educational institutions,[46] with Punjab having the largest number of educational institutions, at 99,857.[47] In addition to public institutions, about a third of the country's children are enrolled in private schools,[48] with the vast majority being low-fee schools.[49][50]

Enrollment and completion rates are improving; however, progress has been slow, with primary education rates among the lowest in the world.[51] The gross enrollment rate for primary education for children ages 6–10 was 84 percent for 2019–20, while the net enrollment rate was 64 percent.[52] There are considerable disparities based on gender, socioeconomic status, and geography. A total of 10.7 million boys and 8.6 million girls are enrolled in primary school; thus, for every 100 boys enrolled in primary school, there are only 87 girls. At the secondary level, school participation and completion rates also remain persistently low, with enrollment rates dropping to 3.6 million boys and 2.8 million girls enrolled at the lower secondary level. Retention is poor, with only 67 percent of children who enroll in grade one continuing to grade five. Further, a worsening economic situation, high rates of inflation, and political instability have continuously put children and adolescents in poor households at high risk of dropping out of school. With the world's highest number of out-of-school children and adolescents, education remains unrealized for an estimated 21.6 million children ages 5–16, especially for girls (53 percent of out-of-school children),[53][54] children with disabilities, refugees, and displaced persons, and children in the poorest wealth quintile.[55] The gender gap differential increases with age, particularly for rural populations.[56] The COVID-19 pandemic deepened the

44 Ministry of Federal Education and Professional Training, *National Curriculum Framework Pakistan*.
45 Academy of Educational Planning and Management. 2020. *Pakistan Education Statistics 2017–18*. Ministry of Federal Education and Professional Training Pakistan.
46 Educational institutions here encompass public and private pre-primary, primary, middle, high, and higher secondary schools, degree colleges, universities, non-formal basic education, education foundations, technical and vocational institutions, teachers' training institutions, and Deeni Madaris (madrassas).
47 The levels of education cover pre-primary (Katchi class) and primary (grades 1-5), middle (grades 6-8), high (grades 9-10) and higher secondary (grades 11-12).
48 The private sector ranges from low-cost private schools to high-cost elite schools, and includes stand-alone private schools, franchise schools, schools funded by government subsidies by provincial education foundations, no-fee schools run by philanthropists and nongovernmental organizations, and madrassas or religious schools. The private sector remains unregulated.
49 *World Bank. 2019.* "Pakistan: What's the Best Way to Invest in Private Schools?" Policy Note.
50 A 2001 survey showed that about one in five of Pakistan's poorest families sends their children to private village schools (*World Bank 2001*).
51 (*UNESCO. 2019*). UNESCO Pakistan Country Strategic Document 2018-2022.
52 Pakistan Bureau of Statistics, *Pakistan Social and Living Standards Measurement Survey 2019–20*, Government of Pakistan, Islamabad, 2021.
53 Pakistan Social and Living Standards Measurement (PSLM) 2019–2020 extrapolated to 2020 estimated population ages 5 to 16 using Pakistan Bureau of Statistics population projection from the 2017 census.
54 Balochistan has the highest proportion of out-of-school children, followed by Sindh and Khyber Pakhtunkhwa (KP). Punjab has the largest absolute number of out-of-school children, with Sindh next.
55 Children with disabilities are less likely to attend school and more likely to face abuse, neglect, and exclusion. In addition, there are still more than 1.4 million registered refugees (0.4 million Afghan proof-of-registration card holders, 0.84 million Afghan citizenship card holders and 0.4–0.6 million unregistered Afghans), making Pakistan the third largest host country of refugees in the world.
56 PSLM. 2018–2019.

learning crisis,[57] with longstanding gender-related inequities reflected in more girls at risk of dropping out.[58] There remains a lack of alternative pathways for out-of-school children and adolescents; however, a non-formal education sector exists, providing accelerated learning opportunities to late entrants and dropouts, with approximately three percent of children enrolled.[5960]

Broad systemic challenges in the sector and serious capacity gaps at both the federal and provincial levels impede learning and skills development for most girls and boys. Pakistan's learning poverty rate, capturing children unable to read and understand a simple passage, was estimated at 75 percent before the pandemic, 16.3 percentage points lower than the South Asia region average and 19.5 percentage points lower than the average for lower-middle income countries.[61] Only 49 percent of girls ages 10 years and older are literate, compared to 70 percent of boys. This has resulted in an estimated cost of between US$67 billion and US$155 billion in gross domestic product (GDP). Large disparities remain between provinces and between urban and rural areas.[62] Further, two years of partial school openings and closures due to COVID-19 have led to an estimated loss of 0.8 years of learning-adjusted schooling for the average student.[63]

Despite the education sector being the largest public sector in the country in terms of human resources, the annual national education budget is on average 2.76 percent of GDP per capita, against a global benchmark of a minimum of 4 percent.[64] The limited investment is reflected in the lack of public facilities, overcrowded and multigrade classrooms, and institutions lacking disaster risk and climate management safeguards. At least 71 percent of public education facilities have access to water and 77 percent to sanitation; however, the toilet-pupil ratio remains low and there are disparities between girls' and boys' schools, and rural and urban areas.[65] Inappropriate water, sanitation, and hygiene (WASH) facilities in school can affect adolescent girls' continuity in secondary education.[66] Historically, the education sector has been adversely affected by emergencies: the earthquake in 2005 affected the special regions and KP, and the floods of 2010 impacted over 10,000 schools.[67] While there is great promise for the education sector, even before the 2022 floods, urgent attention was needed to improve the quality of education, including mitigating the effects of learning loss, especially among the most marginalized, to enroll, and stay at and learn in school.

57 UNESCO and UNICEF. 2021. *Pakistan Case Study: Situation Analysis on the Effects of and Response to COVID-19 on the Education Sector in Asia*.
58 Idara-e-Taleem-o-Aagahi. 2021. *Measuring the Impact of COVID-19 on Education in Pakistan*.
59 Academy of Educational Planning and Management. 2020. *Pakistan Education Statistics 2017–18*. Ministry of Federal Education and Professional Training Pakistan.
60 PSLM 2018–2019.
61 World Bank. 2019, *Pakistan Learning Poverty Brief*.
62 Foundational learning skills is a newly emerging area covered by multiple indicator cluster surveys. The surveys done so far have reported meager foundational learning skills for children ages 7–14 years both for basic reading and numeracy in Punjab, Sindh, and KP provinces.
63 *Annual Status of Education Report* (ASER).
64 UNESCO. 2019. *UNESCO Pakistan Country Strategic Document 2018-2022*.
65 Over 79 percent of girls' schools have water compared to 67 percent of boys' schools. More than 83 percent of urban schools have sanitation facilities versus 76 percent in rural areas (Pakistan Education Statistics 2017-18, Ministry of Federal Education and Professional Training Pakistan).
66 For example, in Nigeria, UNICEF found that, "Girls' inability to manage their menstrual hygiene in schools, results in school absenteeism, which in turn, has severe economic costs on their lives and on the country." (*UNICEF 2022*).
67 The 2010 floods affected roughly 10,500 schools in about 90 districts across the country.

Assessment of Disaster Effects: Damage and Loss Estimates

Floods and heavy rains have severely impacted 17,205 public schools,[68] colleges, special education centers/schools/institutes,[69] technical and vocational education and training (TVET)[70] and universities in 94 calamity-hit districts,[71] with 6,225 completely destroyed and 10,980 partially damaged. The damaged institutions constitute 23 percent of the total institutions in the calamity hit districts. Damage is classified as partially damaged if less than 40 percent of the asset is damaged, the structure is still sound, and the repair cost would be less than 40 percent of the total value of the asset. Damage is classified as completely destroyed if more than 40 percent of the asset has been damaged or if the replacement cost of the damages would be more than 40 percent of the total value of the asset. Significantly, the scope of the educational institutions assessed is limited to public ones, since data on private educational institutions could not be collected before the PDNA was finalized.[72] Most affected institutions are primary schools (80 percent).[73] In addition, more than 7,062 schools that were not damaged have served as relief sites to provide shelter to displaced populations.[74] Damage to educational institutions has affected some 94,478 teachers and 2,624,013 enrolled students (1,032,950 girls). The largest number of institutions affected are in Sindh (12,706), followed by Balochistan (2,850). The educational institutions are most heavily damaged in Sindh, followed by Balochistan, KP, Punjab, and the Special Regions.

Since the floods occurred during the ongoing academic year, there were service and productivity losses in contact hours, which may have an impact on the school calendar and require adjustments to the teaching and learning process. All 17,205 educational institutions affected experienced school closures of differing durations. Some partially damaged schools have been able to resume or use some of their classrooms (employing a shift system) after dewatering, cleaning, and repairing and replacing teaching and learning materials and furniture. Schools with extensive damage have started to identify and establish alternative or temporary learning locations in the community, including the use of temporary learning centers (TLCs) in non-affected and cleaned-up partially damaged schools, and in organized and spontaneous relief sites of displaced communities, to ensure education continuity and mitigate learning losses.

The total damage to educational institutions in the 94 calamity-hit districts is PKR 120 billion (US$559 million) and total loss at PKR 47 billion (US$219 million). Sindh has the highest amount of damage and loss, (Table 14).

68 Public schools data covers primary (inclusive of Katchi), middle, high, and higher secondary schools.
69 The public special education data received was from Sindh.
70 The public TVET data received was from Sindh, Balochistan and Punjab.
71 With a few exceptions, flood-affected districts already lagged in terms of development indicators and were high on the Multidimensional Poverty Index.
72 From 2017 census enrollment data on primary, middle, high, and higher secondary schools, an estimated 61 percent of schools in Punjab are private, 57 percent in Sindh, and 71 percent in KP.
73 All damage data analyzed was received from and validated by the government.
74 Pakistan Education Sector Working Group. 2022. "*Pakistan Floods: Education Snapshot*." 30 September 2022.

TABLE 14. EDUCATION SECTOR DAMAGE AND LOSS SUMMARY

Region	Damage (PKR Billion)	Loss (PKR Billion)	Damage Identified		Loss Identified	
			Institutions Completely Destroyed (units)	Institutions Partially Damaged (units)	Interrupted learning (total no. of students)	Interrupted learning (no. of girls out of total)
Balochistan	29.4	14.4	1,076	1,774	658,871	251,840
KP	7.2	2.4	108	1,199	203,985	54,603
Punjab	3.1	1.1	103	216	64,943	25,396
Sindh	80.3	29.2	4,935	7,771	1,692,180	700,302
Special Regions	0.08	0.08	3	20	4,034	809
Total	**120.0**	**47.1**	**6,225**	**10,980**	**2,624,013**	**1,032,950**
Total (US$ Million)	**558.7**	**219.3**	-	-	-	-

Assumptions

Due to time limitations and unverified field information through field surveys, damage costs are estimates. Damage costs may therefore be over- or underestimated and may require correction upon further analysis. The following assumptions were made in estimating the financial costs of the damage incurred:

- For partially damaged, the share of classroom damage was calculated at 40 percent of the affected institution.
- For completely destroyed, the share of classroom[75] damage was calculated at 80 percent of the affected institution.
- Educational institution damage costs include damage to washroom and toilet facilities.
- No major infrastructure damage to provincial, division, or district-level education administration offices was reported. It is assumed that offices were undamaged, or the administration has managed to repair affected offices. This remains a data gap to be captured in the in-depth facility assessment.

The following assumptions were made in estimating the financial losses sustained:

- For students in partially damaged educational institutions, temporary learning arrangements will be needed for some 12 months.
- For students in fully damaged educational institutions, temporary learning arrangements will be needed for some 24 months.
- The TLC unit cost is comprehensive and covers the establishment and running costs of the space. Costs include establishing a TLC in a safe and accessible location with (i) adequate, hygienic, and gender-sensitive WASH facilities and menstrual hygiene management supplies; (ii) teaching and learning materials, including recreational and early childhood development kits; (iii) replacement textbooks and uniforms as required; (iv) targeted teacher training (such as mental health and psychosocial

75 The number of classrooms was estimated by the level of educational institution, with an average of two classrooms in primary schools, six classrooms in middle schools, 10 classrooms in high schools, and 15 classrooms in higher secondary schools.

support (MHPSS), multigrade teaching, remedial and accelerated learning, education in emergencies, interpersonal communication); (v) compensated community facilitators and teachers as needed; (vi) community engagement, social mobilization, and training of parent-teacher associations (PTAs), school management committees (SMCs), and school councils (SCs); and (vii) cross-sectoral activities (such as WASH, child protection, health, nutrition, social and behavioral change).

- To ensure continuity of learning, losses also factored in the continuity of education grants for educational institutions, the costs of dewatering, cleaning, disinfecting, and sanitizing partially damaged institutions, and facility assessment and planning.

Linking the Effects to the Human Impact

The floods exposed preexisting challenges within the education sector. The effects range from an immediate disruption of education for millions of children and adolescents,[76] including 2.4 million students in public schools, to the associated learning losses, to future human development. Loss of lives, livelihoods, and material assets from the floods will have a transformational impact on affected learning communities.[77] Delays in the resumption of learning will lead to loss of learning time, impacting student learning outcomes and achievements, which are already lagging. This can have lasting effects on children and adolescents' future productivity, disproportionately affecting the most marginalized, and can translate into devastating impacts on human capital development, exacerbating cyclical poverty. Post-floods, learning poverty is estimated to have risen by five percentage points from school deprivation alone (before learning deprivation is accounted for), which compounds the four-percentage point increase from the pandemic school closures.[78] Following natural disasters, losses to human capital have been found to accumulate even after children return to school if they fall behind and are unable to catch up.[79][80] The loss of learning may have a devasting impact on this generation's earnings, productivity, and wellbeing. Moreover, the distress caused by the floods threatens children and adolescents' psychosocial wellbeing and that of their teachers, parents, caregivers, and families.

Due to the associated cost of schooling (such as transportation) and the increasing opportunity cost of participating in educational activities, the number of children and adolescents at risk of dropping out of formal and non-formal schooling is expected to rise, with an accompanying increase in child labor, early marriages, and young girls' odds of unintended pregnancy and early and forced marriage—negative coping mechanisms during crisis and displacement that may lead to trauma, stress, and anxiety.[81][82] Identifying children at risk of dropping out of school is essential to mitigate longer-term protection risks, such as child trafficking, child labor, early marriage, and gender-based and domestic violence. It will be vital for the education and social protection sectors to collectively provide MHPSS for children in and out of school.

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76 Children and adolescents at the intersection of multiple marginalization, particularly gender, poverty, disabilities, and displacement, will be disproportionately affected.

77 The Center for Disaster Philanthropy reports that more that 1.1 million livestock have been killed and nearly 15 percent of the country's rice crop and 40 percent of its cotton crop have been affected. This has severe repercussions for the population, which depends on them for their income and livelihoods, and may also result in major food shortages. It also states that at least 7.9 million people are displaced and almost 600,000 are living in relief camps. Road and transport infrastructure in the 86 affected districts has been damaged and health facilities' service delivery has been challenged.

78 Saavedra, Jaime and Sherburne-Benz, Lynne. 2022. "*Pakistan's Floods are Deepening its Learning Crisis*." World Bank Blogs.

79 Research on Improving Systems of Education (RISE). 2020. *We have to Protect the Kids*.

80 Andrabi, T., Daniels, B., Das, J. 2020. "*Human Capital Accumulation and Disasters: Evidence from the Pakistan Earthquake of 2005*." RISE Working Paper Series. 20/039.

81 Bellizzi, S. et al. 2021. "*Humanitarian Crises and Child Marriage: Historical Recurrent Interrelated Event*." Journal of Global Health 11: 03112.

82 Historically, the uncertainty following the earthquake of 2005 and the floods of 2010 prompted affected communities to adopt negative coping strategies such as discontinuing schooling, especially of girls and children old enough to contribute to household income.

Recovery Needs and Strategy

Implementation of response and recovery efforts will be the responsibility of the Education Departments in conjunction with district and provincial-level governments and partners, relying on and building upon existing delivery mechanisms with adaptation as needed. The total needs for recovery and reconstruction are estimated at PKR 197 billion (US$918 million) (Table 15). Recovery needs were identified and estimated based on the replacement costs of infrastructure, materials, losses and also factoring in inflation, build back better (BBB) and disaster risk reduction (DRR) principles,[83] which aim for schools, teachers, students and Education Departments to become resilient to future disasters and to ensure a better and inclusive learning environment under educational reforms. The recovery strategies were defined and refined in collaboration and consultation with the Ministry of Federal Education and Professional Training (MoFE&PT), provincial Education Departments, and the Education Sector Working Group (ESWG), co-led by MoFE&PT and UNICEF.

TABLE 15. DAMAGE, LOSS, AND NEEDS ESTIMATION

Province	Damage (PKR billion)	Loss (PKR billion)	Needs (PKR billion)
Balochistan	29.4	14.4	51.1
KP	7.2	2.4	11.4
Punjab	3.1	1.1	5.0
Sindh	80.3	29.2	129.5
Special Regions	0.08	0.08	0.18
Total (PKR billion)	**120.0**	**47.1**	**197.2**
Total (US$ million)	**558.7**	**219.3**	**918.1**

In the short term, the recovery strategies emphasize the need to continue learning, to improve equitable and inclusive access for all children and adolescents, and present an exceptional opportunity to reach and reintegrate out-of-school children, adolescents, and especially girls through accessible, alternative, and flexible learning. A comprehensive TLC package is being promoted. Early recovery efforts have commenced, with over 500 TLCs established and over 70 schools dewatered by the beginning of October 2022.[84] The use of alternative learning spaces, such as TLCs, prefabricated classrooms, and rented buildings, and maintaining adequate student-to-teacher ratios, may be sustained into the intermediate phase. The movement and/or relocation of communities, such as migration from rural to urban or vice versa, will also be a factor. Of paramount importance is to restore education services and recover learning losses, keeping teachers, parents, caregivers, children, and adolescents motivated, while continuing the process of dewatering, cleaning, sanitizing, and fumigating damaged schools.

83 BBB principles are closely linked to the Comprehensive School Safety framework and will guide recovery and reconstruction. The framework focuses on safe learning facilities, school disaster management, and resilience education. It helps to ensure that all learners and education workers are protected from death, injury, and harm in schools; and supports educational continuity in the face of all types of hazards and threats. It also safeguards education sector investments—in both physical and human capital—and contributes to increasing the resilience of children and communities to the negative impacts of climate change and disasters.

84 Recovery efforts as communicated by the ESWG, 10 October 2022.

Into the medium term, continued analyses based on student-level tracking of access (enrollment and retention) and learning outcomes is necessary to support evidence-based planning and the development of multipronged flexible strategies to teach all children and adolescents at the right level, which also provide an opportunity to reach and mainstream out-of-school girls and boys.[85] To ensure all children and adolescents resume learning, the loss of assistive devices for children with disabilities requires attention. Community outreach and engagement strategies, enrollment campaigns, and mass media messaging are expected to promote a return to learning, especially for girls, children with disabilities, out-of-school children, and other marginalized children and adolescents.

Medium to longer term strategies will focus on the repair and reconstruction of educational institutions and on the resilience of the education system, guided by BBB principles. Provincial and district-wide hazard risk maps will need to be updated. Strategic planning on the locations of schools will be critical for the government. If needed, the relocation or merger of schools may be considered to avoid having educational institutions located in high-risk areas.[86] School construction standards and codes will also need to be reviewed and strengthened to ensure resilient buildings and reduce disaster and climatic risks. To strengthen the system, the focus is on mainstreaming DRR in education into the curriculum, and teaching and learning materials, through extensive and continuous teacher education and training, the capacity development of education officers across all levels, and the engagement and training of PTAs, SMCs, and SCs. The specific short-, medium-, and long-term needs are proposed in Table 16, organized by the Inter-Agency Network for Education in Emergencies Minimum Standards.[87]

Recovery needs were identified, prioritized, and sequenced in consultation with the ESWG. The short-term strategies align with the ESWG's nine-month flood response plan activities and focus on the resumption of learning, including using the opportunity to reintegrate and mainstream out-of-school children and adolescents. The medium- to longer-term needs transition to rebuilding the educational institutions back better, to recovering learning for all children and adolescents, to improving the teaching and learning processes, and to strengthening the system's resilience via the Safe School Framework,[88] DRR education, and disaster risk management (DRM).

85 Strategies to mitigate learning loss may include sample-based formative assessments, review and prioritization of student learning objectives to be covered in the remaining academic year, overview and tailoring of learning expectations and assessments for students, and analysis of the cascaded impact of loss of instruction time in subsequent academic years.

86 Administrative divisions, school catchment areas, and the capacity of schools will need to be fully considered.

87 The *Inter-Agency Network for Education in Emergencies Minimum Standards* include the following domains: access and learning environments, teaching and learning, teachers and other education personnel, and education policy.

88 Government of Pakistan and National Disaster Management Authority. 2017. *Pakistan School Safety Framework*.

TABLE 16. RECOVERY NEEDS PRIORITIZATION AND SEQUENCING

Intervention/Activity	Short Term (Up to 12 months)	Intermediate (Up to 3 years)	Long Term (Up to 5 years)	Priority (Rank 1-5)
Access and Learning Environments				
Total (PKR billion) 190.9				
Total (US$ million) 888.7				
Resume learning via a comprehensive TLC package.	X	X		1
Conduct standardized facility damage assessment of affected public/private educational institutions, including institutions used as temporary shelters.	X			1
Dewater, clean, sanitize, and fumigate educational institutions and compounds.	X			1
Establish prefabricated classrooms in fully damaged educational institutions or use nearby rented buildings.	X	X		1
Renovate, rehabilitate, retrofit, and reconstruct damaged educational institutions, applying BBB principles with updated standards[89] for inclusion.		X	X	1
Set up enrollment campaigns and social and mass media messaging on the return to learning, especially for the most marginalized children, adolescents, and girls.	X	X		2
Mobilize and train PTAs, SMCs, and SCs on safe school reopening, MHPSS, IPC, and gender-based violence risk mitigation measures, and preparation of school disaster management plans.	X			2
Engage with stakeholders to advance community mobilization/sensitization on access to learning opportunities and participation in response and recovery efforts.	X	X	X	1
Introduce vouchers for students, especially girls, to attend accessible private institutions if their schools are unable to resume operations within 2-3 years.[90]	X	X	X	3

89 Building educational institutions back better may include features such as solar lighting, water harvesting structures, climate/seismic-resilient infrastructure, inclusive structures for children with disabilities, ventilation, natural light. In addition, a school and teacher rationalization exercise at the district level may be required to identify buildings that need to be relocated because of their current locations in areas prone to floods, earthquakes, and other natural disasters, and/or are not viable schools long-term per the current applicable school education policies (such as minimum number of rooms, student-to-teacher ratios) or due to the movement or migration of populations. The development of resettlement plans to identify and acquire suitable sites for buildings that need relocation should be done in consultation with communities in catchment areas.

90 As appropriate, the use of conditional cash transfers to encourage enrollment and attendance at TLCs and schools may also need be considered (refer to the Social Policy section with descriptions and costings on the opportunity to extend the existing government-run education CCT Taleemi Wazaif program to target the poorest 60 percent of the affected population due to increased vulnerabilities). There is also an opportunity for WFP's food support and FAO's support for livelihoods to be linked to the use of CCTs. These interventions and costs are reflected in the Social Protection section of the report.

Teaching and Learning					
	Total (PKR billion)	**3.6**			
	Total (US$ million)	**16.8**			
Assess loss of instructional hours and develop evidence-based local remedial plans to recover learning loss and bridge learning gaps for affected children and out-of-school children.		X	X	X	1
Establish gender-responsive monitoring systems to measure access and learning outcomes, including a registry of newly enrolled out-of-school children and adolescents.		X	X	X	1
Provide continuous, needs-based teacher professional development opportunities.		X	X	X	2
Education Policy					
	Total (PKR billion)	**2.7**			
	Total (US$ million)	**12.6**			
Update and operationalize the School Safety Framework and include a DRM module for teacher and education personnel training.			X	X	3
Develop district-based (i) emergency response and evacuation plans and drills, (ii) early warning systems, and (iii) learning continuity plans.				X	3
Introduce a mandatory and costed DRM component in education sector plans (and Planning Commission Form-1s as relevant).				X	2
Expand school curricula to include DRR and education.			X	X	3
Introduce low-interest loans for damaged private schools to allow education continuity during reconstruction.			X	X	4
Establish public-private partnerships (PPPs) with agile and low-cost delivery models, including support to education foundations.			X	X	4
Establish a process to track PDNA recovery efforts, linked to the national flood response and recovery dashboard and integrated into the national, provincial, and district level tracking and monitoring and evaluation processes.		X	X	X	2

Partnerships will play a key role in the response and recovery process, as already manifested in the response efforts in Sindh. A coordinated response with the support of the ESWG will continue to be important for recovery planning and implementation. Arrangements for recovery and reconstruction will vary among different subsectors of education. The Education Departments may need to tap into PPPs at the provincial and district levels to garner backing, resources, and funding, including for targeted service delivery. At the grassroots level, partnerships with local agencies, and community support, engagement,

and mobilization will be essential to implement recovery strategies and identify effective interventions for ensuring access to safe learning environments and continuity of learning. Non-government, multilateral, and bilateral partners have all committed resources and expertise to the flood response and recovery. The bulk of funding will be allocated by the government, with partnerships at multiple levels pivotal in generating funds for the recovery, including through national and international donor agencies. There are existing resources to be reprogrammed[91] and dedicated funding mechanisms, such as Education Cannot Wait (ECW)[92] and the Global Partnership for Education (GPE)[93] to leverage.

Limitations

Fundamental limitations are highlighted. First, educational institution damage data was limited to the public sector. As the role of the private sector in education is significant,[94] many marginalized children and adolescents enrolled in a variety of PPP schemes, including government education assistance to private schools and provision of government funding for privately enrolled students, are not captured in this report. As listed among recovery priorities, there is an opportunity to leverage private sector flexibility and widen access in underserved communities to expand and complement public efforts. Prioritizing reliable and comprehensive information across all types of education—private schools, private early childhood education offerings, special education, refugee schools, non-formal centers—will safeguard recovery planning in the best interests of all children. Additionally, due to time constraints, consultations were not conducted with children, adolescents, teachers, or parents and caregivers; however, qualitative findings, including the views and voices of children from the multisector rapid needs assessment, were incorporated.[95] Qualitative data from education partners' secondary sources and stakeholders' personal observations were considered. During the early recovery period, as provincial frameworks and action plans are developed, children, teachers, parents, and caregivers should continue to be consulted.

Culture and Heritage

Pre-Floods Context and Baseline

Pakistan has incredible diversity when it comes to cultural heritage – both tangible and intangible. The Culture Sector in Pakistan is composed of a wide variety of creative and cultural artistic disciplines that stem from its multifaceted history, and the diverse ethnic and religious identities of the inhabitants of its land –

91 As an example, the SELECT project supported by the World Bank will build on its investments to improve classroom learning environments and infrastructure and will scale-up activities around early childhood education, foundational literacy and numeracy, formative assessment, and continuous teacher professional development.
92 Education Cannot Wait *press release*, 23 September 2022.
93 Global Partnership for Education *statement*, 31 August 2022.
94 Private education represents some 37.9 percent of all educational institutions and 44 percent of total enrollments (*Asian Development Bank* 2022).
95 OCHA. 2022. *Multi-Sector Rapid Needs Assessment in Flood-Affected Areas of Khyber Pakhtunkhwa, Punjab and Sindh.*

both past and present.[96] After the passing of the 18th Amendment to the Constitution of Pakistan in 2010, there was a devolution of power, and cultural heritage management became the primary responsibility of each province and region, while limited authority and responsibility was retained at the federal level.[97] At both the federal and provincial levels, the government has sought to better understand the contribution of the creative sector to socioeconomic growth and job creation.[98] The Khyber Pakhtunkhwa Cultural Policy and the National Cultural Policy were established in 2018. More recently, the Punjab Cultural Policy was established in 2021. Pakistan has ratified several UNESCO conventions pertaining to cultural heritage that make the government responsible and accountable for the protection, preservation, and promotion of cultural heritage.[99]

The most recent UNESCO convention ratified by Pakistan, just before the monsoon season of 2022, focuses on shaping the design and implementation of policies and measures that support the creation, production, distribution, and access to cultural goods and services that make up the creative economy.[100] These developments strongly indicate that Pakistan is in agreement with the global community on moving towards widespread acceptance and acknowledgement of the role of culture as both a driver and enabler of sustainable development. Despite these positive steps forward, the Culture Sector in Pakistan lacks adequate social protection measures and financial safety nets that leave both cultural sites and cultural professionals vulnerable to economic fluctuations and upheavals caused by natural and manmade disasters. Cultural professionals are people who earn a primary or secondary living from their cultural and creative endeavors. This includes (but is not limited to) musicians, craftspeople, artists, performers, and heritage entrepreneurs. In 2020, the COVID-19 pandemic revealed the vulnerabilities of the culture sector when cultural professionals were among the worst-affected by prolonged lockdowns, and also the ones least likely to recover fully due to the absence of social safety nets, and adequate funding and mechanisms for recovery. Financial stability and job security are not commonly found in Pakistan's Culture Sector, which has caused cultural practitioners to put aside their craft and gravitate towards job opportunities in fields that are considered more likely to provide a better income. In post-disaster communities, this shift is likely to rise as economic vulnerability increases.

Due to limited funds and trained expertise in conservation, heritage sites across Pakistan are vulnerable to harsh environmental changes. Built heritage is almost always accompanied by a vast treasure trove of intangible cultural heritage (ICH) among communities that live around the sites. ICH consists of cultural knowledge, crafts skills, oral traditions, social practices, and rituals etc., which not only form the foundation of social systems, but are also an important source of livelihoods for community members. Examples of ICH in Pakistan include calligraphy; folk tales such as Sohni Mahiwal and Heer Ranjha; forms of dance such as Attan, Khattak, Bhangra and Baloch Chaap; indigenous practices such as falconry and Suri Jagek[101]; traditional crafts knowledge such as Changair Sazi (basketry), Ajrak and Chunnri making;

96 There are six World Heritage Sites across Pakistan, three elements from Pakistan have been inscribed on UNESCO's Lists of Intangible Cultural Heritage, and in 2019, Lahore became the first city from Pakistan to join UNESCO's Creative Cities Network (UCCN) as a City of Literature.

97 Key government counterparts in the PDNA exercise included the Directorate of Archaeology and Museums (Khyber Pakhtunkhwa), Directorate General of Archaeology (Punjab), Directorate General of Antiquities and Archaeology (Sindh), Directorate of Archaeology and Museums (Balochistan), Local Government and Rural Development Department (Special Regions), and provincial Auqaf and Religious Affairs Departments. In each province and region, support was provided by the Culture Departments as well.

98 UNESCO: Empowering Artists and Creative Entrepreneurs in Pakistan. *https://en.unesco.org/creativity/sites/creativity/files/empowering_artists_and_creative_entrepreneurs_in_pakistan.pdf*

99 UNESCO Conventions ratified by Pakistan: *https://en.unesco.org/countries/pakistan/conventions*

100 The 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions: *https://en.unesco.org/creativity/convention*

101 Suri Jagek is a traditional meteorological and astronomical practice based on the observation of the sun, moon, and stars in reference to local topography, that is practiced by the indigenous Kalasha people in Pakistan. The practice was inscribed on UNESCO's List of ICH in Need of Urgent Safeguarding in 2018. *https://ich.unesco.org/en/USL/suri-jagek-observing-the-sun-traditional-meteorological-and-astronomical-practice-based-on-the-observation-of-the-sun-moon-and-stars-in-reference-to-the-local-topography-01381*

camel hair, skin, and bone art; and traditional cuisines such as chalpi kebab, lassi, saji, and more.[102] Unfortunately, many indigenous ICH practitioners in Pakistan live in abject poverty, unable to achieve the socioeconomic mobility needed for sustainable financial growth. This is causing many cultural professionals to move towards alternate forms of employment, resulting in a rapid loss of ICH as practice and transmission dwindles. Furthermore, the contributions of the creative economy are still not formally assessed in the country's GDP. These factors combined contribute to the fragility of the Culture Sector in Pakistan – and have led to significant damages and losses in the wake of the 2022 floods.

Assessment of the Disaster: Damage and Loss Estimates

Culture frames people's relationship to others in their society and to the world around them, including the built and natural environment. The resilience of social systems to disasters is in effect guided by cultural practices. The assessment of damage to cultural heritage in a post-disaster context is important for two key reasons[103]:

1. Cultural considerations can shape the effectiveness and sustainability of post-disaster recovery. Thus, culture has cross-cutting implications for all sectors, similarly to gender equality, governance, or disaster risk reduction.
2. The culture sector is an important and powerful component of the economic, social and environmental aspects of sustainable development in any society, and therefore must be made a key part of post-disaster recovery and rebuilding efforts.

The floods have caused an estimated damage of PKR 1.3 billion (US$6.1 million) for the Culture Sector. Early estimates indicate that at least 149 sites have suffered partial but considerable damage across Balochistan, Sindh, Punjab, Khyber Pakhtunkhwa, and Special Regions. This includes two World Heritage Sites in Sindh, namely the Makli Necropolis and the Archaeological Ruins of Moenjodaro. Numerous Buddhist stupas, Hindu temples, and tombs of pre- and post-Islamic dynasties have been heavily damaged, and many are in danger of further deterioration as stagnant floodwaters threaten structural integrity. Many historic mosques and shrines that are still used as places of worship and community gathering have been damaged.

While movable heritage has remained largely unscathed, reports of damage to the exterior walls of museums in Sindh, Balochistan, and Khyber Pakhtunkhwa are cause for immediate concern. In Balochistan, the Karez Water System – a unique indigenous social system of water management and community development – has been badly damaged.

The damage reports received from the PDNA focus primarily on tangible and built heritage. Most heritage sites in flood-hit areas suffered extensive damage, which is reflected in the costs. It is significant to note that the data available at present is from the Public Sector. While the Public Sector controls most heritage sites in Pakistan, there are historic properties controlled by the Private Sector, for which data are not currently available. An even greater challenge, however, for the Culture Sector is to assess damages to ICH, which will only emerge with time. Displacement is a significant risk to the safeguarding and transmission of ICH, as it is fundamentally linked to a community within a specific region or environment.

102 UNESCO's 2003 Convention for the Safeguarding of Intangible Cultural Heritage recommends five broad domains for ICH, namely (i) oral traditions and expressions, (ii) performing arts, (iii) social practices, rituals, and festivals, (iv) knowledge and practices concerning nature and the universe, (v) traditional crafts knowledge.

103 PDNA Guidelines Volume B: Culture.

When communities are forced to migrate away from familiar environmental settings, their ICH starts to weaken and fade. The breaking of ties with the broader community, and disconnect with the land itself, and the significant trauma of displacement are significant threats to ICH in the wake of the floods. ICH contributes to strengthening social beliefs and cohesion, building resilience, and economic development. Therefore, impacts on ICH may have negative repercussions on the socioeconomic development of a community.

Due to the vulnerability of knowledge carried only within communities themselves, and limited understanding of the socioeconomic value of contributions of ICH, there are very few mechanisms currently in place to assess the impact of natural disasters on ICH in Pakistan. Additionally, there is a lack of viable data on the contributions of the culture and creative industries to the economy. Many cultural professionals are part of the informal economy, or practice their craft as a 'second job', which means they are overlooked in survey and census data. To account for the significant impact on ICH and loss of cultural livelihoods in flood-hit areas, a 10 percent increase was considered when calculating losses for the Culture Sector. It is imperative to note that this is a conservative estimate, and that the true scale of the impact is likely to be higher, and will become evident as floodwaters recede and rebuilding efforts begin.

Damaged heritage sites, loss of income, displacement, and possible migration to larger urban centres will continue to result in heavy, often irreparable losses to the tangible and intangible cultural heritage of Pakistan. These losses will continue to affect visitor numbers and revenue from ticket sales, and indirect earnings in the food, hospitality, and tourism industries for the foreseeable future.[104]

TABLE 17. DAMAGE AND LOSS ESTIMATES FOR THE CULTURE AND HERITAGE SECTOR

Province/Region	Overview of Damage & Loss		Damage (PKR Million)	Loss (PKR Million)
	Built Heritage	Intangible Cultural Heritage		
Sindh	9 shrines and tombs, 20 mosques, 25 archaeological and historic sites, 5 historic graveyards, 4 forts, and 2 museums have been heavily damaged.	ICH forms the foundation of social systems and is also an important livelihood for community members. Displacement and forced migration are a significant threat to the survival and transmission of ICH.	934	1,027
Punjab	1 archaeological site and 6 shrines and tombs have been heavily damaged.		125	137.5
Balochistan	56 mosques, 1 museum, and 3 archaeological and historic sites have been heavily damaged.		70	77
KP	1 mosque, 1 historic graveyard, and 11 archaeological and historic sites have been heavily damaged.		160	176
Special Regions	1 mosque and 1 imambargah have been heavily damaged.		19	20.9
Total (PKR Million)	**At least 149 sites have reported heavy damage.**	**Significant impact on ICH.**	**1,308**	**1,438**
Total (US$ Million)			**6**	**7**

104 A comprehensive assessment can be found in the Tourism Sector analysis of the PDNA.

Linking Effects to Impacts

Climate change is a threat multiplier and the effects of climate change exacerbate existing stresses such as pollution, conflict, resource scarcity, habitat fragmentation, gender disparity, loss of ICH, and unplanned or poorly managed tourism.

ICH includes valuable knowledge about environment, weather, biodiversity, agriculture, sustainable building techniques, and more, that can help communities better adapt to the increasingly detrimental effects of climate change. However, climate-induced calamities cause displacement and forced migration of the very people who carry this knowledge. This endangers ICH, and as a ripple effect, hampers the ability to adapt, and makes communities more vulnerable to the effects of climate change.

Women are one of the most vulnerable demographics in disaster-hit regions. In more conservative regions of Pakistan, there are already limited opportunities for women to earn a living, which are largely centered around agriculture, livestock, and craft development. Considering the massive loss of life already reported, there are many households that have lost the breadwinners of the family. Many female cultural professionals worked out of their own homes. With the loss of their homes and their equipment, they have lost their means of earning a living. For many communities in flood-hit areas, agriculture was a primary source of income, while cultural practices formed a more informal, secondary source. Now, both of these sources of earning have been impacted by floods.

One of the greatest, yet least quantifiable losses in the wake of a natural disaster of this scale, is the stifling of creative expression among affected communities. Cultural traditions and practices are not just a means for making a living. They give a community its sense of identity – both shared and individual. As humans, we define ourselves by what we wear, what we eat, what we sing, how we dance, and the stories we tell. Our social practices, our rituals, and our habits bind us to each other, and to the land upon which we live. When a disaster of this scale diminishes this collective identity for millions of people, and there are limited social safety nets, then the cultural and social repercussions of that loss will reverberate for decades.

Recovery Needs and Strategy

The integration of culture in Pakistan's post-disaster recovery strategy is a welcome step towards effective and sustainable long-term rehabilitation.

The recovery needs for the culture sector are estimated at PKR 1,831 million (US$8,524,209). When estimating the costs for recovery, an expected price escalation (25 percent) and expenses for capacity building and climate resilience measures (15 percent) were factored into estimates.

A phased approach is recommended for recovery and rebuilding of the Culture Sector, as determined during consultations with provincial government counterparts. Prioritization of interventions has been structured in such a way that urgent assistance is provided where it is most needed, while secondary measures are aimed towards long-term recovery and resilience against future climate-induced disasters.[105]

105 UNESCO's ongoing flood relief efforts for the Culture Sector in Pakistan are built upon a similar, phased approach, which focuses foremost on damage assessment and immediate stabilization, followed by capacity building, and policy advocacy for emergency preparedness in the future.

TABLE 18. DAMAGE, LOSS AND NEEDS FOR THE CULTURE & HERITAGE SECTOR

Province/Region	Damage (PKR Million)	Loss (PKR Million)	Needs (PKR Million)
Balochistan	70	77	98
KP	160	176	224
Punjab	125	137.5	175
Sindh	934	1,027	1,307
Special Regions	19	20.9	26.6
Total (PKR Million)	**1,308**	**1,438**	**1,831.2**
Total (US$ Million)	**6**	**7**	**9**

In the **short term**, the recovery strategy must focus on conducting a detailed damage assessment for flood-affected sites and communities. Among the districts declared calamity-hit by the government that were analyzed for this report, there are at least 149 heritage sites that have been heavily damaged. While preliminary damage assessment has already taken place for many sites, a more thorough assessment and evaluation by heritage conservation experts must take place to determine the best course of action. Urgent stabilization measures must then be carried out at the most fragile sites, using appropriate equipment, material, and skilled experts with knowledge of each site's specific requirements, e.g., the tomb of Ghazi Khan in Punjab requires expertise in Kashi tilework, while the archaeological ruins of Moenjodaro in Sindh require expertise in earthen structures. Additionally, standing floodwater is a continuing threat to the stability of foundations and structural integrity of several sites. When the floodwater recedes and these sites are accessible again, the priority must be to carry out emergency stabilization to prevent further deterioration or collapse. Alongside damage assessment of built heritage, data must be collected on the loss of livelihoods for cultural professionals and the threats to ICH in flood-hit areas. A comprehensive recovery strategy must focus on both tangible and intangible cultural heritage.

In the **medium term**, the focus must be on capacity building of heritage management staff for emergency preparedness and immediate stabilization of vulnerable sites. Caretakers of many heritage sites across the country lack the technical expertise required to implement stabilization measures in line with international conservation best practices. With the provision of specialized equipment and comprehensive training by heritage conservation experts, site management staff can be better prepared to protect sites against future climate-induced calamities and carry out immediate stabilization if needed. This is an important step to build capacity of site management staff, and reduce reliance on experts for basic conservation and protection of heritage sites. The cultural context of flood-affected areas will impact recovery and reconstruction.

In the **long term**, rebuilding measures must consider indigenous knowledge of sustainable construction techniques, water management systems etc., and global best practices must be adapted to suit local contexts to develop climate-change resilient communities. "Build Back Better" for the Culture Sector means reviving traditional practices that create harmony between the natural and built environments, instead of disrupting the system and increasing vulnerability to natural disasters. The recovery strategy must involve indigenous people and local communities in every step of climate adaptation and responsible tourism development.[106]

The long-term prospects of the recovery strategy hinge on several key policy actions. Regulations controlling construction and infrastructure development around heritage sites must be strengthened and reinforced.[107] Regular maintenance and conservation interventions must be carried out at all heritage sites to protect against extreme weather conditions. Some key measures include early warning systems, protective mechanisms, and evacuation plans for vulnerable sites and movable heritage during high-risk periods (e.g., monsoon). A national Disaster Risk Reduction strategy that incorporates indigenous knowledge and global best practices is also needed. The full extent of the contribution of cultural heritage towards socioeconomic development can only be understood if there is data on heritage sites and cultural practices, and publicly accessible provincial and national inventories[108]. The frameworks within which economic development is measured must be modified so that the contributions of the culture and creative industries to GDP are measured. Through these measures, social protection mechanisms can be established specifically to offer a safety net to cultural professionals. At present, Pakistan has a National Cultural Policy, while Provincial Cultural Policies are in place for Khyber Pakhtunkhwa and Punjab. Comprehensive cultural policies will strengthen the overall sector, and guide strategies for long-term resilience against climate-induced disasters and instability in the future.[109] Finally, emergency preparedness, urgent stabilization, and damage assessments for the Culture Sector must be fully integrated into all regional, provincial, and national level disaster management plans.

A significant challenge for the recovery strategy is to mobilize funds. There is a need for increased collaboration and knowledge sharing among donors, aid agencies, government departments, and civil society representatives in the Culture Sector. Through this, partnerships can be established, innovative modes of funding can be developed, and efforts can be streamlined.

106 A significant amount of research has been undertaken at the global level, especially in the field of archaeology that can provide data on how human populations have adapted to climate changes in the past. The scale of climate-induced disasters today is unlike anything seen in history before, but there is value in learning from adaptive and sustainable resource use by indigenous people. (World Heritage and Tourism in a Changing Climate, UNESCO 2016. *https://whc.unesco.org/en/tourism-climate-change/*)

107 All World Heritage Sites have a designated 'Buffer Zone', within which any construction or large-scale development cannot take place without prior review and approval by UNESCO's World Heritage Centre. A similar mechanism is recommended for all significant heritage sites in Pakistan, under the supervision of a provincial advisory body composed of government officials and heritage experts from civil society. Such measures will protect sites against illegal encroachments or ill-planned construction that may increase vulnerability to natural disasters.

108 The National Inventory for Intangible Cultural Heritage (*https://ichinventory.pk/*) was developed by the National Heritage and Culture Division at the Federal level in 2019. UNESCO is currently working with government counterparts to update this inventory and establish provincial inventories as well.

109 Mechanisms to implement existing cultural policies more effectively must be established through collaborative partnerships between the government, development agencies, civil society organizations, and cultural professionals. Additionally, there is an urgent need for comprehensive cultural policies for the provinces of Balochistan and Sindh, and the Special Regions.

TABLE 19. SUMMARY OF PRIORITIZED INTERVENTIONS IN THE CULTURE & HERITAGE SECTOR

Intervention/Activity	**Short** (Up to 12 months)	**Intermediate** (Up to 3 years)	**Long** (Up to 5 years)	**Priority** (Rank 1–5)	**Estimated Cost**[110]
Detailed damage assessment for flood-affected heritage sites.	X			1	549.4
Urgent stabilization for most vulnerable sites.	X			1	
Data collection on the impact on cultural professionals and specific recovery needs for each region and cultural practice.	X	X		2	366.2
Capacity building of heritage management staff.		X	X	2	
Integration of indigenous knowledge into mainstream practices, through direct engagement with local communities and stakeholders.			X	2	915.6
Consultations with stakeholders to update regulations around heritage sites and develop stronger mechanisms for enforcement.			X	3	
Establishment of early warning systems and evacuation protocols.			X	2	
Development of a DRR strategy for the Culture Sector.			X	3	
Data collection for tangible and ICH at the national and provincial level.			X	4	
Strengthening provincial and national cultural policies and establishing mechanisms for effective implementation.			X	5	
Inclusion of Culture Sector in provincial and national level disaster management plans.			X	5	
Funds mobilization.	X	X	X	1	

110 Estimated costs have been determined based on the duration of the suggested interventions. Short-term interventions are costed together, as these funds will be needed immediately. Long-term interventions are costed together as these funds will be needed later on in the rebuilding and recovery phase.

Limitations

The inclusion of Culture as a separate sector in the PDNA framework is relatively new, and as such, mechanisms for data collection, costing estimates, and overall analysis are still developing. Due to this, there are several limitations to this analysis. The foremost limitation is the lack of data from flood-hit districts on various aspects of culture. While there are procedures to assess damage to built heritage, assessing ICH is neither easy, nor commonly understood, even among heritage managers and cultural practitioners themselves. Second, due to limited time, data have only been collected from publicly managed cultural heritage sites. The damage to privately managed historic buildings could not be ascertained at this time. Third, there are limited baseline data for comparison and analysis – especially for information such as Culture Sector contributions to GDP – which makes it difficult to quantify damages and losses. Fourth, the data and analysis in this report reflects only the selected calamity-hit districts as determined by the government. It is important to note that heritage sites of considerable significance have been damaged in other districts. Combined with the losses in ICH which will only gradually become evident, it is likely that the overall damages, losses, and recovery needs for the Culture Sector will finally be higher than currently anticipated.


Photo credit: PRIDE - SIA Pakistan

Infrastructure Sectors

Photo credit: UNDP

Transport and Communications

Pre-floods Context and Baseline

Roads and Railways: Pakistan has a total road network of around 263,000 kilometers (km). Road transport is the backbone of Pakistan's transport system, shouldering the bulk of the country's traffic and handling 94 percent and 96 percent of all freight and passenger traffic, respectively. However, development of new roads and maintenance of the existing network at the provincial level has lacked a formal asset management system to consider total life cycle costs and climate resilience. On average, provinces allocate only 20–30 percent of the required maintenance budgets, leading to significant maintenance backlog over time. The engineering and design standards used by road agencies are obsolete and lack adequate climate resilience elements.

The national highway and motorway network is under the administration of the federal National Highway Authority. This network is over 14,000 km long, which constitutes about 4.6 percent of the total road network but carries nearly 80 percent of Pakistan's total traffic. There is also a significant part of the road network that is administered by the respective provincial, district, local governments, irrigation, and other departments. In most cases, the quality of these roads remains low due to inadequate technical and financial capacities.

Pakistan has a rail network of 7,791 route-km or 11,881 track-km, which includes 1,040 km of multiple tracks. The 1,726 km Main Line 1 (ML-1) runs from Karachi to Peshawar via major urban centers in Sindh and Punjab. It serves as the most important south–north link, carrying over 75 percent of the total trains and over 85 percent of the total freight traffic. The ML-3 links ML-1 with Quetta, the provincial capital of Balochistan. The existing rail infrastructure remains underutilized due to dilapidated track and signaling infrastructure and poor management. The baseline lengths of the road and rail networks are given in Table 20.

TABLE 20. BASELINE LENGTHS OF ROAD AND RAIL NETWORKS

Agency	Total Network (kms)
National Highway Authority, Federal	14,480
Works and Services Department, Sindh	43,000
Works, Physical Planning and Housing Department, Balochistan	42,000
Communication and Works Department, KP	21,500
Communication and Works Department, Punjab	60,000
Pakistan Railways (Tracks)	11,881 track-km 7,791 route-km

Telecommunications: Pakistan has 195 million cellular mobile subscribers and 123 million broadband internet subscribers. Over 98 percent (120 million) use mobile networks, while only 2 percent use fixed-line internet. Eight submarine cable systems with landing stations at Karachi and five national backbone fiber (core network) operators provide connectivity across the country. In the middle and last mile, multiple

operators use various technologies to provide access, including 3G/4G, digital subscriber line (DSL), fiber to the home, (FTTH/X), satellite, and wireless metropolitan access technologies. There are 50,632 mobile communication towers and approximately 130,000 km of fiber optic cables. Only 10 percent of towers are connected to the fiber optic network. The flood damage to information and communications technology infrastructure and services is likely to further defer the required improvements to the sector.

Assessment of Disaster Effects: Damage and Loss Estimates

Damages: A summary of damage to infrastructure is in Tables 21 and 22. Preliminary assessments showed that the damage during these floods was caused by: (i) unprecedented rains that resulted in flooding and ponding due to topography and lack of drainage infrastructure, particularly for Balochistan and Sindh; (ii) washed away road sections and bridges due to flash floods generated in hilly terrains, particularly in northern parts of KP; and (iii) the infrastructure's overall lack of climate resilience. Lack of routine maintenance (especially drains clogged with solid waste) and insufficient disaster resilience (in terms of network redundancy, hydrological studies, and modeling) added to the effects of floods on the road network. Pakistan's fiber optic network runs under highways and railway tracks, many of which were washed away. Draining water required digging and cutting roads and building trenches using heavy machinery, which caused further damage to the fiber optic network.

In terms of road infrastructure Sindh is the hardest hit province, followed by Balochistan and KP. Damage to the railway infrastructure in Sindh involved damage to the embankment, rail tracks, cross drainage structures, bridges, service buildings, and signaling. The Main railway Line 1 (ML-1) in Sindh (Khanpur to Hyderabad) was completely submerged, hence operations remained suspended for some time. Similarly, railway operations also remained suspended on ML-2 due to damage to the railways line and ML-3 due to damage to bridges. The Civil Aviation Authority has not reported any damage. The telecommunication sector collectively reported a direct loss of approximately PKR 17.3 billion (US $80.5 million) to the Pakistan Telecommunication Authority (PTA). The reported loss includes damage to mobile towers, long-haul fiber optic cables, communication equipment in exchange sites, power backup systems, and other physical infrastructure. The damage also caused the temporary isolation of most of Balochistan province, including Quetta, which remained disconnected from both voice and data networks for extended periods.

TABLE 21. ROAD NETWORK DAMAGE SUMMARY

Province/Region	Total CWD/WS Network (km)	Completely Destroyed (km)	Partially Damaged (km)	No. of Bridges Damaged
Balochistan	42,000	878.0	1,009.0	43
KP	21,500	256.0	802.7	63
Punjab	60,000	177.1	284.2	6
Sindh	43,000	3,263.6	892.6	44
Cross-provincial	14,480	256.7	236.2	45
Special Regions	19,099	53.7	219.8	146

TABLE 22. RAILWAY INFRASTRUCTURE DAMAGE SUMMARY

Infrastructure Type	Completely Destroyed	Partially Damaged	Total	Remarks
Tracks and Signaling	3,127 km	208 km	3,335 km	203.4 km track damages to Wazirabad–Sialkot, Sialkot–Narowal, and Lalamusa–Taxila sections excluded
Embankments	932 km	0 km	932 km	109 km embankment in Lahore and Rawalpindi Division excluded
Bridges and Culverts	0	1,269	1,269	79 bridges and culverts in Lahore and Rawalpindi Division excluded; 189 new bridges proposed by Ministry Of Railways excluded
Stations	0	34	34	
Service Buildings	0	2,249,712	2,249,712	35,138 sq ft of damages to service buildings in Lahore Division and Rawalpindi Division excluded
Residential Buildings for Railway Staff	0	13,480,225	13,480,225	

Note: Table includes existing infrastructure damaged in calamity-hit districts only.

Loss: The damage and loss sustained in the transport and communication sector are presented in Tables 23 and 24. A rapid assessment has been carried out for losses. The assessment for losses for roads and rail network was based on indirect losses to damaged kilometers factor/ratio of the 2010 PDNA floods data. The losses per kilometer from 2010 were updated according to the accumulated inflation rate till 2022 to obtain their current values. Using these factors, losses per kilometer were calculated for each of the provinces by multiplying with the current number of damaged kilometers. This factor is deemed acceptable for this rapid assessment as both floods impacted similar areas, road and rails conditions remain relatively constant, and road and rail technology did not face drastic changes.

TABLE 23. LOSS IN COMMUNICATIONS

Operator	Loss in US$ Million	Loss in PKR Million	Remarks
Jazz	34.3	7,540	Towers, equipment, OFC
Zong	3.9	861.3	Towers, equipment
Wateen	3.1	672	OFC, equipment
Ufone	2.1	469.2	Towers, equipment
PTCL	10.4	2,283.8	OFC, access network, transmission equipment
Telenor	24.8	5,448	Towers, equipment
Total	**80.4**	**17,274.3**	

TABLE 24. DAMAGE AND LOSS IN TRANSPORT

Provinces /Region	Damage	Loss
	PKR Millions	
Roads		
Balochistan	16,071.9	4,474.4
KP	17,500.1	3,809.2
Punjab	31,477.1	5,106.1
Sindh	66,727.5	33,020.5
Cross-provincial	76,473.6	3,096.9
Special Regions	5,502.2	99.5
Subtotal	213,752.3	49,606.6
Railways		
Subtotal	470,062	10,678.6
Telecommunication	17,274.34	
Total (PKR Million)	701,088.6	60,285.2
Total (US$ Million)	3,263.9	280.7

Note: Railway damage includes existing tracks, bridges, stations, signaling, service buildings, and residential buildings that have been impacted by flooding in calamity-hit districts only. Numbers may not add up due to rounding.

Cross-cutting Issues: Communication disruption can severely impact operations at both the macro and micro level. Efficient communication is a backbone for the economy and enables the market to be competitive. While the network needs to be restored, this should be taken as an opportunity to factor in climate resilient features and prioritize reconstruction efforts strategically. The debris removal will be costly and will take a long time due to the need for appropriate disposal sites, the cost of collection and transport to those sites, the routes available to designated sites, and the need for heavy vehicles and equipment for removal. To minimize the negative impact on the air and environment, the landfill site should be earmarked; and clearing debris should be made part of the reconstruction contracts so that disposal can be appropriately monitored.

Linking the Effects to the Human Impact

Poor accessibility to basic services resulting from the flood damage will have negative economic and social impacts. Roads and railways are the main means of transporting goods, including agricultural commodities, to market and factories, accessing health services and public services, and commuting to schools in nearby tehsils or districts. The extensive flood-related damage to the road and railway network will significantly stall economic operations and lower the quality of life for residents. It is expected that transportation costs will increase due to longer journey times and detours, which would generate higher fuel costs and hence increased fares and huge differences between farm gate and retail prices for most

commodities. The poor road and rail network will also hinder traffic safety. Damaged infrastructure will likewise hamper relief efforts, leading to health emergencies. Unfortunately, reconstruction efforts on the damaged transport infrastructure will take time because of the number of structures. Further analysis for resilience reconstruction is also required. Until the completion of the work, the affected communities—particularly vulnerable population groups such as women, children, and the extremely poor, who already suffer in pre-flood conditions from restricted mobility for cultural and financial reasons—will continue to suffer from further access barriers to markets, schools, health facilities, and jobs.

Recovery Needs and Strategy

Estimation of Recovery and Reconstruction Needs: As presented in Table 25, the estimates for rehabilitation and reconstruction are based on the current costs for each item of transport infrastructure, and also factor in elements of social safeguards, project management and capacity building, likely post-flood cost escalation, and need to build back better and smarter.

TABLE 25. TRANSPORT AND COMMUNICATIONS RECONSTRUCTION AND RECOVERY NEEDS SUMMARY

Provinces/Region	Reconstruction and Recovery Costs	Social Safeguards (10 percent)	Project Management & Capacity Building (8 percent)	Price Escalation (20 percent)	Climate Resilience (15 percent)	Total
	PKR (Million)					
Roads						
Balochistan	16,071.9	1,607.2	1,285.8	3,214.4	2,410.8	24,590.0
KP	17,500.1	1,750.0	1,400.0	3,500.0	2,625.0	26,775.2
Punjab	31,477.1	3,147.7	2,518.2	6,295.4	4,721.6	48,160.0
Sindh	66,727.5	6,672.8	5,338.2	13,345.5	10,009.1	102,093.1
Cross-provincial	76,473.6	7,647.4	6,117.9	15,294.7	11,471.0	117,004.6
Special Regions	5,502.2	550.2	440.2	1,100.4	825.3	8,418.4
Sub-total	213,752.4	21,375.2	17,100.2	42,750.5	32062.8	327,040.4
Railways						
Sub-total	470,062.0	47,006.2	37,604.96	94,012.4	117,515.5	719,195
Telecom						
Sub-total	17,274.3	1,727.4	1,381.9	3,454.9	4,318.6	26,430
Total (PKR Million)	**701,088.66**	**70,108.83**	**56,087.06**	**140,217.75**	**175,027.62**	**1,072,665.4**
Total (US$ Million)	**3,263.91**	**326.39**	**261.11**	**652.78**	**814.84**	**4,993.8**

Note: Exchange rate PKR 214.8=US$1; numbers may not add up due to rounding.

Sector Recovery Strategy: The transport sector plays a pivotal role in generating economic activity, hence immediate sector recovery will reduce the effects of floods. Sector recovery will not only require reconstruction and rehabilitation works but also require some critical reforms to address resilience, including policy decisions; climate risk analysis; road planning and prioritization based on climate risks and criticality; updating engineering, design, construction, and maintenance practices; and embedding disaster and climate resilience in the reconstructed and new infrastructure. The financing requirement is vast and government, multilateral, and bilateral financing will be limited. Private sector resource mobilization would therefore be actively pursued wherever possible at stages of recovery and during maintenance of recovered, reconstructed, or new infrastructure. The recovery and reconstruction will be broadly split into: (i) short term (up to 12 months); (ii) intermediate (up to three years); and (iii) long term (up to five years). Total recovery demand will have to be met through a multi-stage implementation plan because of the funding gaps. Priority should be given to linkages that are completely destroyed but are critical for recovery, especially primary roads, and to rail lines. Considering factors such as availability of labor and extent of road/railway damage, some repair and restoration work may use labor-intensive methods to provide short-term employment to communities and improve their livelihoods.

Short Term (up to 12 Months): This includes the need to temporarily restore connectivity and accessibility. The vulnerability and risk assessments data should also be used by the PTA to issue guidelines so that the damaged infrastructure of telecommunication companies is restored immediately, as a functioning telecommunication system is critical for the efficacy of the early warning system and the emergency response. Restoration should, however, adhere to climate and disaster resilience standards. For the roads and rail sector, temporary restoration of critical damaged sections has been completed so that traffic may resume. For the bridges which are damaged, steel bridges are set up, and for the sections which are washed away, diversions are created to restore access and connectivity. However, these sections would require some temporary repairs to sustain the traffic for a longer period till the time actual reconstruction works commence.

For provincial and district roads, emergency repairs such as removing landslide debris and backfilling the washed away sections with locally available materials, have been carried out. For railways, embankments have been strengthened at key locations to resume operations. However, for locations that are inundated or key bridges damaged, operations are suspended. Considering the quantum of completely destroyed sections and resource constraints, locations that are pivotal to ensuring national and regional connectivity must be identified and prioritized in the initial 12 months. This includes completely destroyed bridges and road and rail sections that have resulted in the suspension of operations across key north–south corridors. At the provincial level, priority should be given to roads that would improve access to public facilities, social services, markets, and relief operations.

Intermediate (up to Three Years) and Long Term (up to Five Years): In order to build back better, it is imperative that all the relevant agencies consider adopting climate change and disaster resilient strategies in the planning process and prioritization of roads. These strategies include designing standards utilizing hazard data, utilizing a transport systems level approach with redundancy, prioritizing disaster management investments, ensuring regular maintenance of assets, contingency and emergency plans, conducting revised hydrological studies, introducing the use of technology and software to make infrastructure resilient, and capacity building for relevant agencies. Similarly, investments in the medium-term growth of the telecommunications infrastructure are crucial and need to be prioritized in lieu of short-term fiscal gains. For transport infrastructure, based on the revised hydrology, it is recommended that detailed condition surveys for the flood-affected network should be undertaken, followed by preparation of detailed cost estimates and prioritization of projects based on their impact. However, the following constraints need to be considered:

- Capacity of local consulting firms to: (i) undertake designs and deliver a build-back-better strategy; (ii) cope with market and cost fluctuations; and (iii) match speed with quality and accountability.
- Availability of necessary materials and market reactions to demand–supply issues, given the enormity of scale and the need to undertake projects simultaneously.
- Availability of skilled labor and machinery.
- Asset management and the development of a robust and fair reporting and prioritization system.
- Acceptability of new climate resilience standards within relevant agencies and the government.

For telecommunications, the medium to long-term recovery strategy must consider: (i) building disaster resilience in the long-haul fiber optic network; (ii) promoting infrastructure sharing for improving redundancy and reducing deployment cost; and (iii) improving and making the electric power infrastructure disaster resilient to improve availability and reduce operating costs. As Pakistan accelerates its digital transformation—changing the way people communicate, work, do business, and access services—it is essential to develop infrastructure that ensures digital connectivity and resilience.

Prioritization Framework: The prioritized sector recovery framework is presented in Table 26. It is important for fast-track funding to leverage all available sources, including government funds allocated for regular annual development plans, budget-sharing mechanisms between the provincial and federal governments, emergency loans from international development partners, public–private partnerships, and raising additional funds through possible new levies or surcharges to fund reconstruction.

TABLE 26. TRANSPORT AND COMMUNICATIONS PRIORITIZED SECTOR RECOVERY FRAMEWORK

Activity	Short (1–12 Months)	Immediate (Up to 3 Years)	Long (Up to 5 Years)	Priority* (Rank 1–5)	Cost in PKR Million
Emergency works for restoration of services and basic connectivity and permanent repair of minor damages	X			1	131,136
Rehabilitation and reconstruction plan in the communication sector based on prioritization criteria (national to local) and its implementation		X	X	1	941,529
Identification of the critical network and introduction and scale-up of road asset management system at provincial level		X	X	2	433
Studies and adoption of climate and disaster resilient designs		X	X	1	433
Improving relevant insurance industry for disaster response		X	X	3	433
Regulation on the disposal of debris, including landfill site management		X	X	2	433
Skills transfer from international firms and contractors to local counterparts and capacity development of road agencies		X	X	2	433
Total (PKR Million)	**131,136**	**419,323**	**524,371**		**1,074,830**
Total (US$ Million)	**610.5**	**1,952.2**	**2,441.2**		**5,003.9**

Note: *1=highest priority; 5= lowest priority. Exchange rate PKR 214.8=US$1.

For effective implementation of the recovery plan, key actions to consider include (but are not limited to):

i. develop, in consultation with key stakeholders, a priority list from the recovery and reconstruction needs prior to initiating work;
ii. assess capacity of local labor and materials before releasing (in aggregate or phased) work into market, so as to create as much local employment as possible while avoiding artificially driving up contract prices; and
iii. engage qualified design and construction supervision teams (combined or separate) to conduct detailed engineering design and strict quality control, especially for roads and bridges requiring heavy rehabilitation or reconstruction, to help ensure the future flood resilience of rehabilitated and reconstructed infrastructure. Systematically investing in preparedness measures and infrastructure strengthening is more cost-effective than addressing failures as they arise. Nature-based solutions, improving the relevant insurance provisions for disaster response, and mobilizing resources ex-ante through disaster risk financing all require more attention in the medium to long run. There is also a need for robust management of design and construction supervision consultancy contracts, which in most cases have failed to deliver the necessary skills transfer from international to local firms and capacity development/training of the clients.

Limitations

The transport sector damage and loss assessment was primarily based on the information collected and reported by federal entities (National Highway Authority, Pakistan Railways, and PTA) and the respective Communication and Works Department of all flood-affected provinces through their field offices. The time constraints for this assessment and the situation on the ground could not allow for large-scale field validation. Nevertheless, the assessment was supplemented by remote sensing data, desk review and in-house analysis (e.g., collection of secondary quantitative data and pre-disaster baseline information), and field visits and interviews coordinated with national and local authorities. Physical validation by international and/or local consultants has been carried out for all national highways and motorways and almost 27 percent of Sindh Works and Services Department's road network. In addition, this analysis took advantage of remote sensing data made available by Ipsos. Effort has been made to triangulate the data in the most effective way possible. This assessment covered only the calamity-hit regions of Pakistan as advised by the government. Pakistan Railways reported the data from the calamity-hit districts in entirety. Detailed analysis of losses due to traffic detours and loss of revenue to the private sector due to cancellation of transport services was not conducted in the analysis.

Energy

Pre-floods Context and Baseline

In Pakistan's four provinces, power distribution is conducted by 10 public sector power distribution companies (DISCOs) and one private sector power company—Karachi Electric (KE). In special regions, local electricity departments are responsible for distribution and hydro generation. Transmission is the responsibility of the National Transmission & Despatch Company (NTDC), which is responsible for dispatch of power from generating plants to the DISCOs.

Pakistan's power generation mix is diversified, comprising hydropower plants, thermal power plants, nuclear power plants, and renewable energy power plants, including wind, solar, and bagasse/biomass power plants. For the remote areas of Balochistan province, Pakistan also imports electric power from Iran. The Central Power Purchase Agency (CPPA-G) undertakes the power procurement from public/private power plants on behalf of DISCOs for all of Pakistan except for the geographical region of Karachi, which KE is responsible for.

The total power generation from public sector power plants in the country during FY22 was 79,034.77 gigawatt hours (GWh), which is 51 percent of total generation. Total generation from private sector power plants, including KE, has been recorded as 74,839.44 GWh, which is 49 percent of total generation. In FY22, CPPA-G's total generation was 143,108.69 GWh, comprising 35,546.28 GWh (24.8 percent) from hydro, 82,604.62 GWh from thermal sources (57.7 percent), 18,247.77 GWh (12.7 percent) from nuclear, and 6,195.66 GWh (4.3 percent) from renewables including wind, solar, and bagasse.[111]

The Water and Power Development Authority (WAPDA) is a public sector entity that owns and operates 23 hydroelectric facilities, with installed capacity of 9,443 megawatts (MW). Thermal power is generated through G\gas (57 percent), coal (27 percent), and furnace oil (15 percent). The public sector owns and operates around 82 percent of the total installed capacity of thermal plants.

The provincial governments and special regions also own and operate power generation assets through their respective energy departments. The government of Punjab has contributed an additional 1,820 MW into the national grid, including 500 MW solar photovoltaic (PV) and 1,320 MW coal power. It has also initiated solarization of public sector buildings such as schools, healthcare facilities, and offices. The Energy Department of Sindh is pursuing development of wind and solar PV through private sector investment and is initiating work related to a total of 400 MW solar plants at three locations. It is also working on solarization of public sector buildings and village electrification through standalone PV-based solar home systems. The Government of Sindh has completed its first 132 kilovolt (kV) transmission line of 95.47 kilometers. Pakhtunkhwa Energy Development Organization (PEDO) is the organization established by KP province to identify and explore the immense hydel potential located in the province. PEDO presently operates seven hydropower projects with a total capacity of 161.2 MW, and eight hydropower plants with a total capacity of 476.36 MW are under construction. PEDO has undertaken solarization of villages, mosques/places of worship, and public sector buildings such as schools and healthcare facilities; construction of mini-grids; and setting up off-grid micro-hydropower plants at streams/canals. The Balochistan energy department has initiated the process of private sector participation by issuance of Letters of Intent (LOIs) to 16 companies for developing 750 MW solar PV and 10 LOIs for developing 500 MW wind power projects. However, the construction works have not started. Special regions operate their respective electricity boards for distribution of power from the national grid through 11 kV and 400 voltage (V) lines. They also have both off and on-grid hydro generating facilities.

Petroleum Sector: The petroleum sector in Pakistan is a mix of both public and private sector entities. The public sector entities come under the domain of the federal government. The Petroleum Division of the Ministry of Energy performs the coordination. Provincial governments play a limited role and are primarily consulted on policy related matters.

Oil Sector: Pakistan's oil refining capacity reached an all-time high of 19.410 million tons/year in 2020 from five main refineries: Pakistan Refinery Ltd, Par-Arab Refinery, National Refinery Ltd, BYCO Petroleum Ltd, and Attock Refinery Ltd. Refineries are primarily owned by the private sector. There are more than 60

111 National Electric Power Regulatory Authority. 2022. "State of Industry Report 2022."

oil marketing companies with their own multiple oil storage depots and facilities in different areas of Pakistan. As per prevailing policy of the government and licensing conditions of Oil and Gas Regulatory Authority, every oil marketing company is required to develop a minimum storage of 20 days' worth of its proposed sales, and to ensure to maintain the requisite stocks to meet its requirements across the country.

Product distribution is largely by road network, but around 35 percent is distributed through cross country pipelines. The three sectors that depend on petroleum products are transportation, power generation, and industry, with 59 percent, 32 percent, and 8 percent use respectively of petroleum products. The crude oil and product pipeline network covers over 2,000 kilometers.

Gas Sector: Natural gas is a major contributing fuel in the country's energy mix. The demand for natural gas—particularly by residential, fertilizer, and power sectors—has increased over the years, causing more pressure on limited indigenous gas supplies. Indigenous gas production has declined and the deficit between production and consumption is partially being met through regassified liquefied natural gas imports, whose share in natural gas supplies increased to 29 percent in FY20.

The country has a huge gas pipeline transmission network of 13,452 kilometers and a distribution network of 177,029 kilometers providing natural gas to domestic, industrial, commercial, and transport sectors. Two state-owned companies, Sui Northern Gas Pipelines Ltd and Sui Southern Gas Company Ltd, distribute about 78 percent of the total natural gas production to consumers. The state-owned Mari Gas Company Ltd supplies 12 percent while independent systems supply 10 percent. There are around 122 liquefied petroleum gas marketing companies and around 4,000 compressed natural gas stations across the country.

Upstream Oil and Gas: The two main national oil and gas companies, Oil and Gas Development Corporation Ltd and Pakistan Petroleum Ltd, and various international oil companies and domestic firms operate in the upstream sector. Current oil production is around 88,000 barrels per day. Recoverable gas reserves are around 21 trillion cubic feet. Potential tight gas reserves are about 40 trillion cubic feet.

Assessment of Disaster Effects: Damage and Loss Estimates

This assessment is based on the information provided by the focal point of the Power Division, Ministry of Energy, for federal government establishments and from the respective energy departments of the provinces and special regions. No information was provided by the Petroleum Division, Ministry of Energy.

Power Sector: Distribution has been most affected, and seven DISCOs have sustained physical and operational damage. They are Peshawar Electric Supply Company, Tribal Electric Supply Company in KP, Multan Electric Power Company, Gujranwala Electric Power Company in Punjab, Sukkur Electric Supply Company, Hyderabad Electric Supply Company in Sindh, and Quetta Electric Supply Company in Balochistan. Islamabad Electric Supply Company, Faisalabad Electric Supply Company, and Lahore Electric Supply Company were unaffected.

The majority of the damages identified by DISCOs relate to the 11 kV high tension lines, 400 V low tension lines, and distribution transformers used for distribution to consumers. Poles, structures, conductors, cables, hardware, and energy meters associated with the distribution lines have been damaged. In Hyderabad, Sukkur, and Quetta, the secondary transmission lines of 132 kV have also been damaged,

causing interruptions in supply from the national grid. Damages have also been reported to the civil infrastructure under the jurisdiction of DISCOs.

NTDC has reported damages to 13 towers of its 220kV transmission network; 12 towers of Quetta–Sibbi transmission line and one tower of Dadu–Khuzdar were also damaged. NTDC also reported collapse of boundary walls of its grid stations at Loralai, T.M. Khan, Rohri and Hala Road, and Hyderabad.

WAPDA has reported partial damages to three of its hydropower plants—Duber Khwar, Golen Gol, and Gomal Zam. Damages to WAPDA's hydropower plants still under construction have not been reported.

PEDO has reported damages to 114 off-grid micro/mini-hydropower plants and to two on-grid micro/mini-hydropower plants—Ranolia and Duber Khwar. Partial damages have been reported to around 300 solar PV installations in schools and basic health units in KP province. In Punjab, solar installations of 217 schools in Multan, Rahim Yar Khan, and Rajanpur districts have been partially damaged. Sindh has reported partial damage to its operated 95 kilometers transmission line between Noori Abad power plant and KDA grid, Karachi. Balochistan has not reported any damage to its power sector assets.

Petroleum Sector: Major damages related to building infrastructure in Balochistan and Sindh have been reported. The distribution pipelines of Sui Southern Gas Company have been partially damaged, with around 14.5 km in Balochistan and 2.8 km in Sindh affected. Two gas distribution pipelines to Quetta have been damaged. The refineries and gas exploration companies have suffered some minor infrastructure damages as well as loss of revenue due to decrease in sales; however, this has not been reported as the losses due to floods are covered under their insurance policies subject to a certain percent of deductibles.

Damage Quantification: Damage and loss estimates were gathered from the relevant companies. Values were assessed for reasonableness and compared against available pricing data. Damage estimates are based on replacement cost. Losses reflect a reduction in earnings due to loss of production or reduced business activity.

TABLE 27. ENERGY INFRASTRUCTURE DAMAGE AND LOSS SUMMARY

	Damage		Loss		Needs	
Region	PKR Billion	US$ Million	PKR Billion	US$ Million	PKR Billion	US$ Million
Balochistan	-	-			-	-
KP	11.1	51.9			14.5	67.4
Punjab	0.02	0.07			0.02	0.08
Sindh	0.09	0.4			0.11	0.5
Cross-provincial	6.7	31.1	0.5	2.5	8.5	39.4
Special Regions	1.5	7.2			2.0	9.3
Total	19.5	90.6[112]	0.5	2.5	25.1	116.7

112 Due to the utilization of a different conversion rate, the Pakistan Floods 2022-- Post-Disaster Needs Assessment (main report) reported the total damage to the energy sector as US$88 million while this document reports the total damage as US$90.6 million. The PKR remains the same in both documents.

Power Sector: Flood-related damage and loss in the power sector totals PKR 17.4 billion (US$81 million). Losses pertain to the loss of revenue to the DISCOs.

Petroleum Sector: Total reported damages are PKR 2 billion (US$9.3 million). Damages are primarily reported from the transmission and distribution pipeline network of Sui Southern Gas Company in Sindh and Balochistan.

Linking the Effects to the Human Impact

The damage and needs assessment for the energy sector focuses on the three main subsectors of power, oil, and gas. Subsistence fuels (wood and dung) are not included in the scope. In Pakistan, women are key users and managers of energy in their domestic and productive work, being affected on a day-to-day basis by the absence of clean and accessible energy sources and technologies, especially in rural areas. Access to energy therefore reinforces the process of economic empowerment of people: it enables their productive work to become more efficient and it facilitates better market access through support for telecommunications and information technology. In addition, it generates new job options within the energy sector and its institutions; reduces the time of care tasks, freeing women from these responsibilities; and generates new opportunities that complement the recognition, reduction, and redistribution of unpaid care policies. Although a reduction in actual time for cooking and doing laundry could be drastically reduced (as through better access to water), some tradeoffs might appear. These would relate to changing consumption patterns as the country moves to higher incomes that, in turn, increase the demand for energy and for new activities and higher skilled jobs. Reduction of unpaid care work should be accompanied by other policies that aim to redistribute care work in the household, but also between households, the private sector, and government.

It should be noted, however, that more than 40 million people remain without access to electricity, and half the population lacks access to clean cooking facilities.[113]

Recovery Needs and Strategy

The basic recovery strategy for the energy sector has three priorities. The first priority is to restore basic services conditions; the second is to rehabilitate supporting infrastructure; and the third is to restore projects that were completely destroyed or under construction. As there are no formal institutional arrangements for risk management and mitigation strategies, and no existing disaster risk reduction or climate proofing program for the energy sector, the recovery interventions include recommendations to formulate policies and standard operating procedures (SOPs). There are annual development programs, such as the Public Sector Development Program, for all the Public Sector Enterprises. Special development funds are also available for new village electrification and improvement of oil logistics.

Estimation of Recovery and Reconstruction Needs: Immediate needs for the power sector are PKR 22.6 billion (US$105.2 million) covering damages to DISCOs and provinces. Needs for the petroleum sector are PKR 2.4 billion (US$11.2 million). Insurance cover for both public and private sector companies has not been factored into these estimates. Rehabilitating the existing infrastructure of distribution and of micro/mini-hydropower plants with disaster resilient design improvement in order to align with build-back-better principles is under consideration.

113 International Energy Agency (dataset). "Pakistan." *https://www.iea.org/countries/pakistan*.

TABLE 28. ENERGY SECTOR RECOVERY AND RECONSTRUCTION NEEDS ESTIMATES

Intervention/Activity	Short (Up to 12 Months)	Intermediate (Up to 3 Years)	Long (Up to 5 Years)	Priority (Rank 1–5)	Cost in PKR Billion	Cost in US$ Million
Fast track infrastructure restoration	x			2	5.6	26.3
Reconstruct, repair, and rehabilitate damaged facilities	x			3	5.4	25.0
Fast track procurement	x			4	4.7	21.9
Provide renewable energy systems to provide power to communities that are cut off	x			1	1.9	8.8
Establish emergency SOP, including disaster management, stores back-up, prioritization, costing, providing renewable power equipment as emergency supply to cut-off areas	x			5	0.9	4.4
Review the distribution network design to make it more resilient to natural hazards		x		1	2.5	11.7
Rehabilitation of micro/mini-hydroelectric power plants based on climate resilient designs		x		2	2.1	9.8
Implement SOP for emergencies		x		3	0.5	2.4
Long-term development planning for power generation, transmission, and distribution improvement program, increase power supply coverage, explore alternate sources of energy			x	1	0.8	3.9
Long-term sustainable development			x	2	0.6	2.7
Total					25.1	116.7

Limitations

Data collection and validation in the energy sector was a challenge considering that both the power and oil/gas sectors have entities working under the federal Ministry of Energy and there was no direct interaction with any transmission or distribution utility. Some of the key challenges include:

- The non-availability of real time data on power distribution, which made it difficult to distinguish between direct and indirect losses.
- The power and gas transmission and distribution companies did not follow data collection templates.
- The same lumpsum cost has been provided as damage and recovery, suggesting replacement cost rather than recovery cost. There is also no consideration for inflationary pressures and design changes.
- No data was received from the Government of Balochistan. No recovery cost has therefore been considered for any energy assets owned and operated by the provincial government.
- No data regarding the oil sector was submitted by the Ministry of Energy (Petroleum Division).

WASH, Municipal Services, and Community Infrastructure

Pre-floods Context and Baseline

The water, sanitation, and hygiene (WASH) services in Pakistan have remained weak and suffer mostly from issues of limited coverage/access, quality, and sustainability of services. The root cause of most issues in the WASH sector is poor governance due to overlapping institutions and weak technical capacities, which negatively impact already insufficient investment. Historically, municipal service delivery has been a local government function, but WASH infrastructure is mostly provided by provincial governments through the Public Health Engineering Department (PHED) and often maintained by them in rural areas, resulting in conflicts, gaps, and overlaps. In the 2001 Local Government Act, the function was further devolved to local governments, but they were not provided the skilled staff, management capacity and systems, or operating budgets to do the job.[114] This justified the continued involvement of the provinces in the sector. Non-governmental organizations (NGOs) and community-based organizations have also provided WASH related facilities under a broader scheme known as Community Physical Infrastructure (CPI), either through vertical government programs[115] or directly to households. Key aspects of public awareness and hygiene education are conspicuously lacking in the sector, resulting in low hygiene standards and the inappropriate use and wastage of resources. Furthermore, almost 62 percent of the children in the country are anemic, with higher prevalence in rural and peri urban areas.[116] Even before the floods of 2022, infant mortality rates stood at 54 per 1,000 live births, a large proportion of which were related to waterborne diseases.[117] Table 29 provides the key indicators of the sector.

Municipal water supply is mostly intermittent and not potable; only 22 percent of households with access to water are connected to the network, with huge regional disparities. While 58 percent of connected households have more than six hours of water a day in Punjab, the figure is just 7 percent in Sindh and 2 percent in Balochistan.[118] Sewerage services are inadequate with most households not connected to any system; and 15 percent of rural inhabitants have no toilet.[119] With hardly any sewage treatment plants or sanitary landfills, the broader urban environment is excessively polluted. From the public sector budget, currently about PKR 1,390 per capita is being spent on water and sanitation in Pakistan, which is about 1 percent of gross domestic product.

In Pakistan, groundwater is the predominant source of water, wherever available. However, some large cities, such as Karachi and Faisalabad, and many rural areas rely upon surface water from rivers and canals, as ground water is brackish in about a fourth of the country. The majority of rural inhabitants

114 More recently, local governments have been further affected by the absence of elected councils and nazims.
115 Federal and provincial government schemes executed through the member of national assembly or member of provincial assembly.
116 UNICEF. "Nutrition." https://www.unicef.org/pakistan/nutrition-0.
117 World Bank (dataset). "Mortality Rate, Infant (per 1,000 Live Births) – Pakistan." *https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=PK*.
118 World Bank. 2018. "When Water Becomes a Hazard: A Diagnostic Report on the State of Water Supply, Sanitation, and Poverty in Pakistan and Its Impact on Child Stunting."
119 Government of Pakistan. "Pakistan Social and Living Standards Measurement Survey, 2019–20." Pakistan Bureau of Statistics, Islamabad.

rely on groundwater sources such as boreholes, springs or unsafe shallow wells and rainwater ponds, with municipalities hardly providing any piped water. Apart from overall poor service delivery, and regional disparities, another key issue is the extremely low tariff and poor cost recovery, making the services unsustainable.

TABLE 29. KEY INDICATORS FOR WATER SUPPLY AND SANITATION

Sources of Drinking Water Supply (% of Households)							
Region/Province	**Tap**	**Hand Pump**	**Motorized Pump**	**Dug Well**	**Tanker**	**Filtration Plant**	**Others**
Pakistan (Total)	**22**	**23**	**30**	**3**	**4**	**20**	**7**
Urban	36	7	24	1	6		
Rural	14	33	34	5	2		
Punjab	**13**	**22**	**42**	**1**	**3**	**18**	**2**
Urban	18	6	33	0.5	5	34	3
Rural	9	31	47	1	2	8	2
Sindh	**35**	**36**	**9**	**4**	**4**	**2**	**10**
Urban	57	10	10	0.4	7	3	14
Rural	9	69	8	8	2	1	4
KP	**30**	**13**	**29**	**9**	**1**	**0.18**	**17**
Urban	50	6	36	5	1	0.5	3
Rural	27	15	28	10	1	0	20
Balochistan	**32**	**4**	**20**	**9**	**17**	**0.34**	**18**
Urban	55	1	12	0.7	30	0.2	2
Rural	24	4	24	12	13	0.4	23
Special Regions	Data not available						

Source: Pakistan Social and Living Standards Measurement Survey (PSLM), 2019–20.

Assessment of Disaster Effects: Damage and Loss Estimates

Nature and Extent of the Damage: Damage to WASH related infrastructure varied from the gravity-based schemes in mountainous northern region to the pumped-driven boreholes or surface water extraction schemes on the plains in the southern provinces. In mountainous districts, damage was severe due to the flash floods and buildings, machinery, and pipework were washed away. At lower elevations, primarily in Sindh, damage from inundation typically affected tube wells, pumping machinery, electric and electronic equipment, pipe distribution networks, street pavements, and sewerage and drainage

systems. The majority of the damaged schemes require rehabilitation, cleaning and disinfection, and repair of damaged components. Table 30 summarizes the number of damaged WASH systems, including drainage-related infrastructure.

TABLE 30. NUMBER OF DAMAGED WASH SYSTEMS

Province	Total Schemes/ Small Works	PHED		Local Government		NGO/Community/Private	
		Water Supply	Sanitation	Water Supply	Sanitation	Water Supply	Sanitation
Balochistan	**456**	358	-	9	89		
KP	**1,079**	794	2	45	23	215	-
Punjab	**86**	56	18	6	6	-	-
Sindh	**5,318**	2,471	2,190	275	292	2	88
Special Regions	**121**	97	-	16	8	-	
Total	**7,060**	**3,776**	**2,210**	**351**	**418**	**217**	**88**

Source: Data provided by the provinces, on a standard template. Reported private/community infrastructure data was incomplete and estimated separately using PSLM-based estimates.

Damage Reported and Institutional Shares: Across all provinces, a total of 7,060 public sector schemes were reported partially damaged or completely destroyed, which included 4,344 water supply and 2,716 sanitation schemes. Out of the damage data reported, most of the WASH facilities were constructed and operated by the PHED, while only 351 water supply and 418 sanitation schemes were operated by local governments (almost 10 percent). The CPI schemes implemented through vertical programs, or by communities, private individuals, and NGOs, were low-cost and therefore more vulnerable to natural disasters.

TABLE 31. TYPE AND COST OF DAMAGED PUBLIC WASH SCHEMES

Category	No. of Schemes Damaged	Assessed Cost (PKR Million)	Assessed Cost (US$ Million)
A. Water Supply	**4,344**	**17,865**	83.2
B. Health and Sanitation	**2,716**	**22,215**	103.4
Drainage	110	3,043	14.2
Paved Streets	169	7,149	33.3
Sanitation	2,320	11,783	54.9
Solid Waste	117	239	1.1
Total	**7,060**	**40,079**	**186.6**

TABLE 32. SUMMARY OF WASH SECTOR DAMAGES AND RECOVERY COST

Sector	Damage		Loss		Recovery Needs	Recovery Needs
	(PKR Million)	(US$ Million)	(PKR Million)	(US$ Million)	(PKR Million)	(US$ Million)
Public						
Balochistan	3,176.7	14.8	1,066.9	5.0	4,606.2	21.4
KP	3,904.0	18.2	299.9	1.4	5,660.8	26.4
Punjab	1,268.9	5.9	85.1	0.4	1,839.8	8.6
Sindh	31,611.0	147.2	6,459.9	30.1	45,836.0	213.4
Special Regions	118.8	0.6	6.5	0.03	172.2	0.8
Subtotal	**40,079.3**	**186.7**	**7,918.3**	**36.9**	**58,115**	**270.6**
NGOs/Community/Private						
Balochistan	6,751	31.4	2,368.90	11.0	979.9	4.6
KP	9,109	42.4	731.2	3.4	1,322.30	6.2
Punjab	8,492	39.5	594.7	0.2	1,232.60	5.7
Sindh	58,706	273.3	12,534.70	58.4	8,521.70	39.7
Special Regions	277	1.3	16.00	0.07	40.20	0.2
Subtotal	**83,335**	**388.0**	**16,245**	**75.6**	**12,097**	**56.3**
Grand Total	**123,413.90**	**574.7**	**24,164**	**112.49**	**70,211.71**	**326.9**

Methodology of Assessment, Key Assumptions, and Approximations: Data on damage to CPIs was collected through the rural support programs and national and international NGOs working under the platforms of the National Humanitarian Network and Pakistan Humanitarian Forum. The data reported was incomplete. Public sector data was provided on a standard template by the PHED and local governments of each province. However, the level of detail and specifications in all data forms was not uniform. Some provinces reported lump sum cost of schemes without any detail on specifications or scope. Sample schemes were physically validated from all provinces. Sample data and population coverage was used to estimate specification and scope of schemes where details were not provided. In other cases, informed assumptions were made for reasonable estimation and cross referenced with damage data provided in other sectors.

The number of households have been estimated using the average household size (7 persons) as per the latest census (2017). Private and CPI damages include households that do not have tapped water according to the latest PSLM data. Damage cost per household for private or CPI schemes is assumed to be the same as the average household damage cost of public sector schemes as reported by each province. To estimate CPI damages, PSLM data was cross referenced with pre-flood and post-flood imageries of inundation and triangulated with data reported in other sectors, such as housing. Based on these assessments, 65 percent of household without tap water were assumed to be served by CPI or private infrastructure and the losses were calculated accordingly.

Photo credit: Asianet-Pakistan

The public sector foregone income has been estimated at an average of PKR 240 (US$1.1) per month for each household for a period of three months. An estimated 1.5 million households with lost or damaged water supply systems are expected to incur additional losses due to this disruption. The losses per household are estimated based on the cost of provision of water during relief and recovery phase (three months on average). The cost per household has been estimated at PKR 2,500 (US$11.6) per month for three months for urban areas and PKR 1,250 (US$5.8) per month for semi-urban and rural areas.[120] An estimated 1.2 million additional households are expected to be exposed to an increased risk of disease because of poor sanitation, poor water quality, and limited water supplies. The estimated loss per household is assessed as an extra cost of PKR 2,000 (U$$9.3) per household per month for three months on average. This is the extra cost that each household is expected to spend on health care during this period.

The needs have been adjustment to cater for the post-flood replacement cost by 25 percent due to inflation and other external (dollar appreciation) and internal (material shortages and inflation) factors. The premium for build back better and smarter is estimated at 20 percent due to the need for innovations to reduce operation costs and relocation and restructuring required to increase resilience of reconstructed WASH schemes. The cost of re-establishment of WASH services for private and community schemes is assumed as a subsidy that equals 5 percent of the private housing needs/subsidy, excluding the 35 percent of houses that were destroyed or damaged as their WASH services would be provided by the public sector or utilities.

Linking the Effects to the Human Impact

Vulnerable Groups: Although the floods have affected all sections of society, vulnerable groups are disproportionally impacted by poor hygiene, sanitation, and water services. These include women—especially those of childbearing age and those who are pregnant or lactating—and children. Women have particular needs for hygiene during menstruation that are often neglected, including easy access to safe, private water and sanitation facilities, appropriate menstrual materials and supplies, discrete disposal and waste management, and basic information on menstrual hygiene. Taboos surrounding menstruation are a significant challenge in addressing menstrual hygiene management in emergencies, which can hinder adequate assessment and identification of contextually appropriate solutions.[121]

Unsafe and unsanitary water increases the risk of waterborne diseases, including diarrhea, typhoid, cholera, worms and parasites, and trachoma. These risks are particularly acute for children. Flood-affected areas are also at increased risk of malaria due to large pools of standing water. In the absence of appropriate healthcare facilities, malaria can enhance the risk and level of morbidity and mortality in the affected communities. Ailments and ill health, even temporary, in adult males have an additional impact in terms of lost income, which further erodes the ability of poor families to acquire food and medicines. These vulnerabilities must all be appropriately addressed during the relief, early recovery, and reconstruction phases of the flood response.

120 Estimates are based on discussion with utilities, average water consumptions, and cost of sourcing water bowsers for providing water in urban and rural settings. PKR 2,500 (US11.6) is the estimated cost of single bowser used in the calculation.

121 Schmitt, Margaret L. et al. 2017. "Understanding the Menstrual Hygiene Management Challenges Facing Displaced Girls and Women: Findings from Qualitative Assessments in Myanmar and Lebanon." Conflict and Health 11 (19).

Recovery Needs and Strategy

The Strategic Vision for the recovery and reconstruction plan is "the provision of uninterrupted and functioning WASH infrastructure for communities that is resilient and operationally sustainable." WASH facilities are fundamental to health needs, hence the sector requires quick and robust recovery, with clean drinking water taking precedence. The objective should be to re-establish services and promote their sustainability so that investment in recovery can withstand future disasters. Short-term priorities are to clean up and undertake priority repairs; followed by planning and designing for better or smarter replacements or modifications to infrastructure. Hygiene promotion will be essential to reduce health risks but should also be used to encourage consumer demand for water and sanitation services in the longer term, as it remains a weak link in the sector. A key challenge during the recovery and reconstruction process is the planning of incremental improvements compared to resource availability. The recommended investment to build back better will also initiate essential reforms undertaken hand-in-hand with the recovery actions.

The total recovery needs are estimated at over PKR 70 billion (US$327 million). The recovery costs by sector and by province are presented in Table 33.

TABLE 33. SUMMARY OF WASH SECTOR RECOVERY NEEDS

Sector	Needs (PKR Million)	Needs (US$ Million)
Public		
Balochistan	4,606.20	21.4
KP	5,660.80	26.4
Punjab	1,839.80	8.6
Sindh	45,836.00	213.4
Special Regions	172.20	0.8
Subtotal	**58,115**	**270.6**
NGOs/Community/Private		
Balochistan	979.9	4.6
KP	1,322.30	6.2
Punjab	1,232.60	5.7
Sindh	8,521.70	39.7
Special Regions	40.20	0.2
Subtotal	**12,097**	**56.32**
Total	**70,211.71**	**326.87**

Sector Policy Guidelines: The federal and some provincial governments have developed and notified sectoral polices for WASH. These include the Pakistan National Water Policy 2018, the Pakistan National Sanitation Policy 2006, and the Water Acts recently approved by some provinces. These policies and acts, as well as the Sustainable Development Goals framework, provide adequate guidance on effective rehabilitation and on building back better.

Recovery Strategy: Recovery should incorporate resilience principles for both reconstruction and operation of WASH services, using improved techniques, innovation, and new technologies, with due regard for local capacities. WASH is a critical human need so recovery has to be expeditious, which may require special dispensation and arrangement to fast-track approvals and delivery mechanisms. Developing basic guidance and a manual and delivering directly through communities could be one such option for reconstructing CPI and private WASH infrastructure. The approach could also include cash for work programs to support jobs and livelihoods or direct subsidies attached to the housing reconstruction program. For larger public sector schemes, strategic packaging of rehabilitation works based on geographical grouping and principles of economies of scale is expected to expedite implementation. Targeting and prioritizing schemes that serve the most vulnerable communities would reduce the human impact of the disaster.

Strategic Direction: The following aspects constitute the WASH sector's strategic recovery direction:

- Stakeholder engagement in identifying the needs and priorities as well as the recovery process of affected populations - adherence to a community driven and people centric approach, whereby community members and support partners take the lead in prioritization and rehabilitation.
- Further data and analysis to inform a resilient, inclusive, and prioritized recovery approach and plan .
- Inclusion of sociocultural, cross-cutting aspects of disaster recovery, targeting vulnerable segments and mainstreaming gender concerns in the design and planning of the recovery process.
- Informed recovery to guide and support mainstreaming resilience in the reconstruction efforts of the affected population and institutions.
- Inclusion of governance (institutional arrangements) and operational requirements (tariffs, system calibration/metering, etc.) in the design and planning process of recovery to ensure sustainability.
- Sustainable Service Delivery: In the medium to long term, it is advisable to improve non-infrastructure-related business processes, including proper management and maintenance. This would require skilled management, information and accounting systems, staff training, disaster preparedness, service and capital investment planning, energy audits, hygiene awareness, and tariff policy reforms.

Prioritization: Setting priorities for the WASH sector is challenging because facilities are equally important for all communities in all areas. Rehabilitation should nevertheless prioritize the most vulnerable and the poor, who cannot otherwise finance these services. However, schemes that have maximum impact and serve higher numbers of vulnerable communities or are distant from nearby alternative sources also require prioritization in the earlier phases. Remediation of contaminated drinking water sites should be prioritized during recovery. System operators should analyze documentation of the flood events to explore structural and management weaknesses that gave rise to system failure and identify critical areas that need strengthening.

TABLE 34. WASH PRIORITIZATION AND SEQUENCING

Intervention/Activity	Short (Up to 1 Year)	Intermediate (Up to 3 Years)	Long (Up to 5 Years)	Priority (Rank 1–5)	Comments	Cost PKR Million (US$ Million)
Cleaning, disinfection, repairs, and interim arrangement for WASH in priority areas. Disaster and vulnerability assessments of WASH.	X			1	Water supply fully restored and alternate temporary arrangements in place. Immediate repair of sanitation facilities completed.	20,893 (97.3)
Resilient WASH facilities, capacity building, WASH education.		X	X	2		25,318 (117.9)
Larger, more complex schemes requiring complete reconstruction and resizing. Reforms, capacity building, regulations to sustain operation.		X	X	2		24,000 (111.7)
					Total	**70,211 (326.9)**

Short Term: Short-term actions include system de-clogging/cleaning, priority repairs, and, most importantly, review of the models for managing capital investment and service delivery in rural and urban areas. It will be necessary to identify the most vulnerable areas and schemes that serve large areas. Re-thinking approaches to managing water supply infrastructure should go hand-in-hand with an expedited program for repair and reconstruction. Further studies and analysis on climate disaster vulnerabilities of the affected area should be undertaken to inform the recovery plan and design of facilities to be reconstructed and resized.

Medium Term: It will be necessary to develop and revise design parameters for resilient reconstruction. Options for reconstruction should factor in the scope and size of schemes to accommodate population growth and operational costs, and operational arrangements. To improve quality, use, and operation of WASH services, investment would need to be accompanied by awareness raising as well as mechanisms of community and private sector involvement in planning, implementing, and operating WASH services. The majority of water, drainage, and sanitation schemes should be designed and completed in the medium term; however, work on capacity building, awareness, and sustainable operational mechanisms is expected to continue beyond the medium term.

Long Term: This phase should focus more on reconstructing and repairing street pavement and fully reestablishing solid waste management systems. This phase should focus on establishing baseline service data for performance monitoring, asset inventories, developing standard guidelines for building back better, and mainstreaming and integrating the reconstructed scheme in the regulatory and tariff improvements that are currently being planned in the sector. At the system level, reconstruction efforts could further inform and improve sector and institutional policies to enhance access, quality, resilience, and sustainability of WASH related infrastructure and services. Due to the immense size of the recovery

needs, government financing will need to be supplemented by both the capacity and resources of communities and the private sector. The government may need to consider appropriate partnership arrangements to attract outside resources.

Limitations

Key challenges faced in this WASH sector assessment include:

- Data collection templates not strictly followed by all government agencies, nor well understood, so the data quality varied and large part of the assessment had to be based on secondary data and assumption that were triangulated with other sector and validated through imagery.
- There was a general lack of data on asset inventories, baselines for infrastructure or service levels that limited options to undertake deeper analysis.
- Many areas in Sindh and Balochistan are still inundated, and their analysis based on secondary data cannot be easily validated and triangulated, as data for these districts is missing across sectors.
- With no centralized source for information on community infrastructure all information had to be based on secondary data.
- In many cases, the lumpsum cost of the schemes has been given as damage and with little detail on the structural components and specifications.

Photo credit: UNDP

Productive Sectors

Photo credit: UNDP

Agriculture, Food, Livestock and Fisheries

Pre-floods Context and Baseline

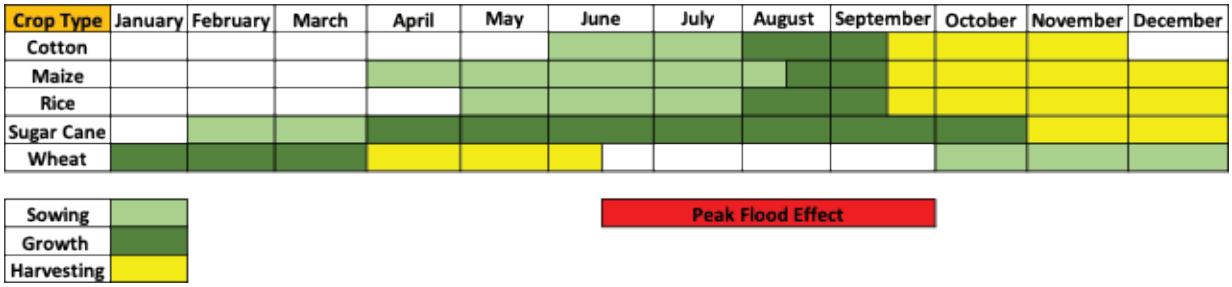
The agriculture sector, represented by the crop, livestock, fisheries, and forestry subsectors, is the main contributor to employment (28.4 percent male and 67.9 percent female)[122] and foreign exchange earnings of the country. The sector contributes 22.7 percent to GDP and provides employment to around 37.5 percent of the labor force in the country.[123] During 2021–22, the agriculture sector recorded a remarkable growth of 4.4 percent, and surpassing the previous year's growth rate of 3.5 percent.[124] This growth was mainly driven by high yields, attractive output prices and supportive government policies, better availability of certified seeds, pesticides, and agriculture credit. Out of a total agricultural area of 79.6 million hectares, 22.1 million hectares are cultivated. The rest of the territory is comprised of densely populated forests and rangelands.[125] The country has one of the world's largest contiguous irrigation systems with around 52 percent of its cultivated area irrigated.[126]

Despite the growth of the agriculture sector in the past year, climate change and other limiting factors remain a major threat to the full potential development of the sector. Deforestation and land degradation are major challenges faced by the country, causing substantial reduction in land productivity, and increasing rainwater runoff and the associated risk of landslides and flooding. Land degradation includes rising soil salinity that reduces the productive capacity of land and lowers low crop yields. This is mainly due to poor management of groundwater for irrigation and the absence of strict regulatory frameworks that have led to groundwater depletion. Furthermore, the use of traditional methods of cultivation and harvesting has led to low yields per acre. Access to market and financial credit, as well as poor road networks are challenges for farmers and livestock producers, especially in rural areas.

The crops sub-sector contributes 19.5 percent of the agricultural share of GDP and 4.4 percent of the country's overall GDP.[127] The subsector is has two main production seasons. The "Kharif" or "summer season" which occurs from April to November during the monsoon period. The main crops cultivated are cotton, rice, sugar cane and maize, in order of importance, followed by fruit plantations of date, mango and banana among others. The "Rabi" or "winter season" on the other hand, accounts for 55 percent of the total annual cereal output, especially wheat production.

122 Pakistan Labour Force Survey 2020–21
123 Pakistan Economic Survey, 2021–22, Economic Adviser's Wing, Finance Division, Government of Pakistan
124 Ibid
125 Pakistan at a Glance, FAO, 2022 *https://www.fao.org/pakistan/our-office/pakistan-at-a-glance/en/*
126 *https://data.worldbank.org/indicator/AG.LND.IRIG.AG.ZS?locations=PK*
127 Pakistan Economic Survey, 2021–22, Economic Adviser's Wing, Finance Division, Government of Pakistan

TABLE 35. SEASONAL CROP CALENDAR



Source: National Agromet Centre (NAMC), 2022[128]

The livestock sub-sector represents 61.9 percent of the agricultural share of GDP and 14 percent of the overall country's GDP[129]. The subsector recorded a growth of 3.2 percent in 2021–22 compared to 2.4 percent during the year before [130]. The total population of livestock is estimated at over 300 million animals[131]. Poultry (commercial and rural), represents the larger population of animals followed by goats, cattle, buffalo, sheep, and camels, in order of importance. Animal husbandry is the most significant economic activity in Pakistan's rural areas. More than 8 million rural families are engaged in livestock production and derive around 35–40 percent of their income from this sector. The poultry sector is one of the most important segments of livestock that provides employment to more than 1.5 million people in the country.[132] **Raising poultry is largely the role of women** and is a driving force for their economic empowerment and social well-being.

The fisheries sub-sector has a share of 1.4 percent of the overall agriculture value addition and accounts for less than 0.4 percent of GDP.[133] Fisheries employ a reported 390,000 people directly, and when secondary jobs such as processing, transporting, and retailing are considered, the number rises to between 900,000 and 1,800,000 jobs in total.[134] While the country has extensive resources of fresh and brackish water, aquaculture in Pakistan is limited in its variety and extent. The industry is dominated by carp, with small quantities of tilapia and trout. Marine and coastal aquaculture, such as shrimp farming, are almost non-existent.

128 *Crop Calendar. NAMC (pmd.gov.pk)*
129 Pakistan Economic Survey, 2021–22, Economic Adviser's Wing, Finance Division, Government of Pakistan
130 Ibid
131 Baseline provided by Ministry of National Food Security and Research, Government of Pakistan
132 Pakistan Economic Survey, 2021–22, Economic Adviser's Wing, Finance Division, Government of Pakistan
133 Ibid
134 *Revitalizing Pakistan's Fisheries, World Bank, 2018*

Assessment of Floods: Damage and Loss Estimates

Aggregate sector analysis

According to the results of the PDNA analysis, around **1,784,126 ha** (4,408,575 acres) of agriculture land have been adversely impacted and more than **800,000 animals have been lost** in the six affected provinces and their 94 districts. In addition, damages to public and private infrastructure such as government buildings, research centers, including animal shelters, fishponds and on-farm irrigation systems and equipment have been reported and are presented below.

The direct and indirect effects caused by the floods, including damage to and destruction of agricultural land and irrigation systems, increased salinity and siltation of lands, coupled with roads and farm access constraints, especially in Sindh, might jeopardize the start of the upcoming "Rabi" season for many farmers. Those farmers who will manage to restore their agricultural land through the removal of debris, cleaning and restoration of irrigation canals, and who have access to seeds and other inputs, might be able to plant in time or use short cycle varieties that can be planted later. For those farmers who are unable to restore their land and access agricultural inputs, the "Rabi" season and related production might be compromised. Issues such as waterlogging remain widespread in many areas of Sindh, and might take months, if not years to recover according to several discussions with local government counterparts. It is very difficult to estimate the loss of land and expected production losses for the "Rabi" season at present.

Damage to the Agriculture Sector: PKR 800 billion (US$3,725 million)

Crop: The total value of the damage was estimated at over **PKR 744,556 million**. Most of the damage recorded in the crop sub-sector is related to fruit trees (dates, apple, mangoes, grapes, pomegranate, and bananas) either washed away by flash floods or dying from prolonged water exposure, followed by damage to on-farm irrigation[135] and agriculture office buildings and seed storage facilities. Most of the damage under the crop sub-sector was registered in Sindh (76 percent) followed by Balochistan (22 percent).

Livestock: The total value of damage in the livestock sub-sector was estimated at **PKR 33,431 million**. The most affected province was Sindh reporting a loss of over 378,000 animals. The largest fatalities were experienced in the goat population followed by sheep, cattle, and buffalo. Balochistan was the second most affected with around 325,000 animals lost. Of this total amount, over 200,000 commercial poultry losses from the private sector were reported in the district of Lasbela alone. KP reported around 93,500 animal losses of which nearly half are commercial poultry. Other provinces reported approximately 2,150 deaths of mainly goats, sheep, and cattle. Punjab and the Special Regions were the least affected , with around 1,580 and 550 animal losses respectively, mainly of goats and sheep.

Most damages (both partial and full destruction) under the livestock sector mainly comprised of public infrastructure such as government offices and veterinary hospitals and clinics, followed by private animal shelters, and commercial poultry and dairy farms. Most infrastructure damages were registered in Sindh, followed by Khyber Pakhtunkhwa, Balochistan, and Punjab.

Fisheries/Aquaculture: The total value of damage in the fisheries and aquaculture sector was estimated at **PKR 22,182 million**. About 91 percent of the total amount of damage was reported in Sindh, followed

135 No data regarding on-farm irrigation were received from Sindh

by Balochistan, Khyber Pakhtunkhwa, and Punjab. Partial and total damages relate to public and private fishponds and fish/fingerlings stocks, hatchery facilities, laboratory equipment and production material such as incubators, generators, water tanks, pipes, and tubes were recorded. in Sindh, nearly 2,500 private fishponds were fully destroyed, whereas, in other provinces, about 250 large fishponds, private and public, were reported destroyed. Government hatchery fish facilities were reported destroyed mostly in Sindh and Khyber Pakhtunkhwa. We can therefore clearly indicate that most of the total amount of damages registered for this subsector are related to aquaculture amenities.

Aggregate change in economic flow in the sector and effects on service delivery
Total value of losses: PKR 1,986 billion (US$9,244 million)

Crop: Estimated production losses in the crop subsector was **PKR 1,536,777.1 million**. Cotton was the most affected crop, followed by rice, sugarcane, and fruit trees. Sindh was the most affected province (PKR 1,145 million), followed by Balochistan (PKR 319,048 million), Punjab (PKR 52,517 million), and Khyber Pakhtunkhwa (PKR 19,846 million). The most affected district was Sindh, mostly regarding rice, cotton, sugarcane, and dates production losses. In Balochistan, the most affected crops were rice, cotton, onion, fodder, and fruit trees. In Khyber Pakhtunkhwa, sugarcane, maize, and rice were the most affected crops, followed by Punjab with cotton, rice, and fodder, and by other provinces with wheat and potatoes, maize and millet.

Livestock: Estimated production losses in the livestock subsector was **PKR 442,263 million**. Sindh was the most affected province with equivalent PKR 265,028 million. Balochistan was the second most affected province (PKR 79,619 million), followed by Khyber Pakhtunkhwa (PKR 65,292 million), and Punjab (PKR 26,911 million). Livestock production losses from the death of animals include the failure of and reduction in meat, milk, eggs, and wool production, and fewer births. The spread of animal diseases such as foot and mouth disease (FMD) was also registered; and, coupled with lack of fodder, feed, shelters, and drugs, these diseases may limit production presently and in the future. These are the main assumptions that were used to estimate the final production losses in terms of dead and alive animal populations.

Fisheries/Aquaculture: Estimated production losses in the fisheries and aquaculture subsector was **PKR 6,499.5 million**. Sindh province reported over 100,000 acres of carp fishponds destroyed with equivalent production losses of (PKR 4,251 million) belonging mainly to the private sector. In Balochistan, production losses from private aquaculture facilities were reported at PKR 1,250 million, mainly in Lasbela district, KP, Punjab and other provinces following with PKR 395 million and PKR 378 million of losses respectively.

TABLE 36. SUMMARY OF DAMAGE, LOSS AND RECOVERY NEEDS IN AGRICULTURE SECTOR BY PROVINCE

	Damage		Loss		Recovery Needs	
Province	**PKR Million**	**US$ Million**	**PKR Million**	**US$ Million**	**PKR Million**	**US$ Million**
Balochistan	171,236.24	778.35	399,917.04	1,817.80	306,877.87	1,394.90
KP	11,158.61	50.72	85,535.93	388.80	30,167.54	137.13
Punjab	6,380.86	29.00	79,891.08	363.14	22,363.11	101.65
Sindh	610,489.09	2,774.95	1,414,580.98	6,429.91	493,148.26	2,241.58
Special Regions	904.83	4.11	5,614.38	25.52	1,577.39	7.08
Grand Total	**800,169.62**	**3,725.18**	**1,985,539.40**	**9,243.66**	**854,114.18**	**3,976.32**

Linking Effects to Impact

Agriculture constitutes a large proportion of export revenues and both formal and informal employment in the country. The harvest failure due to the floods, for the "Kharif" season, and loss of important productive assets such as livestock, will not only result in loss of jobs (for contracted and casual/wage laborers) and income (due to production losses), but will compromise the livelihoods and food and nutrition security of those affected, especially marginalized individuals and small-holders or households with sharecropping agreements.

The floods have added to the inflationary pressure on the economy which began in early 2021, and caused a significant decline in foreign exchange reserves, due to high import bills and scheduled debt repayments, as well as a strong depreciation of the national currency[136]. In August 2022, the Pakistan rupee (PKR) reached a record low at PKR 221 to the US Dollar, depreciating by 35 percent year-on-year[137]. The sharp depreciation of the national currency caused a significant rise in the domestic prices of imported food items, fuel, and energy.

Similarly, domestic prices of essential food items, such as wheat flour, rice, cooking oil, pulses, milk, and meat, have spiked since January 2022, with a sharp rise in wheat and wheat flour, pulses, vegetables, and livestock products prices during the peak of the floods in July–September 2022. High loss of food stocks in affected areas will continue to contribute to reduced supplies and high demand. Expected delays in the sowing of Rabi crops, particularly the staple crop-wheat, could reduce the availability of food during coming months. This would continue to increase the prices of basic food commodities and make access to food more difficult, particularly for low-income groups in hard hit areas. Low purchasing power is expected to continue for rural households because of lingering effects of high food prices, fuel prices and damages/losses to crops, livestock, livelihoods. Estimates suggest that food insecure population will increase from 7 million people[138] to 14.6 million[139] in the calamity struck districts across the provinces assessed.[140]

Recovery Needs and Strategy

The recovery needs and strategy were developed and prioritized according to the severity of damages and losses identified in the agriculture sector analysis. Several discussions were also held with key national authorities and various organizations working in this sector.[141] This approach enabled alignment and coordination with on-going recovery and reconstruction efforts, undertaken both by the government and other humanitarian and development actors, thus avoiding duplication of efforts. For example, in the case of recommended short-term recovery needs such as distribution of agricultural inputs (seeds, fertilizers, etc.), as well as animal feed and drugs, it was advised to scale-up on-going response activities implemented by national and international organizations rather than start "new" distribution campaigns.

136 GIEWS Special Alert N. 351, FAO, 2022
137 International Monetary Fund (IMF), 2022.
138 Based on Food Insecurity Experience Scale (FIES) data from PSLM 2019–2020
139 Estimates based on the extrapolation of Integrated Food Security Phase Classification (IPC) analysis (Sep–Dec. 2022), and data from the Multi-Sectoral Rapid Needs Assessment (MSRNA), WFP & FAO 2022.
140 Such estimate does not consider other provinces.
141 The agriculture sector team organized a validation exercise at the end of the PDNA analysis with the various provincial agriculture, livestock, and fisheries departments, as well as the Ministry of National Food Security and Research to present the results of the analysis and agreed on key recovery interventions for the various subsectors.

The agriculture strategy will be based on inclusive and participatory community-based approaches, with special focus on the poor and other vulnerable groups, as well as those displaced farmers. Given the loss of income resulting from the floods, many small and subsistence farmers, as well as livestock keepers, are now facing significant hardship to rebuild their livelihoods. The aims of the recovery and reconstruction efforts in agriculture are to revive economic activities across the sector and to strengthen farmers' capacity to be more resilient to similar future shocks in accordance with the principles of building back better. The preparation and implementation of a new agriculture census, which includes livestock and fisheries, is needed to support such efforts, considering the last one was conducted in 2010.

In the crop subsectors, short-term activities will address immediate needs by preparing for the incoming "rabi" season through land clearance and land preparation, distribution of agro-inputs (seeds and fertilizers) to small and medium farmers (owning up to 5 hectares of land). For those that missed the window for sowing traditional Rabi wheat, inputs to cultivate alternative crops should be provided. Provision of seedlings and restoration of orchards and fruit tree plantations shall also be considered. Further resources will be required to support farmers who went into debt, or became unemployed during the floods, by offering access to financial support.

Rehabilitation of irrigation schemes, including clearing and repairing watercourses, channels, and on-farm structures, should be implemented through grants to Community Organizations, including water users' associations. The Department of Agriculture and other public institutions should be encouraged to mobilize machinery and equipment to clear blockages in drainage and facilitate the flow of stagnant water. The placement of a moratorium on repair or reconstruction of illegal structures blocking drainage lines/waterways should be also considered.

In the intermediate to long term, various capacity building exercises should be conducted with small and medium farmers on risk mitigation practices such as support for ecofriendly and healthy climate smart agriculture, soil preservation, and innovative management of flood related diseases using forewarning systems (e.g. prevention of invasive pest/pathogens and weeds). Increasing disaster resilience will be achieved by improving land resource management, establishing new drainage systems, distributing resilient crops, increasing awareness about traditional disaster management, and introducing new technology adapted to local contexts. Crop insurance schemes should be also promoted.

In the livestock subsector, short-term activities will support the continuation and rehabilitation of animal production through a scaled-up provision of feed, fodder, veterinary drugs, as well as restocking of small animals (i.e., poultry), especially targeting women and the most vulnerable animal keepers. Access to financial support for the same groups of people shoul also be considered and expedited, together with restoration of destroyed animal shelters using BBB principles. At the same time, damaged public infrastructure such as offices, veterinary hospitals and clinics should also be repaired or rebuilt.

In the intermediate to long term, further resources will be required to restore the livestock economy, promote traditional breeds in selected zones due to their inherent resistance, develop area specific action plans for natural calamities (including assembly points, rescue, and development of low carbon/ climate resilient animal shelters). Capacity building for field veterinarians and livestock keepers on climate smart practices for livestock rearing shall be implemented together with awareness building and development of standardized weather/holistic hazards index-based livestock insurance systems targeting small holders and rural landless needs.

Reconstruction needs shall include restoration of assets at the individual/ community level, and support to the private sector (i.e., poultry/ dairy industry), who were also affected by the floods.

In the fisheries and aquaculture subsector, immediate short term recovery measures include the revival of aquaculture and fisheries systems to pre-flood levels. Rehabilitation of public facilities including hatchery, office buildings, and ponds is of extreme urgency. Capacity building on sustainable and climate resilience aquaculture practices are also recommended in the intermediate to long term.

TABLE 37. AGRICULTURE SECTOR RECOVERY MEASURES

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)	Cost	
					PKR Million	US$ Million
Crop						
Scale-up provision of inputs including seeds, fertilizers and already adopted/ short term cycle varieties for *Rabi* and late Rabi season to small and medium-size farmers (owning up to 5 ha of land).	X			1	30,819	143.47
Provision of inputs including seeds, fertilizers for the next *Kharif* season to small and medium-size farmers (owning up to 5 ha of land).	X			2	30,819	143.47
Provide support for land preparation/ rehabilitation and replanting of damaged orchards and fruit trees (including seedlings).	X	X			447,488	2,083.2
Provide financial support for small farmers to restart their activities for the upcoming agricultural seasons.	X			1	90,000	418.09
Provision of financial support for most vulnerable farmers to reduce their debt.	X				90,000	418.09
Support with rehabilitation of government infrastructures (renovation and improvement).	X			2	4,733	22.03
Support to improve on-farm irrigation (water channels/water management) to promote water availability using BBB principles.		X		2	10,033	46.70
Capacity building exercises in farm operations using Climate Smart Agriculture and Resilient Agriculture practices, which include water conservation and soil health restoration and management.	X	X		3	84	0.39
Support awareness building and development of standardized weather/ holistic hazards index-based crop insurance systems for the most vulnerable farmers living in hazard prone areas.		X		3	66	0.307
Improve agriculture research system to develop climate resilient and climate smart agriculture practices.		X		3	60	0.27
				Total	**704,103**	**3,277**

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)	Cost	
					PKR Million	US$ Million
Livestock						
Provide access to credit for small scale women livestock keepers, to restart their activities.	X			1	24,581	114.43
Scale-up the provision of animal vaccination – for both large and small animals.	X			1	64,298	299.33
Scale-up the provision of animal feed – for both large and small animals.	X			1	6,777	31.55
Restock of lost animals (especially poultry), for most vulnerable women and other small livestock keepers.	X	X		2	25,805	120.1
Rebuild animal shelters using stronger and more resistant materials and BBB principles; develop low carbon models and climate resilient animal shelters.	X			1	3,960	18.43
Support with reconstruction of government offices, vet hospitals and clinics.	X			2	164	0.76
Organize capacity building exercises for field veterinarians and livestock keepers on climate smart practices for livestock rearing.	X	X		3	50	0.2
Support to private sector, poultry and dairy industries.		X		3	2,200	10.24
Awareness creation and building of standardized weather/holistic hazards index-based livestock insurance systems targeting small holders and rural landless needs in the most hazards prone areas.		X	X	4	55	0.2
				Total	**127,890**	**595.39**
Fisheries						
Support with the rehabilitation of destroyed fishponds (private sector).	X			1	21,114	98.29
Support with rehabilitation of public facilities including hatchery, office buildings, and fishponds.	X			1	616	2.87
Organize capacity building exercises on sustainable and climate resilience aquaculture practices for government officials and fish farmers.		X		3	391.11	1.82
				Total	**22,121.2**	**102.9**
				Grand Total	**854,114**	**3,976.3**

Limitations

- Sector teams could not travel to the affected areas due to the limited amount of time. This resulted in a complete reliance on the information received from the provincial authorities without the possibility of undertaking ground-truth validation.
- No clear understanding of how data were collected and damages/losses were costed, or how repair was undertaken by provincial authorities. This point is linked to the one above.
- The agriculture and Livestock census is more than 10 years old. This might have resulted in an over or under estimation of some of the baseline data used.
- Late direct engagement with provincial authorities (Departments of Agriculture, Irrigation, Livestock, and Fisheries) due to the formal process agreed with the government; this led to a rush in the final compilation of the data and analysis of results.

Water Resources and Irrigation

Pre-floods Context and Baseline

Pakistan has suffered from 23 major floods between 1950 and 2020—almost one flood every three years. The Indus Basin Irrigation System is the largest irrigation system in Pakistan, providing and it provides water to more than 14 million hectares through a complex, expansive canal network comprising three reservoirs, 17 barrages, 12 inter-river link canals, and 45 irrigation canal systems with 58,500 kilometers of canals and over 107,000 water courses. Maintaining this vast infrastructure for sustained agricultural production is one of the key water management challenges for Pakistan. The Indus plain is highly susceptible to flooding due to a steep upper catchment and flat alluvial plains in the lower catchment area. Flood protection is primarily provided through hard infrastructure, which includes over 6,000 kilometers of flood dikes and numerous riverbank stabilization retaining walls. Unregulated settlement and infrastructure development in the floodplain have been exacerbated by weak institutions and enforcement of policies, making the population increasingly vulnerable to floods. Further, the flood protection infrastructure is subject to poor maintenance mainly due to the lack of a clear financial mechanism. Obstruction of drainage systems also contributes to the impact of floods.

However, floods also occur outside of the Indus Basin. The 18 river basins of Balochistan support agricultural activities mainly through spate irrigation, but they are subject to massive floods. Destructive flash floods are common, and their impact is exacerbated by the lack of adequate flood management infrastructures. In the mountain areas of Balochistan (Kacchi) and Punjab (Sulaiman Range), hill torrents lead to uncontrolled high-energy floods that damage properties, infrastructures, and agricultural production. These floods usually contribute to substantial land erosion and water quality degradation. Although the National Water Policy (2018) provides strategic direction for flood management—including floodplain zoning and mapping, reservoirs operation, flood forecasting and early warning, construction of additional flood protection dikes, hill torrent management, and community-based flood disaster management—its implementation has suffered from substantial lags. Assessments undertaken in 2010

and 2011 identified weakness in governance; limited institutional capacity; and a lack of effective local governance and transparency as key issues.[142] This is compounded by poorly maintained flood protection infrastructures.

Assessment of Floods: Damage and Loss Estimates

Despite the importance of the water resources and irrigation (WRI) sector for supporting domestic and industrial water supply and ensuring food production, the irrigation network and flood protection infrastructure are highly vulnerable due to their locations in the floodplain and near the rivers. The loss due to suspended irrigation supply services and water quality degradation was not considered in this sectoral assessment as it is reflected under the agriculture and health sectors in terms of reduction in production and increase in waterborne diseases.

The total damages to the WRI sector by the 2022 floods are estimated at PKR 152.6 billion (US$710.6 million). The highest damage was reported to the flood protection infrastructure at PKR 55.5 billion (US$258.5 million) (36 percent) and irrigation channels at PKR 49.4 billion (US$229.9 million) (32 percent). This is followed by the drainage system at PKR 20.7 billion (US$96.6 million) (14 percent); dams, headworks, and weirs at PKR 14.3 billion (US$66.4 million) (9 percent); and supporting infrastructure at PKR 12.7 billion (US$59.3 million) (8 percent). The damage to the Provincial Irrigation Departments' tubewells and inspection roads are reported under this assessment. The damage to watercourses is not included as watercourses are considered under the agriculture sector. The damage to public sector assets is estimated at PKR 150.4 billion (US$700.0 million) and private sector assets at PKR 2.2 billion (US$10.6 million).[143] Sindh sustained the largest reported damage (62.2 percent) followed by Khyber Pakhtunkhwa (KP) (14.4 percent), Balochistan (13.1 percent), Punjab (3.4 percent), Water and Power Development Authority (WAPDA) (6.6 percent), and Special Regions (0.3 percent). The breakdown of the damage cost by province is presented in Table 38.

In Sindh, heavy rains, standing water, and flash flows from the nearby Kirthar hills caused large damages. In KP, most of the damages were caused by floods in Swat, Nowshera, Charsadda, and Dera Ismail Khan regions. The Lower Swat Canal, Chashma Right Bank Canal system, and flood protection works in Swat and Kabul rivers were among the most affected infrastructure. Munda Headworks, which was completely damaged from in the 2010 floods, sustained partial damages. The torrential flows from the Sulaiman range affected the interprovincial Chashma Right Bank Canal in southern parts of KP (DI Khan district) and Punjab (DG Khan and Rajan Pur districts) and the Kacchi Canal system in Punjab and Balochistan. In Balochistan, the principal damages were caused by flash floods that impacted canals, storage structures, weirs, drainage network, and flood protection works. WAPDA has reported damages to large irrigation and drainage systems, mostly to ongoing works. In the special regions, irrigation channels and flood protection structures suffered most of the damages.

The sector assessment is based on the damage data reported by the Provincial Irrigation Departments and WAPDA of the Ministry of Water Resources. The data was collated and analyzed through worksheets. A 5–10 percent sample data was validated in Balochistan, KP, and Punjab provinces. The field teams for

142 Asian Development Bank, Government of Pakistan, and World Bank. 2010. "Pakistan Floods 2010 Preliminary Damage and Needs Assessment."; Asian Development Bank, Government of Pakistan, World Bank. 2011. "2011 Pakistan Floods Preliminary Damage and Needs Assessment."

143 The damage to the civil (private) canals in KP has been considered under private sector assets. No other province or region reported damages to private sector assets.

data collection received appropriate orientation and training. Technologies including smartphone-based data collection applications, earth observations, and (in one case) drone footage were used. In Balochistan, KP, and Punjab, the validation remains within 15 percent of reported damages, requiring no adjustment.

TABLE 38. WATER RESOURCE AND IRRIGATION DAMAGE ESTIMATION

Province/Region	Damage (PKR Million)	
	Public	Private
Balochistan	19,943.1	
KP	19,712.5	2,279.5
Punjab	5,216.0	
Sindh	94,901.8	
Special Regions	458.1	
WAPDA	10,132.4	
Subtotal of Damage/Replacement cost	150,364.0	2,279.5
Total PKR Million	**150,364.0**	**2,279.5**
Total US$ Million	**700.0**	**10.6**

Note: The loss to crops is reported in the Agriculture, Food, Livestock, and Fisheries sector.

Linking the Effects to the Human Impact

The heavy rains and associated floods have killed 1,600 people (including 333 women and 615 children), injured another 12,800 people (including 3,452 women and 4,006 children), and displaced approximately 33 million.[144] One-third of all recorded deaths and injuries are children.[145] A total of 94 districts have been declared as calamity hit, mostly in the provinces of Balochistan, Sindh, and KP. Over 1.1 million livestock have been killed. The Food and Agriculture Organization of the United Nations assesses that some 9.4 million acres of crop area in Pakistan was inundated in August 2022. Much of the impact of the 2022 floods is directly or indirectly linked with mismanagement of water resources, poor drainage, degradation of catchments, and blocked waterways. The post-flood challenges due to sectoral damage are identified as follows:

- Poor drainage and disruption of canal water supplies can affect the sowing of winter (Rabi) crops and agricultural production. This could result in low crop production leading to high food and commodity prices and food insecurity.

144 National Disaster Management Authority. 2022. Situation Reports. *https://cms.ndma.gov.pk/page/sitrep-2022*.
145 OCHA. October 4, 2022. "Revised Pakistan 2022 Floods Response Plan: 01 Sep 2022 – 31 May 2023." *https://reliefweb.int/report/pakistan/revised-pakistan-2022-floods-response-plan-01-sep-2022-31-may-2023-issued-04-oct-2022*.

- Weak or no flood protection can make communities and assets vulnerable to further damages and loss to flood recurrence until restored.
- Storage loss in Balochistan, if unaddressed, will result in longer livelihood loss, migration, or intensification of groundwater abstraction.
- Poor drainage and stagnating water are already causing and will further intensify waterborne diseases such as malaria, dengue, acute watery diarrhea, and cholera.

Recovery Needs and Strategy

Recovery Needs: While damages can be assessed by visual inspection or measurement of the exposed parts, the recovery needs assessment comprises additional costs required to rehabilitate the unexposed parts of structures either under water or buried under debris. A suitable premium to the existing damage can help determine recovery needs that compensate for both underestimation of buried parts and costs associated with building back better and stronger.

TABLE 39. PREMIUM CALCULATIONS FOR RECOVERY COSTS

Description	Premium (%)	Remarks
All necessary temporary works to operationalize canals for timely water supply for Rabi and Kharif crop seasons	10	Closing of canal breaches and clearing the regulating structures from debris
Previously breached and now inundated earthen structures (embankments)	10	Breached canals, drains, and dike sections in Sindh
	30	Breached dams
Cross-drainage works subjected to torrential flow and heavy debris load	20	The cross-drainage works in Balochistan, KP, Punjab, WAPDA
Flood protection (non-earthen)	10	KP, Balochistan, Special Regions
Lined canals, water channels, weir system	20	All geographical areas

Recovery Strategy: The overall recovery strategy is comprised of the damage recovery strategy and the sector resilience strategy. The damage recovery strategy covers a timeframe of one to five years and will mainly focus on restoring full services to the damaged infrastructure and, where possible, improving performance. The sector resilience strategy is planned to last five years or more and will require assessing the performance and adequacy of the WRI sector in light of climate change and the increasing need for water and food security for a burgeoning population, which will likely exacerbate inappropriate land use.

Damage Recovery Strategy: The total recovery cost is estimated at PKR 168.0 billion (US$782.1 million). The recovery cost to flood protection infrastructure is estimated at PKR 61.2 billion (US$284.8 million); irrigation channels at PKR 51.9 billion (US$241.4 million); drainage system at PKR 22.9 billion (US$106.6 million); dams, headworks, and weirs at PKR 18.1 billion (US$84.1 million); and supporting assets in the sector service delivery at PKR 14.0 billion (US$65.3 million). In addition to the damage recovery, the project management cost is estimated at PKR 3.3 billion (US$15.4 million). Additional studies and project preparation is estimated at PKR 7.7 billion (US$35.8 million). Recovery costs for each province are outlined in Table 40. The implementation stages of the recovery strategy are outlined in Table 41.

The short-term recovery (up to one year) will include all the works that are needed to immediately restore the irrigation supplies; the structures that are prone to further damage during the next rainy season; and the works to maintain the full canal supplies, strengthening the canal embankment, operationalize the galleries and *karezes*[146], and rehabilitating the tubewells and watercourses. Closing the breaches of the flood protection embankment and repairing the guide and marginal bund and spurs should also be included in short-term tasks.

The intermediate-term recovery (up to three years) will include strengthening of canals, dams, and appurtenant structures, construction of new structures (when needed) and strengthening of flood protection embankment through structural and non-structural measures. Repairing critical parts of drains and removing blockades and making them operational should also be completed in intermediate term.

The long-term damage recovery works (up to five years) will include the complete operation of drains and drainage systems, canal and canal systems, enhanced safety and stability of flood protection embankments, hydraulic structures, and flood channels. The cost of some structures, for example canals, drains, and dams, was split as per requirements of the works to be undertaken during the short, intermediate, and long term. Technical and financial support will be needed to implement the recovery plan.[147]

Sector Resilience Strategy: There is a compelling need for a more holistic approach to flood forecasting, preparedness, and protection. A sector resilience strategy is recommended to help assess the key problems, their direct and indirect causes, and possible management options. Some of the key elements of the sector resilience strategy include: (i) performance of the drainage system, recovery of the degraded catchment in the hill torrent areas, and clearing the water ways from encroachment; (ii) mitigating measures to create more room for rivers to discharge and adaptive measures to lessen the impact of flooding; (iii) basin scale flood management policy and laws; (iv) nature-based solutions; (v) a thorough review and update of the National Flood Protection Plan-IV; and (vi) the necessary political, institutional, and organizational measures and improved water governance. A scoping study is recommended during the first year to identify and prioritize the studies and to prepare terms of references for each. Around 30 studies under three main themes have been recommended: (i) flood prevention and protection through strong defense measures, such as dikes, embankments, and barrages; (ii) flood resilient spatial planning and measures in mitigation and adaptation; and (iii) disaster management, early warning, and flood forecasting.

146 An underground channel through which water flows from an aquifer within mountains to open fields.

147 Potential donors could include the World Bank, Asian Development Bank, Asian Infrastructure Investment Bank, Islamic Development Bank, International Fund for Agricultural Development, and Japan International Cooperation Agency.

TABLE 40. WRI SECTOR RECOVERY NEEDS ASSESSMENT

Province/ Region	Damage in PKR Million (US$ Million)	Brief Justification of Needs	Needs in PKR Million (US$ Million)
Balochistan	19,943.1 (92.8)	Partial to full recovery of selected dams and storages will require rework of the existing earthwork and improved spillways and energy dissipating solutions. Recovery of weir systems, flood protection, and canal systems also require additional work to build back better.	22,849.0 (106.4)
KP	21,992.0 (102.4)	Canal systems recovery, flood protection, and cross-drainage structure or passages in irrigation system affected by hill torrents. Recovery likely requires extended work to match with the existing structure.	21,791.0 (101.4)
Punjab	5,216.0 (24,3)	Flood protection and cross-drainage structure or passages in irrigation system affected by hill torrents.	5,807.9 (27.0)
Sindh	94,901.8 (441.8)	Canal system, flood protection, drainage, and dams. The underwater parts of structures may not be properly assessed for extent of damage.	105,622.0 (491.7)
Special Regions	458.1 (2.1)	The high flow velocity on sloping land causes erosion of banks and channel base, which often requires a deeper and bigger section for recovery for stability and safety reasons.	498.0 (2.3)
WAPDA	10,132.4 (47.2)	Restoration of canal, dams, and flood protection subject to removal of sediment/debris.	11,436.5 (53.2)
Total	**152,643.5 (710.6)**		**168,005.0 (782.1)**

TABLE 41. WRI SECTOR DAMAGE RECOVERY STRATEGY

Intervention/Activity	Short (Up to 1 Year)	Intermediate (Up to 3 Years)	Long (Up to 5 Years)	Priority (Rank 1–5)	Cost in PKR Million (US$ Million)
All the temporary works to make the structures operational, closing of all the breaches in canals, dams, and flood protection embankments	8,400.0			1	8,400.0 (39.1)
Full recovery of canal operation, repairing of canal regulating structures, strengthening the canal embankment, operationalizing galleries and *Karezes,* rehabilitating tubewells and water courses, repairing the guide and marginal bund and spurs	16,800.0			2	16,800.0 (78.2)
Strengthening of canals, dikes, dams, and appurtenant structures, construction of new structures (when needed), strengthening of flood protection embankment, repairing critical parts of drains, removing blockade		50,401.0		3	50,401.0 (234.6)
Complete operation of drains, drainage systems, canals, and canal systems, enhanced safety and stability of flood protection embankments, hydraulic structures, and flood channels			92,403	4	92,403.0 (430.2)
Total	**25,201.0 (117.3)**	**50,401.0 (234.6)**	**92,403.0 (430.2)**		**168,005.0 (782.1)**

Limitations

The damage costs were assessed by various government agencies and sample verification was carried out by the WRI sector PDNA team. In Sindh, due to ongoing inundation and the large extent of the damages, physical verification could not be carried out. The damage costs reflect the replacement cost without consideration of depreciation. Damage and replacement costs are therefore equivalent. The recovery costs factored in that: (i) unexposed parts of structures (such as foundations) were not fully accessible during assessment, leading to additional costs at the time of reconstruction; and (ii) breaching of embankment may have scoured foundations, likely requiring additional earthwork to recover slope stability. For these reasons, criteria were developed with a recovery premium varying from 10 to 30 percent, depending on the type of structural element considered. The amount of premium for different works is based on the experience and the judgment of engineering experts. A separate note, beyond the scope of the present sectoral PDNA, was prepared to elaborate on the long-term resilience strategy for the sector. The loss due to suspended irrigation services and other such factors is covered under the agriculture sector and is not included here to avoid double counting.

Commerce and Industries

Pre-floods Context and Baseline

The industrial and services sectors account for 77 percent of GDP in Pakistan as of 2022, with the balance of the GDP being accounted for by agriculture sector. Industries, transport and storage, and retail and wholesale trade, accounts for a sizable 47 percent of GDP, highlighting the importance of these subsectors for the economy and country at large. The industrial and services sectors collectively also account for most of the employed people in the country. Approximately 63 percent of those aged 10 and above who were employed in Pakistan as of 2021 were employed either in the industrial or services sectors, while the industrial, transportation and storage, and retail/wholesale sectors alone accounted for close to 40 percent of those aged 10 and above who were employed .[148] The industrial, transportation and storage, and retail/wholesale sectors in essence are at the heart of economic activity, employment generation, and consequently broad-based economic development in Pakistan.

The industrial and services sectors have undergone sizable structural shifts over the past two decades. Growth and development starting in the early 2000s has led to a significant real expansion in the size of these sectors, in addition to the relative expansion of the services sector. In contrast to the 1990s and earlier decades when the agriculture sector was the mainstay of the Pakistani economy, the industrial and in particular the services sectors have come to define economic activity in the country. As of 2015–16, there were a total of 1.28 million industrial concerns operating in Pakistan, with 764,220 industrial concerns operating in Punjab, 223,717 in Sindh, 165,703 in KP, and 88,484 in Balochistan, producing total output valued at PKR 11,753 billion.[149] The services sector has recently become a sizable driver of growth

148 Pakistan Bureau of Statistics. 2022. "Labour Force Survey 2020–21." Government of Pakistan. (Table 15: Percentage Distribution of Employed Persons 10 Years of Age and Over by Major Industry Divisions, Sex and Area 2020–21). *https://www.pbs.gov.pk/sites/default/files/labour_force/publications/lfs2020_21/tables/Table_15.pdf*.

149 Data aggregated from the CMI and SHMI surveys.

and diversification, with financial, tourism, and information technology services gaining sizable shares in both aggregate output and exports. It is pertinent to note that Pakistan's industry is relatively small compared to other countries with an economy of similar size (the average contribution of industry as a percent of GDP is 24 percent in low-income countries and 29 percent in low-middle income countries, against 19 percent in Pakistan), while the services sector in the country is relatively large in comparison to similar economies.

Despite the growth witnessed in recent years, the industrial and services sectors nevertheless remain marred by low productivity, inward orientation, high informality, and declining competitiveness. Analysis based on data on publicly listed firms for the period 2012–20 shows a slow decline in total factor productivity over time.[150] Firms' productivity also remains relatively flat over their lifecycle in Pakistan. The economy at large, and firms within it, have also become increasingly inward oriented. This is most immediately captured by the export to GDP ratio, which has declined from 16 percent in 2000 to 10 percent as of 2020. Low export orientation has been a perennial concern in Pakistan given the importance of exports for the sustainability of growth and the current account, foreign exchange reserves, and because productivity and exporting are strongly linked. Most Pakistani businesses operate in the informal sector. Estimates of the degree of informality vary significantly between researchers depending on the definitions they use, the assumptions they make, and the data sources they cite. The World Bank's Pakistan@100 report refers to relatively old estimates that span anywhere from 20 percent to 70 percent of GDP.[151]

High informality, low productivity, and increased inward orientation (all of which are linked) have led to declining competitiveness in recent years. The evolution of competitiveness at the national level is signified by export competitiveness, which has trended downwards in recent years. Between 2005 and 2019, Pakistan's exports as a share of global exports dropped from 0.15 percent to 0.12 percent. The export profile is also concentrated in terms of products (e.g., textiles and textile-related products account for 60 percent of exports) and markets, and few businesses are integrated in the global economy. In terms of provincial distribution, Sindh, and Punjab account for the lion's share of Pakistan's exports at 51 and 46 percent, respectively. KP and Balochistan only account for 1.7 and 0.41 percent, respectively.

The industries and services sectors were reeling under the pressures of a slowing economy even before the onset of the floods. The economy was slowly emerging from the COVID-19 induced economic slowdown when, in early/mid 2021, external and fiscal imbalances along with surging inflation necessitated a significant tightening in both monetary and fiscal policy. The key policy rate has increased by 800 basis points over the past year while the fiscal stance also tightened significantly in the second half of FY22 under the aegis of the International Monetary Fund program. These measures led to demand compression as indicated by high frequency indicators of economic activity such as cement dispatches which were down 8 percent in the fiscal year 2021-2022 and down 48 percent in the month of July 2022 compared to the same month last year. In addition to a slowdown/decline in demand, high inflation had also started eroding profit margins of firms by increasing input costs. Inflation in the month of July 2022 stood at 24.9 percent—the highest in 14 years—driven by an increase in global commodity prices, in addition to the local price of food and energy. Inflation increased to 27.3 percent in August—the highest in 50 years. The export sector has also been facing economic headwinds. Besides the impact of high inflation through higher input costs and consequently lower margins, exporters have been facing uncertainty stemming from political turmoil within the country and a global economic slowdown.

150 World Bank. Pakistan – Country Economic Memorandum 2.0. Washington, DC: World Bank Group. *http://documents.worldbank.org/curated/en/099555006292221804/P1749040dcb7b606090690b4a5882d7acf*

151 World Bank. 2019. Pakistan at 100: Shaping the Future. World Bank, Washington, DC. *https://openknowledge.worldbank.org/handle/10986/31335*.

Assessment of Disaster Effects: Damage and Loss Estimates[152]

The floods and their direct and indirect impacts have exacerbated the challenges being faced by Pakistan's industries and retail and wholesale services sectors.[153] The narrative and numbers below allude to the economic cost of the floods on the firms operating in the industries and retail and wholesale services sectors in the affected provinces.

TABLE 42. COMMERCE AND INDUSTRIES SECTOR: DAMAGE AND LOSS BY PROVINCE

Province	Damage PKR Million (US$ Million)	Loss PKR Million (US$ Million)
Sindh	38,878	669,371
Balochistan	490.94	85,078
KP	570.9	3,148.9
Punjab	117.4	14.2
Total	**40,057.7 (186)**	**757,613.6 (3,527)**

For KP and Punjab, the data was received from the respective provinces and taken at face value. Data was received on both damages and turnover. Losses were estimated from the turnover using the assumption that losses would amount to one month's turnover, i.e. the amount of money made by the sector in one month. The assumption was anchored in the fact that establishments operating in the flood-affected areas were either completely or partially closed from flood-related damages through the month of August. It is assumed that establishments were able to resume at least partial operation from September. Punjab was largely spared from the destruction caused by the floods and damage was restricted to two districts (Dera Ghazi Khan and Rajanpur).

For Sindh and Balochistan, limited data was received. Owing to the paucity of the data and missing variables, the 2015 Census of Manufacturing Industries (CMI) along with the Small and Household Manufacturing Industries (SHMI) survey was used to extrapolate damages and losses.[154] The following key assumptions were used to estimate the total damages and losses sustained by the industrial and retail/wholesale services sectors in the two provinces:

- Data on value of production and capital stock in the two provinces from the CMI and the SHMI was added together.

152 Damage may be classified as partially damaged if less than 40 percent of the asset is damaged, structure is still sound and repair cost would be less than 40 percent of the total asset value. Damage may be classified as completely destroyed if more than 40 percent of the asset has been damaged or if the replacement cost of the damages would be more than 40 percent of the total value of the asset.

153 The damage and loss assessment in this section has only been undertaken for the industries and retail and wholesale services sectors, as opposed to the entire services sector. This has been done because damages and losses sustained by other subsectors that fall under the ambit of the broader services sector such as financial services, tourism services, transport services, etc. have been assessed elsewhere in the PDNA. Focusing on retail and wholesale services, as such, will prevent double counting of losses and damages.

154 The CMI measures production, structural changes in medium and large-scale manufacturing Industries, and provides data on quantities and values of inputs and outputs, census value added, contribution to GDP, changes in fixed assets, stocks, employment and employment cost, and industrial taxes. The CMI was implemented in 2015–16 and enumerated all the industrial concerns operating in Pakistan with 10+ employees. The SHMI survey was conducted in parallel with the CMI in randomly selected urban and rural areas of the four provinces of Pakistan. The SHMI data focuses on the production and investment behavior of small and household manufacturing industries employing fewer than 10 employees.

- Given that this data was from 2015–16, a growth factor of 24 percent was applied to reflect growth in the industrial sector since the implementation of the census and the survey. The growth factor was determined by quantifying the growth in industrial output in Pakistan between 2015–16 and 2021–22.
- It was assumed that firm attrition was equal to firm creation over the period 2015–16 and 2021–22.
- The retail and wholesale services sector accounts for approximately the same percentage of GDP as the industrial sector, while transportation and storage accounts for approximately half, hence the total estimated value of production in FY22 was increased by a factor of 2.5 while the total capital stock was increased by a factor of 2.5. Capital stock was only increased by a factor of 2, as the industrial sector is more capital intensive than services.
- Damages were estimated by applying a flooding quotient to the total estimated capital stock in the two provinces. The flooding quotient was a function of the percentage of the land area of the respective province that was flooded. For example, if the total estimated capital stock of the industrial and wholesale and retail services sectors in Sindh was PKR 100 prior to the onset of the floods and the floods inundated 50 percent of the total land area of Sindh, then it is assumed that 50 percent of the capital was lost (i.e., the floods caused damages of PKR 50).
- Estimated losses were equivalent to one month's turnover.
- The vast majority of the manufacturing base of Sindh province is located in Karachi or its vicinity, which was largely spared from flooding. Consequently, a Karachi factor is applied to reduce both expected losses and damages. It is assumed that 50 percent of all the industrial and retail/wholesale sector is based in Karachi.

The projected and actual direct losses and damages delineated above are expected to be compounded by indirect losses in the coming months. A likely surge in inflation will lead to an increase in costs, squeezing profit margins of firms that are already struggling. Further monetary tightening will similarly lead to an increase in the cost of finance, which will be required for both reconstruction and rehabilitation, particularly in the formal sector. Demand is also expected to remain subdued in the backdrop of a decline in growth, which will impact sales and consequently profitability. The impact of the floods on the agriculture sector will also spill over into the industrial and wholesale/retail services sectors. Most notably, a decline in the production of cotton will directly impact the bottom-line of the textiles sector as imports of expensive cotton might increase to make up for the domestic shortfall.

Linking the Effects to the Human Impact

The industrial and retail/wholesale services sectors account for 47 percent of the total economic output in Pakistan. The sectors also account for approximately 46 percent of those aged 10 and above who are employed in the country. The two sectors are thus both of significant economic importance and critical for development and livelihoods. The direct damages and losses sustained by the sector can reasonably be expected to lead to closure of some firms, leading to layoffs and unemployment. In other instances, while an establishment may not fold, damages and losses sustained may still induce consolidation and layoffs, again contributing to a regression in the livelihoods of those who were previously employed . The damages and losses will also directly and indirectly impact on production, given the forward and backward linkages between the impacted firms.

Recovery Needs and Strategy

Needs in commerce and industries sector go beyond the sector itself and are interlinked with those of the social sectors' recommendations to restore livelihoods for workers as well as those for the financial sector. It should be noted that the floods came only slightly over a year after firms had started to recover from the impact of the COVID-19 pandemic and the associated lockdowns that lead to an erosion in both working capital and the capital stock.

The recovery needs can be divided in two broad categories: the immediate/short-term needs and the medium-term needs.

In the immediate to short term:

- Firms need finance to restart operations, replenish working capital, and rehabilitate/replace capital where it was damaged/destroyed. Given the limited fiscal space available to the government, access to finance should be facilitated through the microfinance sector, which serves the bottom of the pyramid in remote areas—the areas most impacted by the floods.
- Access to finance can also be facilitated through the establishment/operationalization of a risk-sharing facility for microfinance loans to the impacted firms.
- The government in consultation with the regulators (e.g., the Securities and Exchange Commission of Pakistan and the State Bank of Pakistan) should review the possibility of loan forbearance for the impacted firms, similar to the forbearance unveiled at the start of the COVID-19 pandemic.
- Firms impacted by the floods can be supported through technical assistance to secure access to new markets.

In the medium term:

- It is crucial to continue implementing business regulatory reforms throughout the recovery period, such as accelerating/streamlining processing of regulatory licenses, permits, and certificates.
- The 2022 floods should be taken as an opportunity to plan out industries' resilience against future natural disasters. Activities such as planning for emergency preparedness, response, and business continuity are vital to commerce and industries' resilience and competitiveness.
- There is a critical need to undertake a new economic census. The lack of an up-to-date economic census, along with other comprehensive databases, has implied not only that policy formulation in Pakistan related to the private sector has often taken place in a vacuum, but also that the government is often unable to support enterprises that are most in need of this support. This was particularly evident during the COVID-19 crisis. While the government was able to mobilize support for larger, more established and formal firms—on which data was readily available—it could not convene the same response for smaller, less organized, and informal firms.

Limitations

Up-to-date data on the private sector has been a longstanding challenge in Pakistan. While a number of surveys have been undertaken in recent years, these have been limited to particular sectors or geographic areas, and as such fail to capture the breadth of the private sector. The most comprehensive exercise to enumerate all the firms operating in Pakistan, irrespective of sector, that also captures key financials and other key metrics is the economic census which was undertaken in 2003–2004. Given changes in the economic make-up over the past two decades, this census data has limited utility in the current context.

Given data limitations, the CMI and SHMI surveys were used to establish baselines for the manufacturing sector. The baseline was subsequently inflated to take stock of the retail and wholesale services sectors using the assumptions enumerated above.

In the absence of time and resource constraints, a representative survey in the flood-affected districts could have been implemented to obtain a more robust estimate of the damages and losses.

Finance and Markets

Pre-floods Context and Baseline

From a financial sector perspective, the impact of the floods has been assessed primarily through the impact on the physical infrastructure and asset quality of the banking sector and microfinance sector—both microfinance banks (MFBs) and microfinance institutions (MFIs). MFIs are non-government institutions primarily extending microcredit to the poor through sources other than public savings, while MFBs are licensed and regulated by the State Bank of Pakistan, providing a range of financial services to the poor and microenterprises including microcredit, savings, payment transfers etc.[155] The non-banking financial institution sector, with a particular focus on the insurance sector, has also been reviewed. The financial sector section has estimated damages for infrastructure losses and asset quality deterioration, reflected through rising non-performing loans (NPLs), based on data shared by the relevant sector regulators (Securities and Exchange Commission of Pakistan and the State Bank of Pakistan [SBP]).

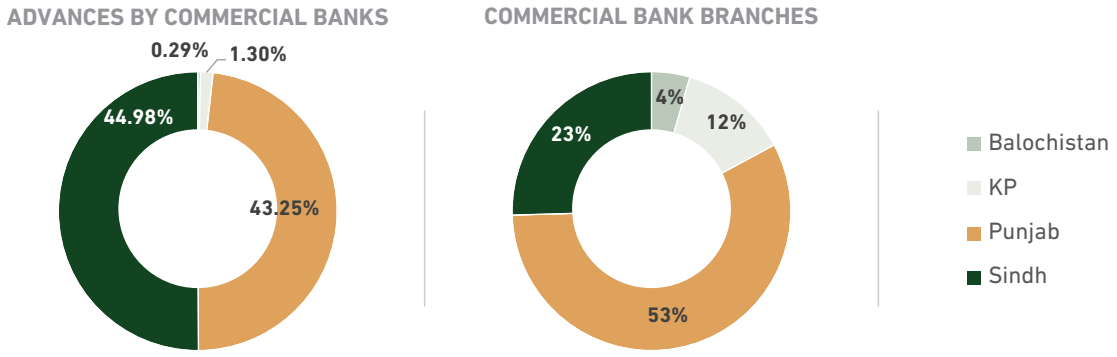
Commercial Banking Sector

Pakistan's financial landscape is dominated by the banking industry, with banks' asset base accounting for over 70 percent of the total financial sector asset base. Bank credit is heavily skewed to the public sector, with approximately 70 percent of all credit flowing to the sovereign. As of June 2022, the banking sector consists of 29 commercial banks, including five public banks, 20 local private banks, and four foreign banks. Furthermore, there are three specialized banks, 11 MFBs, 21 MFIs, and nine development finance institutions. There are 15,244 commercial bank branches across the country, of which 4,875 are in the flood-affected areas.[156] Additionally, there are 4,060 microfinance offices and branches, of which 1,030 are in the flood-affected areas.[157] Furthermore, there are 16,023 automated teller machines (ATMs) installed in the country by commercial banks and 686 by MFBs. Punjab has the most bank branches, followed by Sindh.[158] Similarly, the loan portfolio (advances) of the commercial banks is predominantly located in Punjab and Sindh, with those located in Sindh primarily providing advances to large firms in Karachi.[159] When categorized by segment, the private sector portfolio is composed of 70 percent advances to the corporate sector, 4 percent each to the small and medium enterprise (SME) and agriculture sectors, and 8 percent to the consumer financing sector. Currently, the banking sector faces NPLs of 7.5 percent, with 8.2

155 State bank of Pakistan
156 State Bank of Pakistan. "SBP Regulated Institutes." *https://www.sbp.org.pk/f_links/f-links.asp*.
157 Saeed, Abdullah. September 15, 2022. "Microwatch #64." Pakistan Microfinance Network.
158 State Bank of Pakistan. 2021. "Appendices." *https://www.sbp.org.pk/publications/schedule_banks/Dec-2021/Appendices.pdf*
159 State Bank of Pakistan. "Statistics on Scheduled Banks. Advances by Region." *https://www.sbp.org.pk/publications/schedule_banks/Dec-2021/Title.pdf*

percent of corporate, 15.5 percent of SMEs, 13.9 percent of agriculture, and 3.4 percent of consumer loans impaired.[160] The banking sector is relatively secure against current NPLs as most of them are legacy NPLs and not new ones, with a provisioning of 91.6 percent against all NPLs. The current NPLs will have limited impact on commercial bank capital as they have already been provisioned for, with 86 percent of NPLs categorized as Loss—or outstanding for more than one year—and therefore almost completely provisioned for. The industry-wide capital adequacy ratio (CAR) is 16.1 percent, higher than regulatory requirements.

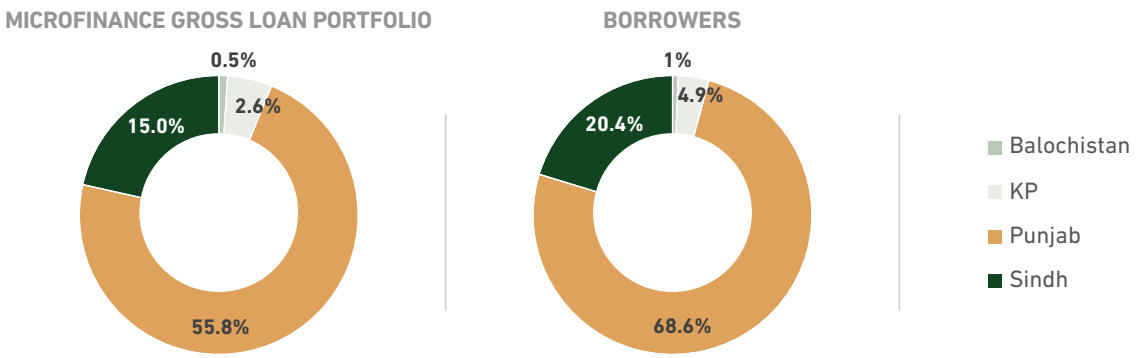
FIGURE 6. ADVANCES AND BRANCHES BY PROVINCE



Microfinance Sector

The microfinance sector services approximately 8.5 million borrowers, making up around 80 percent of all borrowers in the formal financial sector. The gross loan portfolio of the sector is PKR 448.6 billion (US$2.04 billion), with an average loan size of PKR 28,270 (US$128.5). The sector portfolio at risk (PAR) of the past 30 days is 4.5 percent, with a PAR of 6 percent, 3.5 percent, and 4.2 percent for MFBs, MFIs, and rural support programs , respectively. Of the total borrowers, 46 percent are female and 54 percent male; and close to 70 percent come from Punjab. The microfinance sector has grown significantly over the last decade, especially in rural and underserved areas.

FIGURE 7. MICROFINANCE GROSS LOAN PORTFOLIO AND BORROWERS BY PROVINCE



Note: The remaining advances/branches are in Special Regions, and Islamabad.

160 State Bank of Pakistan. "Quarterly Compendium." *https://www.sbp.org.pk/ecodata/fsi/qc/2022/Mar.pdf*

Insurance Sector

The insurance sector accounts for approximately 5 percent of the total financial services sector in terms of total assets. The sector comprises of 10 life insurance and family *Takaful* companies, 30 active non-life insurers and general *Takaful* companies, and one reinsurer. Insurance penetration, as a percentage of gross domestic product remains one of the lowest in the region at 0.94 percent.[161]

Assessment of Disaster Effects: Damage and Loss Estimates[162]

Effects: PKR 90.2 billion (US$419.9 million): The assessment of damages to the financial sector includes the impact of floods on the physical infrastructure (branches and ATMs) and an estimation of the rise in NPLs in the outstanding portfolio of the commercial banks and microfinance sector.

Commercial Banking Sector

Damages: The reported impact to physical infrastructure includes damages to 268 commercial banks branches and 35 ATMs, projected based on the impact to ATMs in the 2010 floods. The estimated physical infrastructure damage amounts to PKR 516.5 million (US$2.4 million) in the commercial banking sector, consisting of PKR 455.3 million (US$2.11 million) to branches and PKR 61.2 million (US$2.84 million) to ATMs.

Losses: The total NPLs of the banking sector in flood-affected areas are estimated to be PKR 152.4 billion (US$709.4 million), subsequent to the flood, growing incrementally by PKR 26.0 billion (US$121 million). Given that NPLs materialize many months after a borrower's ability to repay the banks is negatively impacted, data on potential NPLs is still being collected. The assessment therefore projects incremental increases in current NPLs according to estimations provided by the SBP. Of the additional NPLs, 53.2 percent are estimated to be from the agriculture sector, 32.4 percent from the SME sector, and 12.5 percent from consumer financing. Furthermore, given that the losses will likely be long-term for many borrowers, banks will have to provision for the NPLs accordingly. This will impact bank profitability and potentially augment risks of those banks with lower CARs falling below the minimum requirements.

TABLE 43. BANKING SECTOR PORTFOLIO, NPLS, AND DAMAGE TOTALS BY PROVINCE

Commercial Banks (PKR Billion)					
Province	Existing Portfolio in Flood Impacted Areas	Current NPLs	Projected Incremental NPLs	Branches Damaged	ATMs Damaged
Balochistan	16.4	8.6	3.3	104	14
KP	30.8	4.9	1.3	13	2
Punjab	626.6	44.2	4.9	18	2
Sindh	597.7	68.6	16.2	133	17
Special Regions	0.22	0.006	0.01		
Total	**1,272.01**	**126.4**	**26.0**	**268**	**35**

161 Insurance Association of Pakistan. "Insurance Year Book 2021–21." *http://www.iap.net.pk/download/IAP-YearBook-2020-21.pdf.*
162

Microfinance Banks (PKR Billion)					
Province	Existing Portfolio in Flood Impacted Areas	Current NPLs	Projected Incremental NPLs	Branches Damaged	ATMs Damaged
Balochistan	3.8	0.06	0.79	11	
KP	5.9	0.19	1.1	5	
Punjab	66.3	7.7	12.1	2	
Sindh	65.0	2.8	19.8	29	2
Special Regions	0.65	0.05	0.04		
Total	**141.7**	**10.8**	**33.9**	**47**	**2**
Microfinance Institutions (PKR Billion)					
Province	Existing Portfolio in Flood Impacted Areas	Current NPLs	Projected Incremental NPLs	Branches Damaged	
Balochistan	0.30	0.002	0.02		
KP	0.88	0.03	0.47		
Punjab	13.4	0.46	2.8	4	
Sindh	29.7	1.8	20.8	30	
Special Regions	0.37	0.0008	-		
Total	**44.8**	**2.3**	**24.3**	**34**	
Grand Total	**1,458.5**	**139.7**	**84.1**	**349**	

Microfinance Sector:

Damages: The reported impact to physical infrastructure includes damages to 47 MFB branches and 34 MFI branches. Furthermore, based on the learnings from the impact to ATMs in the 2010 floods, it is estimated that two MFB ATMs would have been damaged. The estimated microfinance sector physical infrastructure damage amounts to PKR 93.1 million (US$0.43 million), including PKR 89.6 million (US$0.41 million) of damages to the branches and PKR 3.5 million (US$0.02 million) to ATMs.

Losses: Of the total outstanding microfinance sector portfolio, it is estimated that approximately 17.6 percent of borrowers and more than 40 percent of the loans are estimated to be in flood impacted areas. According to early estimates, MFBs will incur additional NPLs of PKR 33.9 billion (US$157.8 million) and MFIs will incur additional NPLs of PKR 24.3 billion (US$113.1 million) due to the floods. The microfinance sector as a whole will therefore have approximately PKR 58.2 billion (US$270.9 million) of incremental NPLs directly due to the floods (loan losses to the sector). In contrast to the 2010 floods, where significant loan losses were faced by the commercial banking sector, the microfinance sector has been significantly more exposed to the 2022 floods.

Insurance Sector:

Damages: The estimated physical damage to the insurance industry infrastructure is PKR 19.7 million (US$0.09 million), with 54 offices/branches being affected.

Losses: Aggregate insurance claims are estimated at PKR 20.6 billion (US$95.9 million), based on *exposure at risk* covering both the life and non-life sectors. The major share of the insurance claims (86 percent) pertains to the infrastructure sector (roads and dams), estimated at PKR 17.7 billion (US$82.4 million), followed by PKR 1.7 billion (US$7.9 million) claims related to the agriculture and livestock sector. Of these, a significant amount has been reinsured by foreign insurers. The uninsured claims or those with reinsurance risk within Pakistan are estimated at PKR 5.4 billion (US$25.1 million). Low insurance claims related to highly impacted agriculture, livestock, and infrastructure sectors reflect low awareness and insurance penetration among the affected population. The larger industry players remain insulated from material financial impacts. Some smaller insurance companies that have exposures related to crop loan insurance programs are likely to be impacted. Given the high reinsurance coverage (up to 95 percent) for the impacted infrastructure sector portfolio, the liquidity impact was minimal across the industry.

TABLE 44. INSURANCE SECTOR DAMAGES AND LOSSES BY PROVINCE

Province	Physical Damage (PKR Million)	Loan Loss (PKR Million)
Balochistan	220.8	4,487.2
KP	34.7	3,109.7
Punjab	42.8	21,228.5
Sindh	330.6	60,754.9
Special Regions	0.01	53.2
Total	**PKR 629.1 (US$ Million 2.92)**	**PKR 89,633.6 (US$ Million 417.2)**

Note: Some figures have been rounded up.

The damages and losses highlighted in this subsection assume that all financial sector data of flood-affected areas shared by relevant regulators are in the agreed upon 94 districts and are private sector losses. Additionally, as quantified damages for branches and ATMs of commercial banks and MFBs were unavailable, estimations were made based on the 2010 PDNA and consultations with the banking sector. For branch damages, quantified damages from the 2010 PDNA were inflation-adjusted using latest available inflation data. For ATM damages, the cost of a new ATM was estimated based on consultation with the banking sector. The damages to the insurance sector have been allocated to provinces based on the ratio of incremental NPLs by province to total incremental NPLs.

Linking the Effects to the Human Impact

The floods will impact the financial sector's ability to lend to the private sector to support growth, livelihood, and food security. Furthermore, due to low insurance penetration in the flood impacted areas, resilience to the floods is likely to be low. The supply chain of industries outside of the flood zone may also be disrupted due to a credit crunch and logistics related issues. Of particular concern will be the bank–sovereign nexus, which will become more dominant as the sovereign faces fiscal deficits due to rising

costs and low revenue generation. Furthermore, interest rates are likely to rise because of inflationary pressures, which will have a negative impact on private sector borrowing, with higher cost of borrowing and difficulty in servicing floating loans.

The microfinance sector has been heavily impacted due to a relatively larger footprint in the flood-affected rural areas in Sindh. This is of grave concern since the sector accounts for close to 80 percent of all formal borrowers. Borrowers will face increasing difficulties in repaying loans, given high inflation and low economic growth. Additionally, a sudden halt in financial services and damages to the financial infrastructure in these areas can adversely impact the flow of remittances, including emergency cash assistance, and restrict saving avenues.

TABLE 45. VULNERABILITIES AND OVERALL RISK TO FINANCIAL SECTOR

Sector	Existing Vulnerability	Impact of Floods
Commercial Banking Sector	Limited lending to priority sectors (agriculture, housing, SME etc.)	As NPLs rise, the commercial banking sector may further limit access to credit.
	Increasing dominance of bank–sovereign nexus	The rebuilding needs of the government, including financing public infrastructure rehabilitation, may push the sovereign to become an even more dominant borrower of the banking sector, especially as international credit markets tighten.
	Overall risk	The banking sector would be at risk of the floods causing significant capital erosion. While the banks are well provisioned for existing NPLs, new NPLs would require additional provisioning, which may start to erode bank capital.
Microfinance Sector	Financial inclusion	The microfinance sector is at the heart of financial inclusion in Pakistan, accounting for close to 80 percent of all formal borrowers. The livelihoods of the borrowers have been severely affected through direct and indirect loses. With widespread displacement and loss of collateral, the borrower's ability to generate future income will also be affected.
	Loan portfolio deterioration	While the microfinance sector has been lending to priority sectors, microfinance providers would likely face liquidity crunches as NPLs grow.
	Stability	The microfinance sector emerged from the COVID-19 crisis with weak financial fundamentals and the threat of another wave of NPLs could have serious consequences for the stability of the sector.
	Overall risk	The risk to the microfinance sector would be more significant, given that the floods will impact existing loans and new lending. Existing portfolio would be hampered by the potential inability of existing borrowers to repay loans. New lending would be hampered as MFBs would require further capital injections from sponsors and MFIs would need additional liquidity to lend, given higher NPLs.

Recovery Needs and Strategy

Recovery/Reconstruction Needs: The financial sector needs will emanate from its ability and inclination to lend to the private sector. The rising risks to the commercial banking sector will hamper access to finance in Pakistan and limit credit to the private sector. Severe shocks to financial systems can lead to risk aversion from banks, especially in scenarios where the capital base has been weakened. This would lead to even more hesitancy in lending to a private sector that is already crowded out by lending to public sector. Broad recommendations to support the banking sector include: (i) credit guarantee facilities; (ii) targeted regulatory forbearance that is time bound; and (iii) enhancing targeted refinancing lines for the housing, agriculture, and SME sectors.

The microfinance sector will be instrumental to expanding financial inclusion in Pakistan. There are four proposed strategies to support the sector as it recovers. Firstly, microfinance banks will likely need capital injections from existing or new sponsors. Given the macro-financial conditions, potential creditors may look for risk-sharing facilities. Secondly, MFIs may be facing a liquidity crunch, as growing NPLs would impact their ability to provide new loans. Subsidized lines of credit would enhance their ability to extend new loans and the ability of new borrowers to service loans. Additionally, a rescheduling of existing loans may enable borrowers to pay back loans more sustainably. Lastly, it may be pertinent to establish a disaster risk insurance facility for portfolio level insurance for the microfinance sector, in addition to rehabilitation of damaged assets and infrastructure.

Within the financial sector, the ability to provide sustainable housing finance will have to be strengthened, especially with significant flood-related housing damage increasing demand. The commercial banking and microfinance sectors will require targeted lines of credit and risk-sharing facilities to continue the recent growth of the housing finance market.

TABLE 46. COMMERCIAL SECTOR INTERVENTIONS

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)
Commercial Banking Sector			
Credit Guarantee Facility for Commercial Banks			X
Line of Credit and Credit Guarantee Facility for Housing Finance for Commercial Banking and Microfinance Sectors			X
Microfinance Sector			
Credit Guarantee Facility for Microfinance Sector Creditors			X
Line of Credit for Microfinance Sector			X
Regulatory Forbearance for Microfinance Sector	X		
Disaster Risk Insurance Facility for Microfinance Sector			X

Limitations

The current assessment of damages to the financial sector is restricted by data gaps and limitations in estimating the impact on NPLs and insurance claims due to recency of the floods. The financial sector has multiple regulators and primarily consists of private sector participants, sometimes leading to information gaps. Furthermore, much of the routine data collection is conducted at the provincial or federal level, making it difficult to ascertain losses at a district level. Finally, NPLs do not translate to loan losses immediately.

Tourism

Pre-floods Context and Baseline

Overview

Pakistan's tourism industry was already reeling from the impact of the COVID-19 pandemic. The total contribution of travel and tourism (T&T) to GDP stood at 4.4 percent of the economy in 2020, which fell by 23.1 percent from 2019.[163] The recent floods will have further impacted the tourism economy. The industry relies mostly on domestic tourism inflows, which account for 91 percent of tourism spending.[164] A breakdown of the total contribution of T&T to GDP shows that direct contribution accounted for 27.8 percent in 2020,[165] while indirect and induced contributions accounted for the remainder.[166] This signifies the importance of the sector's wider economic impacts on value chains such as food and beverage, construction, and the creative industry.

The tourist season in the country's central and northern areas runs from June to October. These months witness the maximum number of tourist inflows to destinations in KP and Punjab, when the lodging facilities and tour operators are mostly booked to capacity and local markets are busy serving the visitors.[167]

Tourism Facilities and Impact

Despite the impacts of COVID-19, the T&T sector still accounted for approximately 3 million jobs in the country (4.8 percent of total employment) in 2020. In 2021, international visitors' spending stood at PKR 139 billion (US$647.1 million) and domestic tourism spending amounted to PKR 1,396 billion (US$6.5 billion).[168]

163 World Travel and Tourism Council (WTTC). 2021. "Travel and Tourism Economic Impact, Pakistan."
164 WTTC. 2021. "Travel and Tourism Economic Impact, Pakistan." p.2.
165 WTTC. 2021. "Travel and Tourism Economic Impact, Pakistan." p.7.
166 Indirect contributions refer to T&T investment spending, government spending, and impact of suppliers. Induced contributions refer to spending of direct and indirect employees in tourism.
167 Lead Pakistan. May 8, 2022. "Almost all PTDC Hotels in KP Booked to Full Capacity." *https://leadpakistan.com.pk/news/almost-all-ptdc-hotels-in-kp-booked-to-full-capacity/*; Mir, Shabbir. July 9, 2016. "Hotels Booked to the Brim Following Tourist Influx in G-B." Tribune. *https://tribune.com.pk/story/1138421/camps-lake-hotels-booked-brim-following-tourist-influx*
168 WTTC. 2022. World Travel and Tourism Council.

According to the Department of Tourist Services (DTS), there are currently 2,010 registered tour operators in KP, 4,350 in Punjab, 2,213 in Sindh, and 130 in Balochistan. In the Dera Ghazi Khan district of Punjab, there are 158 registered travel agents, 11 restaurants, and 24 hotels. In KP, tourism constitutes 19 percent of total national tourist traffic.[169] From August 2021 to August 2022, more than 6.3 million domestic and 2,802 international tourists visited KP.[170] The combined yearly economic contribution of Pakistan's four most visited destinations in KP—Galiyat, Naran, Kalam, and Kumrat—to the provincial economy was PKR 60.7–74.8 billion (US$282.6–348.2 million), which is substantive.[171] KP province had 740 hotels and 282 restaurants in the flood-affected districts.[172]

In 2021, 896,366 tourists visited the Special Regions (893,129 domestic, 3,237 international) compared to 623,965 tourists in 2020 (622,887 domestic, 1,078 international). There are 660 registered hotels, with 4,786 total rooms and a bed capacity of 7,015, in these regions. A large segment of their tourism sector relies on revenues and jobs contributed by trekking and mountaineering expeditions. In 2019, 153 trekking parties (906 members) undertook expeditions, generating employment for 2,388 porters and 153 guides. Waste management fees collected by expeditions generated PKR 6.8 million (US$0.03 million).

Air connectivity is vital for T&T's development. However, although there are regular flights to the northern parts of the country, the majority of tourists still access these locations by road, underscoring the importance of resilient road connectivity infrastructure.

Assessment of Disaster Effects: Damage and Loss Estimates

The enterprises in the T&T sector have faced losses due to the cancellation of hotel bookings and tours as tourists were barred from visiting the flood-impacted districts immediately after the disaster. International mountaineering and adventure tourist expeditions, which are a major source for revenue in Special Regions, were also impacted. This has serious implications for the livelihoods of individuals employed in the T&T value chain, especially tour operators, travel guides, transporters, street hawkers, laborers, and those involved in mountaineering/trekking, restaurants, and home-based businesses. Most of these employ locals.

The damage and loss to cultural heritage as calculated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) stands at PKR 1,308 million (US$6.1 million) and PKR 1,439 million (US$6.7 million), respectively. Further province-specific information on the damage and loss to cultural heritage can be found in the Culture and Heritage chapter under the Social Sector reports.

Damage and Loss Estimates

Balochistan: Balochistan only reported losses to private sector enterprises, which are around PKR 440 million (US$2 million). Hotel occupancy decreased significantly due to reduced tourist footfall. Several cultural heritage sites have been damaged, including mosques (details of which are covered in the Culture and Heritage chapter. Heavy rains caused lakes to overflow, which damaged bridges and led to landslides along key routes. Several areas are still facing connectivity issues.

169 Consortium for Development Policy Research. 2021. "Stimulating the Urban Economy in Khyber Pakhtunkhwa." CDPR report with the Sustainable Energy and Economic Development Programme.
170 As reported by Khyber Pakhtunkhwa Culture and Tourism Authority.
171 According to exchange rate at the time in 2018. See also: Government of KP and MDTF. 2018. "The Way Forward for the Tourism Sector of Khyber Pakhtunkhwa."
172 Government of KP. Industries, Commerce and Technical Education Department.

KP: In KP's calamity-hit districts, 90 out of 740 hotels have been destroyed completely and 46 have been partially damaged. The restaurants in these districts have suffered significant losses, with 161 out of 282 restaurants destroyed and 39 partially damaged. Estimated damage to tourism sites and tourism infrastructure is PKR 46 million (US$0.2 million). For the private sector, the total estimated damage to hotels and restaurants stands at PKR 2,038.9 million (US$9.5 million). Of this, private sector losses in KP province alone are estimated to be PKR 11,249.1 million (US$52.4 million), which includes revenue loss due to foregone tourist spending and income losses.

Punjab: Flood-affected districts are located in the south of Punjab, where limited seasonal tourism activity takes place. However, the area usually receives significant religious tourism due to various shrines, forts, and heritage sites. Although no damage to public sector infrastructure has been reported, loss to the private sector amounts to PKR 2,200 million (US$10.2 million) as a result of reduced tourist footfall and uncertainty amongst travelers.

Sindh: Public sector assets in Sindh have suffered losses due to damage to public sector resorts and restaurants. The damage estimates for public sector sites are estimated to be PKR 20 million (US$0.1 million), and revenue losses are PKR 10 million (US$0.05 million). Private sector estimates for loss stand at PKR 1,760 million (US$8.2 million). Stagnant flood water, road blockages, and damaged railway tracks continue to affect accessibility, thereby limiting tourist activity. Damage to public sector infrastructure, including railways and roads in the province, is reported to be PKR 20 million (US$0.1 million), with a loss of revenue amounting to PKR 10 million (US$0.05 million)—this amount is not, however, being included in tourism sector losses to avoid double counting.

Special Regions: No infrastructural damages were reported in the public or private sector. However, as these regions are a tourist hub and destination of choice during the peak tourist season, local businesses and communities have been impacted directly and severely (due to low occupancy, road connectivity disruptions, overall uncertainty due to unpredictable weather, and consequential losses of seasonal jobs in transport and tourism value chains). Loss in the tourism private sector is estimated at PKR 4,400 million (US$20.5 million).

TABLE 47. DAMAGE AND LOSS ESTIMATED FOR THE TOURISM SECTOR

Province / Region	Damage PKR Million (US$ Million)		Loss PKR Million (US$ Million)	
	Public	Private	Public	Private
Balochistan	Not available	Not available	Not available	440 (2)
KP	46 (0.2)	2,039 (9.5)	No Losses reported	11,249 (52.4)
Punjab	No damage reported	Not available	No loss reported	2,200 (10.2)
Sindh	20 (0.1)	No losses reported	10 (0.05)	1,760 (8.2)
Special Regions	No damage reported	No damage reported	Not available	4,400 (20.5)
Total	**66 (0.3)**	**2,039 (9.5)**	**10 (0.05)**	**20,049 (93.3)**

Linking the Effects to the Human Impact

Employment is the surest pathway out of poverty. One in every 10 jobs in Pakistan is related to tourism. As a service industry, tourism is labor intensive with small and micro enterprises (SMEs) dominating the value chain. The WTTC 2012 report states that tourism is the second most efficient job creator. When direct, indirect, and induced effects are included, 50 jobs are created for every US$1 million generated in tourism receipts, giving the sector double the job creation power of the automotive, telecommunications, and financial industries. Tourism is also one of the few services that can thrive in remote and rural areas, enabling local job creation.[173]

Tourism is the mainstay of communities in KP and Punjab. Tourism also enables women entrepreneurs to showcase their crafts and earn a living through homebased ventures. Other small businesses that rely on a functional tourism value chain include transport (jeeps and cars for local commute of tourists), food and beverage, travel guides, vendors, micro enterprises (corner shops, retailers, eateries), and hawkers. Local communities and small firms are now at an increased risk due to the decrease in tourist footfall owing to the damaged infrastructure, ongoing rehabilitation efforts, drop in the hotel occupancy rates, and hesitancy of tourists to visit even non-affected sites across the country. In the medium to long term, tourism will also suffer due to the decreased purchasing power of tourists due to loss of livelihoods and economic downturn caused by the floods. Coupled with the fast-approaching winter (a low season for tourism), this will have a ripple effect on local communities and individuals employed in the informal economy as well as on those who travel for seasonal jobs in the sector.

Recovery Needs and Strategy

Short Term: An immediate response is required with a focus on the sector's recovery through the restoration of road connectivity, reconstruction of bridges, and rehabilitation of basic tourist infrastructure and facilities. T&T has the ability to bounce back rather quickly after disasters, and domestic tourism has already been restored to some extent in KP, although not to the pre-flood levels. Timely execution of targeted interventions will therefore be crucial to alleviate—and prevent further—negative impacts of floods on the T&T value chain.

For the provincial governments, it will be important to repurpose the available financing to meet the recovery needs of the T&T sector. Rehabilitation efforts in the short term must focus on supporting operational small and micro enterprises in both the formal and informal economy. This can be done through financial support, training on waste management, awareness raising with regard to public sector initiatives for relief, and restoring connectivity. If a critical mass of enterprises (hotel, restaurants, transporters, tour operators, and travel agents) and vital infrastructure exists and/or is restored, the markets can continue to operate, thereby encouraging tourism.

Medium to Long Term: In the medium to long term, small enterprises and home-based entrepreneurs will require technical assistance (TA) and access to finance to upgrade and sustain their businesses. Some recommendations include:

- Microfinance, matching grants, and microinsurance schemes for enterprises to support reconstruction, financing of working capital, and introduction of hospitality standards. If feasible, a targeted financial

173 International Finance Corporation. 2017. "20 Reasons Sustainable Tourism Counts for Development." Tourism for Development Knowledge Series, World Bank, Washington, DC.

scheme (as requested by the Federation of Pakistan Chambers of Commerce and Industry) for the tourism sector may be considered by the provincial/commercial banks.

- An effective communication strategy to inform the communities, private sector, and travelers about weather conditions, available accommodation, and road closures.
- Tax incentives for attracting private sector investment in green, resilient, and inclusive development of the tourism sector.
- Build back better for more resilient architecture, considering the recurring nature of floods due to climate change. This would include:
  - A detailed assessment of tourist infrastructure to determine the structural integrity of sites and destinations, including geological stability, soil testing, and hydrology assessments to devise technical solutions to mitigate the risk of future flooding and landslides.
  - Enforcement of measures to prevent construction on hazardous terrain (multi-hazard mapping) and encroachments on riverbanks. This requires improved oversight to keep burgeoning and haphazard infrastructural development under check.
  - Environment and social (E&S) screenings and environmental impact assessments (EIAs) by the public sector for tourist sites and integrated tourism zones prior to commencement of reconstruction and/or new development.

Preventive Measures: To strengthen the preventive measures and disaster reduction mechanisms in the medium to long term, an early warning system should be installed, particularly in the northern parts of the country which are at the risk of glacial lake outburst floods events. Emergency helpline numbers should be extended to all areas accessed by tourists to provide real time updates, in addition to ensuring that emergency evacuation protocols/systems are in place. Additional measures are required to strengthen the capacity of local rescue authorities.

Community Involvement: In the long term, sustainable development of the sector needs to involve the consultation of local communities when formulating policy, legal, and regulatory frameworks, to ensure their ownership.

Tourism Research: Establishing a digital data collection mechanism and development of a comprehensive central database that can store T&T data (tourist inflows, night stays, tourism services data, economic indicators, etc.) is recommended as a long-term priority. This will help compile baselines in a centralized manner and allow better and early positioning of the sector to mitigate the impact of disasters. The provinces and central government can also adopt a National Tourism Competitiveness Index (being developed through World Bank advisory support), develop and enforce industry standards, and create a credible brand for service delivery. A conducive investment climate and streamlined procedures could encourage the businesses to register with the DTS, thereby attaining formality. Without a digital database of industry stakeholders, including restaurants, hotels, tour operators and travel guides, it will not be possible to both regulate and support businesses.

A summary of the recommended interventions, along with the nature of activities, priority rank, and estimated costs, are outlined in Table 48.

TABLE 48. RECOVERY NEEDS AND ESTIMATES

Intervention/Activity	Nature of Activity (TA vs Investment Financing [IF])	Short (1–2 Years)	Medium to Long (2–5 Years)	Priority (Rank 1–5)*	Cost (Million)/ comment
1. Rehabilitation of road infrastructure to provide accessibility to tourism destinations/sites	IF	X		1	Covered in Transport and Communications section
2. Strengthening the capacity of rescue authorities to improve disaster responsiveness	IF + TA	X		1	PKR 250 (US$1.2) for 2 sites
3. Sustainable financing solutions for reviving SMEs (e.g., matching grants, interest friendly loans)	IF + TA	X		2	PKR 45 (US$0.2)
4. Expanding the coverage of 24/7 tourist helplines in Punjab and KP for timely updates on weather and road conditions	TA	X		1	Existing helplines may be expanded to cover the provinces
5. Detailed E&S assessment of tourist infrastructure and incorporating EIA mitigation measures before commencing any reconstruction	TA + IF	X	X	1	Policy and enforcement measures
6. Strengthening preventive measures through installation of early warning systems	IF + TA	X		1	Covered in Disaster Risk Reduction and Resilience chapter
7. Involving local communities in the infrastructure and livelihoods restoration	TA	X		1	Community consultations
8. Developing a comprehensive database of travel and tourism industry patterns, contribution to GDP and indicators	TA + IF	X		2	PKR 55 (US$0.26)
9. Update and Enforce laws pertaining to construction on riverbanks and anti-encroachment	TA + IF	X	X	1	Policy Measure
10. Increasing the capacity of DTS for better coordination	TA + IF	X	X	2	Policy Measure
Total					**PKR 350 (US$1.6)**

Note: *1=highest priority; 5= lowest priority.

Limitations

Pakistan does not have a central mechanism to collect tourism sector data, which affects the availability of reliable data to measure the economic contribution of tourism. This is particularly the case for Sindh and Balochistan provinces, where the tourism sector could still benefit from support to realize its potential.

The data for damage, loss, and recovery needs estimates was collected with the help of Ministry of Planning, Development and Special Initiatives, provincial tourism departments, Planning and Development Department of KP, DTS of Punjab and Islamabad, the Project Management Unit of the KP Integrated Tourism Development project district, local administrations, and private sector tourism associations. Due to the unavailability of centralized data collection mechanisms, the information gathered is based on reported damages and losses, estimates, and approximations. There are possible gaps with regard to information on private sector damages and losses, as the tourism associations and provincial tourism departments have limited capacity to collect this data and are still gathering information. Subsequent detailed assessments will have to be undertaken to determine the exact extent of damage and loss to the sector.

Cross-cutting Sectors

Photo credit: Asianet-Pakistan

Governance

Pre-floods Context and Baseline

Public Financial Management (PFM) & Governance

Pakistan, like many comparable democracies in transition, faces the challenge of devolving its governance, and delivering services: a primary reason for this lack of devolution is a political economy wedded to centralization and with limited capabilities on the ground. Consequently, the Federal Government, despite the 18th Amendment, still performs some of the most basic functions of delivering services and protecting the rights of the most vulnerable.

The local governance system has been inconsistent (see Table 49) and its operations are vulnerable to disasters. This is because the system is not empowered, has not established an identity, and thus has weak capacity to plan, manage and spend funds.[174]

TABLE 49. CURRENT STRUCTURE OF LOCAL GOVERNMENTS (LG) IN FLOOD-IMPACTED REGIONS

Punjab	Sindh	KP	Balochistan	GB
Punjab Local Government Act, 2021 still under review - while 2013 Act defunct Metropolitan Corporation Municipal Corporation Tehsil Council Union Council System broadly defunct, DC Office under administrative control, Funds allocated on basis on PFC 2017 (PKR 528 billion 2022)	**Sindh Local Government (Amendment) Bill 2021** Metropolitan Corporation Municipal Corporation District Council Municipal Committees Town Committees No PEC. a small component (fixed amount) distributed evenly acorss districts (varies bewteen PKR 25- 30 bilion)	**Khyber Pakhtunkhwa Local Government (Ammendment) Act. 2022 (main Act is 2013)** Metropolitan Corporation District Councils Tehsils Union Council/NCs/VCs Last PFC Award 2019/20, Award for 2020/21 determined (PKR 261.7 billion	**Local Government Act, 2010** Metropolitan Corporation Municipal Corporation Municipal Corporation **Rural** District Council Union Council No PFC, fixed budget allocated, 50% shared equally and 50% on basis of population	**Local Government Act, 2014** Urban City Metropolitan Corporation Municipal Committee Town Committee Rural District Council Tehsil Council Union Council

Source: Current versions of the LG Acts.

174 Despite the orders of the Supreme Court the LGs are not formally established and Sindh and Balochistan have no PFCs

Federal government retains the primary function to collect revenue, and the division of fiscal resources between federal government and federating units is carried out in accordance with the National Finance Commission (NFC) Award.[175] However, larger provincial development budgets have not been matched by administrative capacity, and the performance of provinces has thus been sub-optimal. Spending of development budgets has been slow, and the quality of services, and management of costs requires improvement. This weak ability to plan and execute provincial-level projects will retard post-flood rehabilitation.

Climate change and gender sensitive financial systems have not been implemented. Climate change is not reflected in budget allocations through the NFC at the federal level, or the Provincial Finance Commission (PFC) at the provincial level. There is no disclosure of climate change related fiscal risk in budget statements or budget execution reports.

The responsibility to maintain law and order lies at the provincial level. The law-and-order situation has been variable over Pakistan due to internal and external factors: at an aggregate level Pakistan is ranked 130th out of 139 countries on 'Rule of Law'.[176] There is concern that this situation will worsen as Law Enforcement Agencies' (LEA) capacities are strained due to flood-related damage, and escalating demands on their resources.

There are no formal mechanisms for CSOs/NGOs to engage with government; while these organizations are informally connected to District Administrations, their responses to crises at local government level remains variable and sporadic. Coordination of all stakeholders (including CSOs/NGOs at national and local level) and tiers of government is essential to plan for post-disaster recovery and resilience.

An analysis of governance has noted a lack of data and mapping capacity, and thus, data-driven early warning systems to mitigate risks and respond to disasters are lacking.

Donor resources are not optimally used because financial managers and project planners lack capacity.

Audit and Anti-Corruption

The Auditor General of Pakistan (AGP) has introduced an audit quality management framework, but progress remains weak. No gender audits have been carried out so far. In recent years, audit reports have highlighted significant delays in Environment Impact Assessment and Initial Environmental Examination processes at the entity level, gaps in the regulatory framework vis-à-vis climate change, and issues related to the Clean Environment Fund. The AGP faces organizational and capacity challenges with specialized audits pertaining to climate change, and established a field audit office, the Director General Audit-Environment and Climate Change (DGA-E&CC) in 2019. However, a coherent and holistic approach to auditing government responses to climate change is not being followed due to the fragmentation of audit jurisdictions.

Anti-corruption agencies exist at federal and provincial levels and can establish internal controls for emergency funds. These include the National Accountability Bureau (NAB), Federal Investigation Authorities and Provincial Anti-corruption agencies. To combat corruption, these agencies need to understand how emergency funds are governed and to uniformly implement the Whistle Blower Protection Policy.

175 Article 160 of the Constitution of Pakistan
176 *WJP Rule of Law Index (worldjusticeproject.org)* Ranking by World Justice Project, 2022

Assessing Disasters: Damage and Loss Estimates

Effective governance provides sustainable, quality services to citizens, and this role becomes more important during disasters, and relies on accessible and conducive infrastructure, and the efficiency and effectiveness of processes, procedures, and operations. The PDNA has recorded substantial damage to public buildings and assets, to which accessibility is now limited. At the aggregate level across the 5 flood-affected regions, local service delivery offices (other than LEAs) have been completely or partially destroyed, and damage is estimated at PKR 3.79 billion (US$ 17.6 million). Even where damage is partial, service provision has been disrupted, and buildings may be hazardous to users (See Table 50 below). The data show that Sindh has been the hardest hit (almost 70 percent of total), followed by Khyber Pakhtunkhwa (18.5 percent), Punjab (12.8 percent), Balochistan (4.5 percent) and Special Regions (1.9 percent).

The district administration has played a vital role to coordinate actions on the ground and help citizen recover. As the flooding worsened the key responding agencies were the NDMA, Federal Flood Commission (FFC), Pakistan Armed Forces and district administrations. Despite having lost their own buildings, their ability to act in the field has not been compromised and local administrations have been the focal point of all efforts.

TABLE 50. DAMAGE TO GOVERNMENT BUILDINGS INCLUDING POLICE, JUDICIARY, PRISONS & PROSECUTION

Public Damage *(Physical Assets and Infrastructure)*		**Damage PKR Million**	**Loss PKR Million**
Balochistan	Office buildings, residences, equipment & records (32 buildings) Police, Judiciary, Prisons & Prosecution (764 buildings)	169.4 371.1	
KP	Office buildings, residences, equipment & records (47 buildings) Police, Judiciary, Prisons & Prosecution (89 buildings)	693.5 140.5	8.0*
Punjab	Office building, residences, equipment & records (59 buildings)	483.7	
Sindh	Office buildings, residences, equipment & records (268 buildings) Police, Judiciary, Prisons & Prosecution (1127 buildings)	2,309.5 8,679.0	54.0*
Special Regions	Office buildings, residences, equipment & records (11 buildings)	72.4	
Loss *(forgone income, additional costs)*			
Balochistan	Temporary rentals for facilities[177]		1,592.0
KP	Temporary rentals for facilities		272.0
Punjab	Temporary rentals for facilities		118.0
Sindh	Temporary rentals for facilities		2,790.0
Special Regions	Temporary rentals for facilities		22.0
Total		**PKR Million 12,919.1 (US$ Million 60.14)**	**PKR Million 4,856.0 (US$ Million 22.60)**

Source: Government of Pakistan Reported Data/Authors' Tabulations
*The data show that approximately PKR 54 million and PKR 8 million in Sindh and KP respectively will be required to retrieve data; the qualitative assessment suggests that substantially more data have been lost permanently. The cost of this may be significant depending on the importance of these data.

177 Estimates based on average annual rental per premise of PKR 2 million (could be containerized office space for rent or any available building locally. It is assumed that Government will take approximately 12 months to reconstruct facilities.

Most of the public sector offices that have been destroyed housed a variety of hard and soft records relating to public financial management, citizens, and other public information, and these have been lost. Several records were only available in hard format, while electronic records will also have been damaged recovery for both is likely to be challenging. This loss of data will have a detrimental impact on ongoing development.

Because of their abundance and distribution, LEAs have suffered more damage than public administration buildings. These amount to roughly PKR 9.191 billion or US$ 42.79 million. Sindh suffered most, where damage to police stations and check points is estimated to be over PKR 3.87 billion, followed by PKR 363 million in Balochistan and PKR 100 million in KP. Prisons are badly damaged, especially in Sindh where damage is estimated to be above PKR 3.4 billion. These impacts may lead to a rise in crime, GBV and SGBV, and impede access to justice services; these effects will be exacerbated by weak coordination and institutional capacities, and loss of official records and evidence.

In addition to their direct costs, flood damage will delay the agency and the implementation of local government's act, and their ability to legislate, and attract skilled staff. In most regions there are no systems to capture basic information on financial management, such as allocations, releases, expenditure and completion status of projects, and the floods will make this situation worse. It is expected that capacity to implement development projects, and transparency and accountability will suffer.

It is important to note that while this section has only reported the damages to governance infrastructure, that the role of governance is much broader, and the effects discussed above will have consequences for speed and efficiencies of response in key sectors such as WASH, Education, Health, Community Infrastructure, and other functions such as Social Protection. Thus, building a more capable governance set-up will be needed for sectoral delivery.

Linking the Effects to the Human Impact

A loss of poorly provided local public services will lead to a loss of trust in Government, perhaps especially in the context of poor access to law enforcement. Local-level public sector offices offer services such as receiving certain licenses, fees and local taxes e.g. property transactions, small business licenses, documentation (marriage certificate, birth certificate, NIC, etc.), all of which may be delayed. The impact on women is higher due to their general dependency on men as heads of households, and negative social norms that limit and restrict their bodily, personal, and economic autonomy, and place them at greater risk of health hazards and of loss of overall well-being.

Flood damage also means that law enforcement staff are unable to perform their duties, or in some cases cannot be reached by, or cannot physically reach the public. These factors alone may increase crime and lawlessness, with those in remote rural areas perhaps especially vulnerable. Evidence from recent disasters shows that the breakdown of traditional social structures leads to an increase in sexual violence, and exploitation and abuse of children, women, and disabled people. Spikes in smuggling and hoarding escalates the costs of basic goods.

Recovery Needs and Strategy

This section discusses recovery needs at two levels. Firstly, it discusses the rebuilding of public sector infrastructure; and secondly, the need for soft reforms and capacity building required for post-disaster responses.

Building back better: Flood damage was made worse by weak, poorly enforced zoning and building regulations. The most badly damaged assets were those on or too close to rivers, or those which ignored building safety standards, both of which are managed locally in all regions. Therefore, it is important to build capacities and develop systems that will help local authorities to zone buildings in safe areas and construct them according to flood resilient bylaws.

Given the scale of loss, certain replacements of infrastructure and functions need to be prioritized, such as police stations, prisons and district administration offices.

Strengthening local capacity: Local governance capacity is needed so that institutions can coordinate with each other and improve PFM and procurement for cross-sector recovery and service delivery. All tiers of government need technical assistance to re-prioritize public investments/development schemes, and to include local stakeholders in this process.

Coordinate through inclusive and participatory multi-stakeholder mechanism for transparency: This mechanism should be informed by the perspectives of the most affected people, such as displaced groups, women, youth, children, the disabled and indigenous groups. Given the difficulties of building capacity, NDMAs/PDMAs should coordinate their efforts, and engage CBOs, or Civil Society/Humanitarian organizations to structure the approach to recovery. Whistle-blower protection and reporting channels, including hotlines and online platforms, should be made available so that civil society, journalists, and the media report corruption. Such people should be protected from retaliation and receive feedback from their actions.

Monitoring system: A monitoring and implementation plan is needed for all tiers of government, and development partners, as a central coordination tool, and to track progress.

Risk Communication: Pakistan's response to disasters such as floods (or Pandemics) is not limited to the immediate emergency alone. It is also a long-term societal adjustment to psychological factors such as denial, fear, and panic. This suite of factors – from social/psychological & cultural to material and economic - make risk communication an important part of the disaster risk management and mitigation strategy.

Based on the analysis above, the following needs have been identified:

TABLE 51. ESTIMATED NEEDS BIFURCATED BY TYPE

Item	Damage	Brief Justification of Needs	Estimated Need in PKR (US$)
Public offices, residential compounds,[178] office equipment, vehicles and records destroyed.	PKR 12.91 billion (US$ 60.06 million)	Close to 60% of these facilities have been destroyed and need to be replaced to provide services and enforce law and order	PKR 12.91 billion (US$ 60.06 million)
Other needs to manage governance.	N/A	Soft reforms to build capabilities at provincial and local levels to coordinate and implement sector level interventions Temporary rental and recoup of records	TA support PKR 1.125 billion (US$ 5.24 million) PKR 4.856 billion (US$22.60 million)

Based on the broad strategy discussed above the following table presents key time-bound interventions/ activities:

TABLE 52. RECOVERY AND RECONSTRUCTION PLAN

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)	Cost in PKR Million (US$ Million)
Establish temporary district level offices and ROL infrastructure using containers or renting premises (2.397 buildings).[179] Reconstruction can start in parallel, however, as it will take time and require more funds from provincial resources. Recoup lost data.	X			1	4,856 (22.61)
Rebuild flood resilient police stations and prisons (1980 buildings).		X		2	9,190.6 (38)[180]
Rebuild flood resilient public offices (417 buildings).		X		2	3,728.5 (17.35)[181]
Soft Governance Reforms across provinces					**up to about 5**
Provide technical support for flood resilient zoning laws and local-level construction bylaws	X			1	225 (1.04)
Support federal and provincial government to develop framework for gender and climate change responsive public investments	X			1	22.5 (0.105)

178 Assumption: the average cost PKR 2 million per annum per building
179 Assumption: the average cost PKR 2 million per annum per building
180 This number does not include Build Back Better premium for police stations.
181 This number does not include Build Back Better premium for public offices

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)	Cost in PKR Million (US$ Million)
Establish governance and coordination mechanism to manage aid and resources, including transparency, accountability, and rapid gender and climate change responsive procurement	X			1	45 (0.209)
Develop a comprehensive monitoring and implementation framework and dashboard to implement PDNA recommendations that are gender and climate change responsive	X	X		1	45 (0.209)
Build capacity and financial agency; implement LG Acts to devolve cross-sector service delivery that is gender and climate change responsive		X	X	3	675 (3.142)
Cross-sector risk communication strategy for disasters; implementation mechanism and pilots	X	X		3	45 (0.209)
Develop systems, capabilities and plans with HR and technology to strengthen accountability systems	X	X		3	67.5 (0.314)
Total (US$ million)					**(83.19)**

Key Recommendations: Based on the areas identified above; specific recommendations are as follows:

Strengthen institutional framework, coordination for disaster management (Short-, Medium- to Long-Term)

It is important to define, and if required, realign, the roles of disaster management authorities at federal, provincial and district levels, and their coordination with Planning & Development machinery, the Economic Affairs Division, Law Enforcement Agencies, and other stakeholders in disaster response, relief, and rehabilitation. Information flow and acquiring damage data require institutions to formally collaborate, which also enables them to manage stocks (real time & short-term), run communication networks (short- to medium- term), and manage Human Resources throughout response, relief, and rehabilitation phases.

Develop framework for climate sensitive planning and budgeting at national and provincial levels (medium-term) by linking medium-term budgetary frameworks and annual plans. Develop instructions to draft climate sensitive budgets in the budget call circulars.

Establish and strengthen databases and statistical capabilities (Medium- to Long-term)

Improve ability to collect, manage and report especially disaster-related data, and establish early warning systems based on regular data capture.

Strengthen accountability

Emergency stimulus measures must be subject to audits, oversight, and reporting so that recipients receive aid, and corruption, fraud, and waste are lessened.

Response and recovery actors should support oversight institutions with resources and the independence to carry out their functions.

Capacity and resource needs at the LG level: Local governments ideally help central and provincial governments respond better to disasters. The following measures may be undertaken: (i) assess risk and disaster preparedness in LG laws, rules, regulations, and rules of business; (ii) reform Provincial Local Government Acts (PLGAs) via mandates for emergency response; (iii) implement PLGAs formally and financially support LGs; (iv) prioritize gender specific inputs and issues (medium-term).

Rule of Law: LEAs can be strengthened to enable Pakistan's Criminal Justice System (CJS) to respond better to emergencies:

- Integrated CJS policy framework with a focus on transparency, coordination, and accountability during recovery and rehabilitation
- Bottom-up demand-driven programming to restore capacity of CJS to respond to future crises and disasters, and to the needs of vulnerable populations
- Capacity building for preparedness, response and emergency management systems and processes
- Leverage the informal justice system for Alternative Dispute Resolution (ADR) in emergencies

IT-enabled governance systems: IT systems help governments to offer responsive, accountable, innovative, participatory, cost- & time-efficient interventions; they also enable governments at all levels to consolidate service provision at single points to mitigate impacts and lower construction costs.

Procurement/e-procurement reform: Current paper-based systems are cumbersome and time consuming, and e-procurement with robust and transparent controls offers a better approach. E-procurement should provide: (i) waivers in PPRA rules for emergency procurement; (ii) review ceiling and approval limits, and (iii) enable faster procurement through pre-qualified suppliers (medium-term).

Civil society, NGOs and local philanthropists: These have played a critical role in immediate responses to floods. An Engagement Plan and Strategy to engage with such organizations should be pursued, and will require establishing common platforms (medium-term).

Donor coordination, aid management and effectiveness: A mechanism is needed to coordinate and monitor the activities of donors, ideally at federal and provincial levels. At the federal level, this body could be set up at EAD or MOP&SI, with NDMA, key federal ministries, provincial governments, and donors/ development partners. At the provincial level, these bodies can be established at the Chief Minister's Office, with PDMAs and provincial departments.

Limitations

The main limitation has been consistency of data used to estimate damages; methods to triangulate data shared through the P&D in each province included field data collection, literature and some KIIs. The numbers nevertheless provide a good estimate of effects at provincial and district levels. Finally, it is important to note the political sensitivities and vested power structures in government, which may compromise the efforts of implementing partners and which are a risk that will have to be actively managed.

Social Sustainability, Inclusion, and Gender

Pre-floods Context and Baseline

Socially excluded and marginalized groups in Pakistan typically comprise women; minorities (ethnic, religious, caste and gender-based); older people; transgender people; people with disabilities; people with HIV/AIDS; young people and children; refugees; indigenous populations; and the rural poor. Service delivery and institutional capacity to address the specific needs of socially excluded and marginalized communities varies greatly across provinces, and access to and quality of services depends on the particular social group seeking access. Invariably, the baseline for service delivery is quite low for marginalized groups, with major gaps in the availability, accessibility, and effectiveness of protection and other services.

Gender: Across numerous global indices measuring gender equality, Pakistan consistently ranks among the lowest in the world.[182] Pakistani society is highly patriarchal, and gender-based disparities are stark between women and men in health[183], education[184], income and employment opportunities[185], social protection[186], personal security[187], control over assets[188] and participation in politics or decision-making processes[189]. Additionally, women shoulder the burden of unpaid care and domestic work (over 10 times more than that of men), further reflecting harmful and restrictive social norms.[190] Violence against women and girls is rampant, as is impunity, and usually spikes around disasters. The number of transgender individuals in Pakistan is contested: while the 2017 national census suggests there are just over 10,000 transgenders in Pakistan, the community believes this figure to be likely closer to 50,000. Data point to significant vulnerabilities among the transgender community, including lack of decent and gainful livelihood options, discrimination in access to protection and other services, higher prevalence of HIV/AIDS with low access to medical help, and intensifying social persecution with organized physical attacks particularly in urban settings.

Major religious and ethnic minorities include the Hindus (1.27 percent and concentrated mainly in Sindh), and Christians (0.09 percent and residing in larger numbers in the Punjab province). Other ethno-national

182 As indicated in the Gender Inequality Index (WHO), Gender Development Index (UNDP), and the Gender Gap Index (WEF)
183 67 percent of women report serious problems accessing health care (Pakistan Demographic Health Survey, 2017–2018, Table 9.17)
184 Women's enrollment in formal education is only 24 percent, consequently female literacy rates are 49 percent vs. 70 percent for men (PSLM 2018–2019)
185 Female labor force participation in Pakistan is one of the lowest in the world (21 percent nationally, and as low as 12 percent in Balochistan), and 69 percent of women are in vulnerable employment, earning 16 percent of what their male counterparts earn. Home-based work accounts for 83 percent of women's employment in manufacturing, predominantly concentrated in textiles, apparel, leather and footwear. Women comprise 68 percent of the agriculture labor force and occupy significant roles in livestock production activities, however, they are excluded from ownership and control of land, which is the single most important source of security, income, and status in the agricultural economy. (Pakistan Labor force surveys, 2017–2018, 2020–2021; WEF, Gender Gap Report 2022)
186 Women account for 77 percent of the population without CNICs (Election Commission of Pakistan. (2021). Pilot Project Report), and only 7.8 percent of women receive benefits from BISP (PDHS, 2017–2018, Table 3.10)
187 The prevalence of GBV in Pakistan is most pronounced among married women (especially those married before the age of 18), divorced, separated, or widowed women, young women aged 15–19, women living in rural areas, and marginalized populations such as people with disabilities and transgender people. (PDHS 2017–2018, Table 16.10)
188 NCSW, UN Women, CGaPs, Norwegian Embassy (2020) Young Women in Pakistan Status Report 2020
189 Women in Pakistan have the smallest share of senior, managerial, and legislative roles (4.5 percent) in the world (World Economic Forum, Global Gender Gap Report 2022)
190 The Power of Parity: How Advancing Women's Equality Can Add US$12 Trillion to Global Growth, McKinsey, 2015

minority groups include Brahvis, Hindkowans, Hazaras, Burushos, Tajiks, Uzbeks, and Afghans, with Afghans comprising the majority of refugees and temporarily displaced populations (TDPs). Refugee populations live in significantly higher numbers in the provinces of KP and Balochistan. Sindh and Punjab are home to 8 percent and 3 percent of the total national refugee population respectively. These communities are generally undocumented and underserved (especially lower caste families and individuals within the Hindu community working in agriculture in Sindh), and vulnerable to social persecution and exclusion, violence, and discrimination in access to basic services and protection.

Older people and children: People above 60 years constitute roughly 7 percent of the population of Pakistan. There is also a large number of young people, with 64 percent of the total population below the age of 30 years, and 29 percent between the ages of 15 and 29 years. Only a small proportion of older adults are financially independent after retirement, whereas child labor and parental physical disciplining remains high across Pakistan, with children under 14 years commonly working as unpaid family helpers in agriculture and girls taking on unpaid care in households from an early age.

People with Disability/ies): About 10.69 percent of the population aged 5 and above are identified to be living with some form of functional difficulty[191]. Women are more likely to suffer from disability than men, including in particular, widowed women[192]. They have limited access to health facilities and are three times more likely to experience physical, sexual, and emotional violence.[193]

Assessment of the Disaster

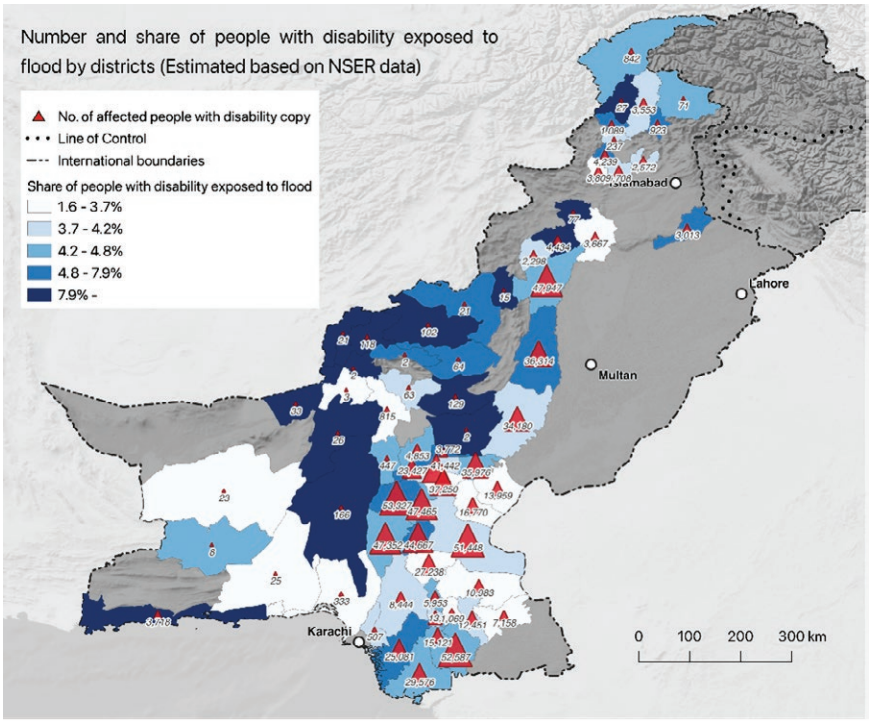
A Social Impacts Assessment (SIA)[194] was carried out as part of the Post-Disaster Needs Assessment (PDNA) using qualitative research methods, with 384 individuals affected by the flood in 8 calamity-hit districts (two from each of the four provinces)[195], and 65 government and non-government officials.

The SIA aimed to inform post-disaster recovery efforts by providing information on the impact of the floods on (i) socio-economic conditions of socially excluded and marginalized groups residing in flood affected areas; (ii) livelihoods and community strategies for recovery – including potential negative coping strategies; (iii) social capital and cohesion; and (iv) community perceptions of aid and recovery efforts – including adequacy of aid, transparency in relief distribution and access to information about available support.

This section also includes key findings from assessments conducted by government and other development partners.

191 PSLM 2019–20
192 PDHS 2017–18
193 UNFPA. We Matter. We Belong. We Decide. UNFPA Disability Inclusion Strategy 2022–2025, 2021.
194 World Bank led SIA exercise, in collaboration with UN Women Pakistan
195 The SIA covered 2 Tehsils each in 8 districts across 4 provinces (i.e., Districts Khairpur and Sukkur in Sindh; Lasbela and Quetta in Balochistan; Dera Ghazi Khan and Rajanpur in Punjab; and Swat and Charsadda in Khyber Pakhtunkhwa). All chosen districts are on Pakistan's National Disaster Management Authority's list of "calamity-hit areas" as of 20th September 2022, where flood related devastation is manifestly greatest. Separate focus group discussions were conducted with men and women (16 with males and 16 with females) so that women were able to freely discuss issues concerning them (including safety and security). 65 Key Informant Interviews were held with community leaders, national and international NGOs, national, provincial and district disaster management authority officials, and district administration officials.

FIGURE 8. FLOOD IMPACTS ON LIVELIHOODS OF VULNERABLE GROUPS



Source: World Bank using NSER sample

The floods have disrupted livelihoods severely, particularly for landless farmers, agricultural laborers, daily-wage workers, and livestock/dairy workers.

Women home-based workers[196] and female on- and off-farm agriculture and dairy/livestock workers have also been disproportionately affected. Livelihood impacts vary based on geography, location and agroeconomic activity of different social groups, and affect precarious workers associated with agricultural and livestock sectors most severely (specifically women, older people, people with disabilities, and landless farmers). While livelihood losses are substantial, damage to infrastructure further restricted casual labor opportunities, particularly for women, transgender persons, and people with disabilities. These impacts will likely push women further into poverty and increase gendered economic inequality.[197, 198] Women's overall security has also been affected. Personal belongings (jewelry and gold) are being sold to cover basic household expenditures. The SIA noted increased pressure to help men pay off loans. Importantly, while all communities report reducing household consumption of basic items, food consumption is dramatically altered for women, children, and the elderly. Women also report greater burdens of unpaid household care and domestic work after the floods, which increased further for those forced to live with extended families**.** This cycle perpetuates the escalating inequalities in women's and men's use of time, while reinforcing discriminatory beliefs that limit control over decisions, and access to resources and opportunities.

196 As indicated in the SIA, women have also suffered notable losses in other forms of livelihoods, such as manufacturing work, which is largely home-based and consists of handicrafts, garment and textile stitching, and embroidery work, due to disruptions in demand and supply chains.

197 UNDP (2021) Womenomics, available at: *https://www.undp.org/pakistan/publications/womenomics-women-powering-economy-pakistan*

198 NCSW/UN Women/Norwegian Embassy, Islamabad/CGAPS. (2020). Young Women in Pakistan – Status Report 2020

In most SIA sites, children had either been pulled out of school (particularly girls) or shifted to public schools (where available). Poor families reported an inability to provide their children with school supplies, while other children missed school for extended periods because they were repairing family homes. Girls became more vulnerable to child and early marriages as a coping strategy by dislocated families. In this regard, 640,000 adolescent girls are vulnerable and at increased risk of coercion, GBV and child marriage in the aftermath of the floods.[199]

Flood Impacts on Social Relations and Cohesion

Severe breakdown of social relations and cohesion is common in flood affected communities. However, uneven knowledge of and access to aid among marginalized groups and displaced populations, and insufficient or inadequate aid have further added to social disharmony and strained relations between government, civil society, and citizens. The SIA shows that community tensions are heightened among flood impacted communities, with conflicts over land, and at temporary accommodations, shelters, and camping sites, in which women, children and the elderly are more severely impacted. In Sukkur and Khairpur districts, the diversion of water to protect the lands and houses of local influential figures also created conflict, with small landowners unable to take on powerful landlords who allegedly enjoy the support of local law enforcement staff who operate under their patronage. In stricken areas, trends indicated that men instigate conflict, while women preserve social cohesion. Except for Charsadda, Swat and Quetta where social codes and norms of Pashtun tribes mandate help to others within the tribe, other districts of the SIA reported to have experienced an increased lack of solidarity following the floods, which presents a challenge in the otherwise collaborative social relationships.

Indicators of post-traumatic stress were noticeable in all communities and impair their ability to function and plan recovery. Stronger manifestations of trauma are seen among women, children, and the elderly.[200]

Domestic violence against women was also mentioned by women respondents as a frequent occurrence after the floods[201] but also justified by them[202] as resulting from frustration among men. Local NGO workers and some community leaders also noted a rise in Gender-Based Violence (GBV) cases in the immediate aftermath of the flood in their areas. While protection services for women and children are few, OCHA's Multisectoral Rapid Needs Assessment has also found that women are unaware of GBV-related services available to them in their area (Sindh 85 percent, Punjab 69 percent, KP 82 percent), and that this is exacerbated among displaced persons by poor camp management. The SIA further found that despite these social problems, no knowledge of avenues for psychosocial and mental health support could be identified by communities, government officials or civil society representatives interviewed. District and Tehsil administration officials were mostly[203] unaware of GBV referral mechanisms, whereas NGO representatives and community leaders noted GBV to be an issue requiring immediate attention at the local level. These findings are consistent with a recent Balochistan Disaster Management Authority's survey report in which key protection concerns identified by the communities included inter-communal disputes (10 percent), child marriages (9 percent), and GBV (7 percent), followed by other issues including violence against children, harassment, physical assault, and human trafficking.

199 UNFPA estimates.

200 In Rajanpur and Dera Ghazi Khan, dead bodies were washed down from villages upstream, causing acute distress and horror among downstream families. Respondents reported that children were underfed, and due to anxiety and trauma, eating even less than was available. SIA, 2022

201 The SIA FGDs included at least four survivors of domestic violence, who mentioned being beaten by their husbands. These women were not probed for details during group discussions as per guidelines provided to the research team. All mention of domestic violence was brought up by women voluntarily.

202 Based on stress among men induced by financial straits and inability to care for their families.

203 District Commissioners were relatively more aware of protection services and had established coordination mechanisms with the police, and in Balochistan's case, the armed forces.

Flood Impacts on Accountability

After the floods, though many community-based groups, influential figures, political leaders, activists, and social organizations sprang into action, concerns remain over uneven, irregular, and inequitable aid distribution. There is substantial perceived favoritism, nepotism, corruption, hoarding, discrimination, and exclusion in aid distribution which deprives marginalized and excluded communities of support and creates an atmosphere of distrust and resentment. Further, lack of coordination was noted between local government officials, NGOs, philanthropists, and community volunteers across the board. In many cases, government officers claimed they were disconnected from higher or lower chains of command/decision-making and other government departments involved in relief work. Lack of communication and coordination emerged as a significant hurdle to government operations, as did lack of equipment, technology, personnel and funding for district and provincial DMA staff, and technical expertise for inclusive needs assessments. Notably, while women were actively involved in self-help reconstruction and rehabilitation work, they are largely absent from mid-management and decision-making bodies at all governance tiers, and are not visibly part of official disaster relief and management teams, despite overwhelming evidence that their participation and leadership increases the resilience of households and communities, and strengthens public sector engagement, effectiveness, and accountability during humanitarian emergencies.[204] In addition, while special interest political and social groups helped minorities and marginalized communities, religious parties allegedly discriminated against people of different faiths in some places. The differences in perception may have been influenced by the number and presence of minority communities in specific Tehsils, which varied between sites. The SIA also identified instances in which political parties and their local leaders distributed aid only to family and party members.

Finally, the timing, location and distribution of aid was also found to prejudice women, older people and people with disabilities. Widows, pregnant women, people with disabilities, older people and poorer populations were most ill-informed about aid distribution activities generally. These groups were unable to obtain help because of the difficulty of negotiating queues and crowds at distribution points.

Interviews conducted during the SIA identified several gaps in terms of medicine, various non-food items such as mosquito nets, hygiene and sanitation products, cooking utensils, stoves, dry wood, bedding and blankets, warm clothes and shoes. Heating, light and gas were also frequently mentioned as missing at the household level. Some degree of inadequacy of relief assistance was noted in all sites, with the needs of women, infants, older people, people with disabilities, and those with special needs considered by respondents to have been largely ignored in relief packages provided.

Impacts on Refugees and People with Disabilities

There are over 800,000 Afghan refugees living in calamity-declared areas.[205] Their access to services is severely limited due to lack of adequate documentation (computerized national identity cards in particular), which is required by many organizations to obtain relief. Much aid and support is available to registered Pakistani citizens only.[206]

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204 *https://climatechampions.unfccc.int/why-female-leadership-is-crucial-to-tackling-climate-change-and-other-crises/*; *https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/Library/Publications/2020/Policy-brief-COVID-19-and-womens-leadership-en.pdf;* Human Rights Commission of Pakistan. (2020). How Far Have Women Legislators Come? A Performance Assessment 2018–20. Lahore: Human Rights Commission of Pakistan.

205 *https://www.unhcr.org/news/briefing/2022/9/63297ee24/unhcr-humanitarian-needs-remain-acute-displaced-flood-hit-areas-pakistan.html*

206 SIA findings from Quetta

It is estimated that 3.8 million people with disabilities have been impacted across 4 provinces.[207] People with disabilities also faced specific challenges during evacuation due to disability un-friendly evacuation services and lack of appropriate equipment for self-help groups according to the SIA.

Recovery

SIA findings suggest that there are significant gaps in the support currently provided to vulnerable and marginalized groups as part of relief and recovery efforts – including in terms of livelihood restoration. In addition, community tensions were identified in nearly all research sites. These tensions were nearly always connected to perceptions that aid distribution was not transparent. The following recommendations focus on supporting community recovery efforts:

1. Support data collection, and coordinate with community efforts

Strengthen sex, age, and disability disaggregated data collection, ongoing needs assessments, communications, monitoring and evaluation in affected districts, and work towards representation of excluded groups to identify and address their vulnerabilities.

- **Support Government of Pakistan's relief coordination efforts in the following areas**: (i) establishing a coordination committee at the union council level to prepare home rehabilitation plans for vulnerable groups;[208] (ii) improving communication on aid delivery and delivery practices. This would include involving local relief committees (with meaningful engagement of at risk/vulnerable groups, NGOs, self-help groups, and organizations of people with disabilities), in the identification of beneficiaries - avoiding locations and timings, and any other barriers that dissuade women, older people and people with disabilities from accessing them; and (iii) establish and/or strengthen Grievance Redress Mechanisms (GRMs) associated with relief distribution to address issues of conflict over aid distribution, and over resources at the local level.

- **Make gender-and disability responsive budgeting** a requirement for all priority plans and budgets, specifying stakeholders, indicators, and benchmarks for achieving gender equality.

2. Provision of protection services and investment in behavioral change interventions

- **Strengthen government's capacity to respond to protection needs by establishing and expanding coverage of critical protection services**. This will include:
  - **Expand and strengthen services offered through women's shelters, crisis centers,** child protection units, old age homes, orphanages, and other community centers to cater to rising needs and cases of violence and abuse in every province.
  - **Expand services provided through mobile health units/specialized NGOs** (with a minimum of 40 percent female health workers) **to remote areas.** Mobile service provision should address the specific protection needs of women, girls, and people with disabilities.

207 UNICEF. The estimated affected people with disability/ies are calculated by using PBS population estimates as of 30th August 2022 for age groups 18 and above. Estimated numbers may be higher because the data do not include affected population below the age of 18.

208 E.g., women, children, transgenders, older people, people with disabilities, those with debilitating diseases, landless farm workers, small holders, home-based piece-rate, and daily-wage workers.

- **Roll-out emergency psycho-social support** as an essential service for recovery, for vulnerable groups in all affected districts.
- **Strengthen GBV and Child Protection referrals** from disaster relief organizations and provincial/district-level protection services.

- **Invest in behavioral change, and community sensitization interventions for GBV** at the community level, to be implemented through community-based organizations/NGOs to transform social norms for GBV prevention.

3. Support community-based early recovery and disaster preparedness efforts

- **Improve early recovery efforts by adopting community driven development[209]approaches focused on livelihood restoration**. Strengthen needs identification process by establishing and /or strengthening community forums, such as community development councils and/or village committees. Channel additional sub-grants funding to such community platforms to expedite recovery and empower communities, and especially vulnerable groups.
  - Given the significant impact on livelihoods, particularly on women home-based workers and casual laborers, the recovery strategy would include: (i) livelihood restoration grants, and (ii) opportunities for labor intensive rehabilitation and reconstruction work, with participation and fair wages to members of marginalized and minority communities.[210]

- **Develop and strengthen community disaster management systems drawing on community service delivery platforms** to address: (i) gaps in the early warning system to ensure they integrate vulnerable groups' concerns and needs; (ii) establish a mechanism through which support can be rapidly/flexibly channeled to affected communities in future disasters with the involvement of local governments; and (iii) improve disaster warning systems, particularly around evacuation and temporary resettlement. This would build on community knowledge and networks and include communication strategies to reach vulnerable and marginalized groups including women, people with disabilities, older people, and minority groups (based on any ethno-lingual-national and religious identity).

209 For example, in line with last-mile service delivery through community-driven development (CDD), a priority identified by the Government of KP under the Tribal Decade Strategy, the government is implementing a Pakistan community support project (CASA-1000) in the merged areas, by establishing community development councils (CDCs) or revitalization of existing community organizations. The objective is to facilitate community participation and oversight; identification and planning of community development priorities (for local infrastructure schemes), among other functions. The CDCs prepare community development plans (CDPs), to be followed by sub grants allocation to CDCs to facilitate implementation of prioritized schemes in their areas.

210 Several World Bank financed government projects are being repurposed to support rehabilitation efforts. Three new projects are being developed in Sindh, the worst affected province by ongoing floods, to strengthen rehabilitation and reconstruction via infrastructure and livelihoods restoration, including cash for work schemes, and provide housing relief to the most vulnerable and marginalized.

TABLE 53. RECOVERY NEEDS AND STRATEGIES

Intervention/Activity	**Short**[211] (Up to 12 months)	**Intermediate** (Up to 3 years)	**Long** (Up to 5 years)	**Priority** (Rank 1–5)	**Cost in PKR Million (US$ Million)**
Support data collection, and coordinate with community efforts					
Support data collection, ongoing needs assessments, communications, outreach and Monitoring and Evaluation. Support Government of Pakistan's coordination efforts to deliver assistance to vulnerable and marginalized groups.		x	x		64.4 (0.3)
Provision of emergency protection services and investment in behavioral change interventions					
Build capacity of social welfare department staff to provide support for GBV survivors and address protection needs of people with disabilities, children, and older people.	x	x			112.8 (0.5)
Support additional provision of critical protection services through crisis centers – including psychosocial support.	x	x	x		6586 (30.7)
Conduct behavioral change community sensitization interventions on main protection concerns (including GBV), and share information on available services at community level (through NGO/CBOs).		x	x		3572 (16.6)
Support community-based early recovery and disaster preparedness efforts					
Support early recovery through community driven development. Support a needs identification process through community development councils/committees/village councils. Channel additional sub-grants funding to such forums to support recovery at the community level.		x	x		9697 (45.1)
Develop community disaster management systems linked to existing community service delivery platforms, addressing gaps in the early warning system tailored to the needs of women, people with disabilities, the elderly, or any other groups.		x	x		504.8 (2.4)
Total					**20,537 (95.6)**

211 Time periods to be finalized with the government.

Limitations

The most significant challenges were a shortage of time and the spread of communities, some of whom could not be reached. Site selection was finalized after considering field teams' safety, especially female enumerators. Certain questions were dropped for their potential triggering effect (such as loss of family members, number of dependents, and questions about GBV). As social impacts can be difficult to identify, particularly facets of social exclusion, the research team had to rely on community participants to point out specific groups of people who were especially marginalized. It was difficult to access transgender persons (although two transgender persons did participate in one location only), due to their unique social structures that keep them separate from mainstream society. For livelihood losses and damages, the research team had to rely on self-reported net asset worth prior to and after the floods. In a few places, FGDs had more participants than planned for. Government data on social protection services such as shelter homes, old age homes, orphanages and local law enforcement and justice were not received in time for this report, and lack of disaggregated data (by gender, disability, age etc.) for affected communities was a major impediment to calculating costs and levels of exclusion.

Social Protection, Livelihoods, and Jobs

Pre-Flood Context and Baseline

This sector report focuses on the poorest segment of the population affected by the floods, which includes both those below the poverty line and the vulnerable population above it. For livelihoods and jobs, the baseline numbers are estimated for the entire population in the flood-affected areas, while the human capital-related education and health baselines numbers include only the bottom three quintiles of the population, since these are considered the most vulnerable.

State of Sector Prior to Disaster: Approximately 38 percent of flood-affected households are female-headed, which are generally more vulnerable because of limited mobility, lower socioeconomic status, and the increased threat of sexual and domestic violence. A total of 3.7 million people affected by the flooding owned livestock or agricultural land, or both. Households in the flood-affected districts were already more impoverished than the national average (poverty rate of 31.4 percent compared to 21.9 percent).[212] The Human Capital Index (HCI) rating, which was already low in the flood-affected areas, is likely to deteriorate.

Livelihoods and Jobs: The pre-flood employment level in the flood-affected districts was 42.2 percent of those ages 10 years and above or 21.8 million people. Although women constituted 48.2 percent of the working age population, their employment share was only 20 percent, while for men it was 80 percent. Only 17.4 percent of working age women residing in the flood affected districts were employed compared to 65.3 percent of working age men. The unemployment rate among women was 8.3 percent, which is 3.8 percentage points higher than that of men. The highest share of the employed were in Sindh, at 50.6 percent (11 million), followed by Khyber Pakhtunkhwa (KP) at 25 percent (5.5 million), Balochistan at 14

212 Human Impact Assessment PDNA - Livelihoods, Incomes and Poverty – WB Poverty & Equity Team.

percent (3.1 million), and lastly Punjab at 10.4 percent (2.2 million). The highest proportion of employed were youth ages 15–29 years, constituting 8.8 million (40.4 percent), followed by those aged 30–44 years, at 7.5 million (34.5 percent), and then those ages 45–60 years, at 4.3 million (19.8 percent). In addition, approximately 0.5 million children ages 10–14 years were engaged in economic activities. The biggest share of employment was in the agriculture sector, at 43.1 percent, followed by subsectors of the service sector—community and social services 15.4 percent; wholesale and retail trade 12.9 percent; and Manufacturing at 10.5 percent.

Among those who were employed, only 21.6 percent had a regular job with a fixed wage, and less than one percent were employers (0.8 percent), the rest were in vulnerable jobs, including own-account workers (35.5 percent), contributing family members (22.3 percent), and casual employees (19.8 percent), indicating a vulnerable population even prior to the floods.

Primary and Secondary Education: There are approximately 5.2 million primary and secondary school-aged children in the poorest 60 percent of the population in the flood-affected districts. The floods may push at least 10 percent of enrolled children out of school—with the majority being the poorest. The government is already running a conditional cash transfer (CCT) program —*Taleemi Wazaif*—to incentivize primary and secondary education. It is operational in all districts of Pakistan, including the flood-affected districts, and targets the poorest 40 percent of the population.

Health and Nutrition: The average stunting rates in the flood-affected districts are relatively higher[213], and could worsen if reconstruction and rehabilitation efforts do not target the health and nutrition of pregnant women and young children. There are approximately 1.1 million children under the age of 2 and 464,000 pregnant women currently residing in the flood-affected districts that fall into the bottom three quintiles (60 percent) of the population. The government-run H&N CCT program—*Nashonuma*—operates in 18 flood-affected districts, but currently covers only 138,000 pregnant women and children under two. Its current coverage among the poorest 60 percent of the population is only 7 percent of children and 14 percent of pregnant women.

Assessment of Disaster Effects: Damage and Loss Estimates

This section mainly analyzes the income losses of the affected population and the adverse impact on human and social capital. Those living above the poverty line but below the vulnerability line—usually 1.5 times the poverty line—are considered most at risk of falling into poverty once a shock hits. The BISP (Benazir Income Support Program), a basic cash transfer program, considers the bottom 40 percent of total population in the National Socio-Economic Registry (NSER) as poor, but based on the convention, those in the third quintile of the distribution are vulnerable to falling into poverty. For purposes of assessing the impact and defining the social assistance interventions, the vulnerable population is defined as the bottom three quintiles of household welfare status as identified in the NSER. For assessing income losses and identifying employment-related strategies, the entire population in the flood-affected areas is considered.

Methodology: The methodology for assessing the impacts adopts a mix of ground-based data, the NSER, Labor Force Survey, Household Income and Expenditure Survey, various Pakistan Bureau of Statistics databases, and remotely collected data. The labor income losses are calculated using

213 Ranging from 50-80 percent in flood affected areas against the national average of 42%, Source: MICS 2010-14, UNOCHA 2018.

potential job losses and disruptions and their associated average monthly earnings. In additional to income losses, the other effects are seen in the shape of negative coping mechanisms (such as additional debt, sale of leftover assets, migrating for work, pulling children out of school, missing meals, child labor). The effects from the negative coping mechanisms can be a delayed impact—but experience from other disasters shows that they are very likely to happen. Labor income losses are only calculated for paid employees and the self-employed, without taking into account contributing family workers, who work on an unpaid basis for the family farm or business and do not have a direct income stream.

Livelihoods and Jobs Impacts: Using the baseline employment figures and considering the vulnerability level of each status of employment, the number of people impacted by disruptions and loss of employment in the flood-affected districts is estimated at 4.3 million workers. This is approximately 20 percent of the pre-flood workforce, suggesting that one in every five workers living in these districts have been affected.

The biggest share of job losses and disruptions (50 percent) were experienced in Sindh, followed by KP (25 percent), Balochistan (14 percent), and Punjab (11 percent). This is not surprising since most workers in the affected districts were living in Sindh prior to the disaster. Sector-wise, in line with the baseline distribution of employment, the highest proportion of employment loss is likely to have been experienced by those engaged in the agriculture sector at 43 percent (1.9 million), followed by the service sector at 36 percent (1.5 million), and then industry, at 21 percent (0.9 million).

The estimated monthly loss per province ranges from PKR 6 billion in Punjab to PKR 30.6 billion in Sindh. To determine the total estimated labor income losses, we estimate the likely number of months of disruption. We estimate that it will take a month for the water to recede in all provinces except for Sindh, which could take three months. This suggests that the total estimated labour income loss will be PKR 130.4 billion. The highest share of labor income loss is estimated for those in Sindh, at PKR 91.8 billion, followed by KP (PKR 19.5 billion), and then Balochistan (PKR 13.1 billion) (Table 54).

TABLE 54. LABOR INCOME LOSSES FOR SELF-EMPLOYED AND PAID EMPLOYEES

	Monthly Labor Income Loss (PKR Billion)	Expected Disruption Period in Months	Total Estimated Labor Income Loss (PKR Billion)
Balochistan	13.1	1	13.1
KP	19.5	1	19.5
Punjab	6	1	6
Sindh	30.6	3	91.8
Total	**-**		**130.4**

Human Capital (Education and Health & Nutrition) Impacts: Given the high maternal mortality, neonatal mortality, and stillbirth rates in Pakistan, the disruption of basic health services because of the floods can have dire consequences for the approximately 1.1 million children under the age of 2 and 464,000 pregnant women who fall into the bottom three welfare quintiles currently residing in the flood-affected

areas. Similarly, about 5.2 million primary and secondary school-aged children remain vulnerable to extreme learning loss because of disruptions of schools. The floods have also disproportionately affected the poor and vulnerable—including persons with disabilities (per the PBS database, 10.69 percent of families have at least one person with a disability), women, and the elderly (per the NSER, 5.2 percent of the population is age 60 and above)—worsening the dire circumstances of many that have no or very limited coping mechanisms available to them. Exact estimates of these losses are being assessed by the health and education sectors in the respective chapters of the PDNA.

Linking Effects to Impacts

Livelihoods and Jobs: Adverse impact is high in areas where water has not receded, and the case of Sindh is extreme in this regard, followed by Punjab, Balochistan, and KP. Among the agriculture-based population in Sindh, it will take a longer time for people to reengage, and some may even miss out on the next cropping cycle. In Balochistan, KP, and Punjab, most of the agriculture-based population has already reengaged for the next cropping cycle. Although the affected population involved in agriculture will need support to compensate for their crop losses, others engaged in informal work in the affected areas will be equally impacted.

Human Capital (Education and Health & Nutrition): Over 5 million primary and secondary school-aged children (approximately 48 percent girls) that fall into the poorest 60 percent of the population in the flood-affected areas are at risk of missing at least one semester of schooling. Prior to the flooding, about 40.8 percent of students enrolled in primary schools, and 37.7 percent of those in secondary schools in these areas were girls. Female children are more likely to discontinue schooling owing to challenges posed by unfavorable living conditions (such as lack of mobility, lack of access to safe transport) and a lack of appropriate school facilities (such as boundary walls and toilets, as well as childcare facilities), further widening the gender gap in school enrollment. The increased care burden from the flooding may also increase the burden on women and girls for unpaid care work, which will also affect school attendance. On the other hand, male children may be compelled to work with family members to supplement household income either through informal jobs or by contributing to family agricultural practices.

The health of 18.6 million people is also at risk because of the flooding. Areas inundated by water are at a high risk of waterborne diseases, such as hepatitis-E, malaria, dengue, and cholera, putting the affected population at risk of disease and chronic conditions, including mental health issue. The mental health impact of unemployment is also likely to instigate gender-based violence and suicides in extreme cases. Many basic health units have been completely or partially destroyed or are inaccessible, rendering the majority of the population without any health infrastructure. The situation will affect the ability of the poor and marginalized to access health and nutrition services and there is a strong fear of malnutrition and an increase in communicable and other diseases. The country already has a high stunting prevalence (over 40 percent), and it is feared that the floods will further exacerbate the situation if health and nutrition services do not reach pregnant/lactating women and children during their first 1,000 days of life.

Recovery Needs and Strategy

Reconstruction/Rehabilitation Strategy for Social Protection, Livelihoods and Jobs Livelihoods and Jobs:

The ILO's Decent Work Agenda is an essential element of the Humanitarian-Development-Peace Nexus, where employment, decent working conditions, skills development and social dialogue can contribute to peace and resilience as outlined in ILO Recommendation 205, which provides guiding principles for promotion of decent work in crisis through all stages of preparedness, recovery and reconstruction.

The most urgent recovery activity should focus on meeting immediate needs, including provision of emergency employment for people to kick-start recovery, while also creating conditions for long-term recovery, resilience to multiple shocks (including sudden climatic events and natural hazards), and sustainable development. The key short-term priority is to provide income opportunities to enable farmers and microentrepreneurs to rebuild their workplaces.

- **Emergency Employment Services (Short Term):** As people have become disenfranchised after the floods, it is imperative to immediately institutionalize support through EES. These include registration and advisory services for jobseekers. The implementation of labour market programmes (e.g. labour-intensive public works; entrepreneurship; etc.) and linking them with social protection programmes. The EES are designed to meet the needs of special groups of job seekers (displaced, old, disabled persons, youth, and women)
- **Skills Development (Short to Medium Term):** The recovery of employment and livelihoods needs to be promoted through rehabilitating the capacities of people and institutions. It is crucial to provide disaster-affected workers with relevant skills development opportunities to address the demand for skilled labor during the recovery process, and to promote sustainable jobs, including in the health and care sector. Skills training programs should focus on resilience building and climate adaptation and can include skills development for rebuilding (such as masons, contractors, carpenters, healthcare, childcare, elder care, care for people with disabilities), entrepreneurship, and financial literacy, especially for women and youth. At the same time, targeted support should be provided to micro and small enterprises to facilitate recovery of the local economy. Special attention must be paid to issues such as child labor, forced labor, and non-discriminatory and equal opportunities for all, while ensuring the inclusion of women and people with disabilities. Moreover, freedom to organize in cooperatives, associations, or as solidarity groups, needs to be mainstreamed in all programmatic activities.
- **Markup Subsidy (medium term):** microfinance offers a wide range of possibilities to effectively buffer income and expenditure shocks. Access to financial services allows families to better manage risks and gives them alternatives to less desirable/negative coping strategies such as child labour and child marriages. However, loans will only have a limited income-generating effect if recipients lack the business skills necessary to start and grow their microenterprise. So, microcredit will be twinned with entrepreneurial training that will help households to restore their small-scale farming and non-farming activities.
- **Employment Intensive Investments (Medium to Long Term)** Systematic support through employment intensive investment programs to rehabilitate and maintain rural infrastructure which is key to establishing and maintaining livable conditions in flood affected areas, and at the same time provide cash injection through immediate and direct job creation and contribute to revitalization of local economies through improved infrastructure, both which are important dimensions of the ability of communities to cope in the current situation, a job-rich recovery strategy that also contributes to resilience.

Social Protection

- **Multipurpose Grants (Short Term):** Families whose main sources of livelihoods were agriculture and daily wage work (mostly workers in the informal economy who are not covered by state run social protection schemes or else), as well as the most vulnerable groups (such as persons with disabilities, the elderly) should be supported in the short term to maintain minimum levels of consumption through multipurpose humanitarian cash transfers, until the target beneficiaries reengage in their regular livelihoods. It is recommended that the poorest 60 percent of families should be provided with consumption-smoothing support for at least three months in the case of Sindh, and two months each for Punjab, KP, Balochistan, and Special Regions. There are approximately 2.3 million families identified in the NSER who would require this support to cover their consumption and partial resettlement expenses. The value of the transfer should be set at the average basic consumption expenditure for the bottom three quintiles. However, since the needs of families who have someone with disabilities are larger, the value of the multipurpose grant should be 20 percent higher for them.
- **Education Conditional Cash Transfers (Taleemi Wazaif) (Short Term):** Since the education CCT program is already functional in all districts of Pakistan, efforts should be taken to ensure that the program is extended from the currently targeted bottom 40 percent of the population to the bottom 60 percent because of increased vulnerabilities. Families currently not enrolled need to be enrolled as quickly as possible, incentivizing parents to bring children back to school, and hence avoid disruption in their education. Provision of the education CCT should continue, irrespective of the availability of schools, to keep families engaged in the program, which may require the temporary suspension of conditions attached to the delivery of the benefits. The program can be instrumental in incentivizing poor families to bring their children back to school after they reopen in the coming months.
- **Health and Nutrition Conditional Cash Transfers (Short to Medium Term):** Since the pregnant woman and child-linked CCT program (BISP's Nashonuma program) is only functional in 18 of the flood-affected districts, the federal and provincial governments should coordinate to make sure that the program is initially extended to at least all of the flood-affected districts. Beneficiaries receive services at the BISP centers and the BISP can very quickly provide the supply-side needs in collaboration with the provincial health departments. Additional health services can also be provided at these one-stop shops to assist in disease prevention and treatment not covered by the CCT program. Equally important is to build the capacities of children, since their ability to take action can enhance information delivery, assessments, and consultation processes. Even though the BISP's Nashonuma program is quite advanced in its operations and can cover this gap quickly, the provinces of Punjab and Sindh are also in the process of consolidating/setting up their social protection delivery systems, which can be expanded for better coverage.
- **Workfare Program (Short Term):** Livelihoods recovery may take some time, and life with dignity will need to be ensured. Fundamental Principles and Rights at work, including non-discriminatory opportunities to employment and training, equal wages for equal value of work, safe working conditions, freedom to organize and negotiate terms of work, and work free of child and forced labor will need to be ensured. A workfare program would be an ideal opportunity to engage the community in reconstruction and provide cyclical income to those that may have lost their livelihoods. There is a considerable need for community infrastructure (including childcare facilities), asset building, land rehabilitation, and housing reconstruction that will require unskilled and semiskilled labor. A workfare program would fit in very well to help the affected communities identify and utilize local human resources. Efforts to engage women in this paid work should be made with cultural sensitivity, where possible. The workfare program would complement efforts to support local livelihoods generation for the up to 2.3 million families from the poorest three quintiles that have been affected. The wage rates for such a program are usually kept lower than the market to assist in self targeting so that uptake is

generally limited to only those that remain unemployed or feel that they do not have access to a better earning opportunity. For the workfare program, a maximum of 15 days of unskilled and semiskilled labor would be allowed in a month to any able-bodied person within a family.[214] For families that have persons with disabilities and cannot participate in the program, a minimum monthly support can be guaranteed upon registration.

- **Savings and Risk Management (Medium Term):** There is a need to build the capacity of the poorest population to mitigate risk by building up cash savings. The possibility of devising a mechanism to enhance the savings of the poor should be explored, initially to help mitigate shocks (both covariate and idiosyncratic), and subsequently to improve eligibility to draw credit to enhance livelihoods opportunities. This will prepare the poorest households to at least partially withstand the immediate impact of future disasters. The hybrid social protection model that the BISP is currently designing may explore this option further. The situation of households with debt due to disasters should be considered to avoid negative coping mechanisms that affect children, such as child marriage or child labor. The addition of risk variables can be linked to the insurance market and the financial sector. A trigger-based risk insurance mechanism can be explored and insurance products for the poor and vulnerable can be designed as part of social protection for quick dispensation. Involving the private sector in designing such a mechanism will also help reduce the financial burden on provincial governments, with the possibility of rationalizing the use of subsidies and anticipating the cost of targeted social protection support.
- **Strengthening of the BISP's Adaptive Delivery System (Medium Term):** It is imperative that existing institutions providing social protection revisit their implementation framework to be adaptive and shock responsive. Using existing delivery mechanisms reduces overhead costs and strengthens the existing infrastructure. A single window service is thus a viable model that would bring all social protection programs under one delivery mechanism. This will also improve transparency and monitoring.

  Any gaps in the BISP's adaptive delivery system need to be further narrowed. This may require the immediate functionality of the MELA[215] (dynamic update mechanism) and improvement in the payment delivery mechanism to make it more beneficiary centric. Similarly, there is a need to improve the payment delivery mechanism by making it more flexible to the needs of the potential affected population in case of emergency. A beneficiary-centric payment system should be put in place to provide easy and countrywide access to cash transfers from the government. It will also be important to consider loss and damage to national identity cards during floods, which will need flexible arrangements for the interim period until cards are replaced. In addition, there is a need to enhance communication and engagement with local communities and displaced populations, and the possibility of setting up a strong grievance redress mechanism with a portal for emergency management and mitigation should be considered to ensure constant citizen feedback.

ILO's Social Protection Floors Recommendation No. 202, the coverage gaps should be closed through appropriate and effectively coordinated social protection schemes, whether contributory or non-contributory, or both, including through the extension of existing contributory schemes to all concerned persons with contributory capacity. Table 55 provides a description of actions and their cost estimates, building on the strategies discussed above.

214 Family as defined per NSER.

215 Multi-Entry Localized Access, which refers to a system that provides greater access to the social registry (NSER) to enable regular and timely updates, big data, and analytics to improve targeting, and to gradually expand protection to the missing middle.

TABLE 55: TOTAL RECOVERY COSTS – LIVELIHOODS AND SOCIAL PROTECTION

Strategies	Description	Priority	Amount in PKR
Livelihoods Recovery Strategies			**13,556,000,000**
Employment Services (Short Term)	Establishment of emergency employment service centers in flood-affected districts to match job seekers with job opportunities. A total of 13 service centers to be established across the four provinces for an initial period of one year.	1	56,000,000
Skills Development (Short to Medium Term)	Provision of skills trainings to 80,000 households in flood-affected districts focused on resilience building and climate adaptation and include skills development for rebuilding (such as masons, contractors, carpenters), entrepreneurship, financial literacy) through a community-based approach.	4	5,300,000,000
Markup Subsidy (Long Term)	Provide a markup subsidy to 600,000 households engaged in self-employment in agricultural and non-agricultural activities in flood-affected districts for obtaining microcredit loans of up to PKR 50,000 @5% interest to restore their small-scale farming and non-farming activities.	3	6,000,000,000
Employment Intensive Investment Program (EIIP) (Medium to Long Term)	Provision of short-term employment for 10,000 households and sustainable assets through rehabilitation and maintenance of priority infrastructure in flood affected areas, including rural roads, irrigation canals and other community infrastructure, based on climate resilient standards and coupled with skills development for more resilient communities.	2	2,200,000,000
Social Protection Strategies			**347,879,074,965**
Multipurpose Cash Grants (Short Term)	Multipurpose, humanitarian cash transfers, are recommended for the poorest 60% of families for consumption smoothing, for at least 3 months for Sindh and 2 months each for Punjab, KP, Balochistan, and Special Regions. Approx. 2.3 million families would benefit, covering 3.8 million children. The cash transfers will be kept at the basic monthly consumption expenditure amount with a slightly higher benefit for families with disabilities.	1	197,725,156,076
Taleemi Wazaif Expansion (Short Term)	The program will expand to incentivize the poorest 60 percent of the population to immediately bring children back to school. The cost covers the differential between children in the 3rd quintile in the flood-affected areas.	3	27,385,447,390
Nashonuma Program Expansion (Short to Medium Term)	The H&N CCT program (*Nashonuma*) is only functional in 18 of the flood-affected districts, it will expand to all flood-affected districts and increase coverage from the current bottom 40% to 60% of families. Approximately 1.1 million pregnant women and children under 2 years are targeted.	2	7,778,985,339
Workfare Program (Short Term)	The workfare program will complement efforts to support local livelihoods generation for up to 2.3 million families affected from the poorest 3 quintiles. It will be a self-targeting mechanism for a maximum of 15 days of unskilled and semiskilled labor in a month to any able-bodied person.	2	114,109,486,160

Strategies	Description	Priority	Amount in PKR
Adaptive Social Protection System, including Savings and Risk Management (Medium Term)	This involves the enhancement of community-level communication and the setup of a portal for emergency-related mitigation activities.	3	880,000,000
Total Cost (PKR)			**361,435,074,965**
Total Cost (US$)			**1,682,658,636**

Limitations

The analysis for the sector is mostly restricted to affected districts across four provinces because of the unavailability of data and the lack of validation of the data. In some of the analysis, where there were discrepancies in the data, informed estimates were made. This includes the reconstruction cost estimates for special regions. In addition, the livelihoods-related analysis excludes nine of the flood-affected districts for which data could not be accessed.

Environment and Climate Change

Pre-floods Context and Baseline

Pakistan is ranked the 35th most vulnerable country to climate change and the 140th least prepared country to address climate change.[216] It also ranks as the 8th most affected by climate change shocks. This extreme vulnerability to climate change contrasts with Pakistan's low carbon footprint of less than 1 percent of global greenhouse gas emissions.[217] Climate change is expected to increase the frequency and magnitude of extreme heat and precipitation events in Pakistan, including monsoon rains.[218] The contribution of climate change to a single event is difficult to calculate and inherently uncertain. The magnitude of extreme monsoon rainfall that triggered the 2022 flood event was estimated to have been exacerbated by climate change by 50 to 75 percent.[219] The role of anthropogenic factors—including those related to infrastructure, capacity, and governance—in aggravating the impact of extreme monsoon rainfall should be acknowledged and addressed (see the DRR and Resilience section).

The loss of vegetation cover—forests, rangelands, and wetlands—has reduced the land's capacity to absorb and reduce the speed of surface runoff and accelerated the loss of fertile topsoil as well as triggering landslides and the formation of gullies. Only about 5.5 percent of Pakistan's land is under forest

216 Germanwatch e.V. 2021. Gain Index and Global Climate Risk Index 2021. Germanwatch e.V.. Bonn.
217 Islamic Republic of Pakistan. 2022. Pakistan's First Biennial Update Report (BUR-1) to the UNFFCC.
218 Intergovernmental Panel on Climate Change (IPCC). 2021. Climate Change 2021: The Physical Science Basis.
219 Otto, F.E.L., et al. 2022. Climate Change Likely Increased Extreme Monsoon Rainfall, Flooding Highly Vulnerable Communities in Pakistan. World Weather Attribution. London. *https://www.worldweatherattribution.org/wp-content/uploads/Pakistan-floods-scientific-report.pdf*.

cover,[220] well below the recommended target cover of 25 percent. While the country's annual deforestation rate dropped from a high of 2 to 2.5 percent and is now among the lowest in Asia,[221] there are concerns regarding forest degradation and depleting tree density requiring major restocking. Rangelands and forests, which cover 65 percent of Pakistan and account for over 50 percent of agricultural gross domestic product (GDP), continue to be heavily overgrazed and overharvested. FAO estimates that rangelands, which contribute 12 percent of GDP, only achieve about 40 percent of their potential. Agroforestry is increasingly found on private and community lands, and supplies over 90 percent of fuel wood and timber needs, playing a critical role in the livelihoods and food security of the poor.

Flood damages have been exacerbated by a lack of on-site water management to control hill torrents, and by deficiencies in small water reservoirs, aquifer recharge points, and anti-erosion measures. Grossly inadequate drainage systems, and the blockage and encroachment on natural drainage channels, including for the disposal of solid waste, has exacerbated the impact of extreme rainfall events and delayed the efficient subsiding of flood water. Major metropolitan cities such as Karachi, which generates 16,500 tonnes of solid waste per day, are facing acute waste management challenges, with serious implications for urban flooding. The dumping of solid waste blocks sewerage and natural drainage systems, causing them to overflow during heavy rains, increasing the risk of disease outbreaks.

Pakistan's protected areas, which cover 13 percent of the country and include 28 national parks, are characterized by poorly defined boundaries with rudimentary management infrastructure. While boasting rich biodiversity, Pakistan's wildlife and flora are facing major pressures from habitat degradation, hunting, and pollution. Despite successful results from individual initiatives, such as mangroves restoration and the 10 billion Tree Tsunami Program, a largely business-as-usual approach prevails, characterized by major natural capital depletion and growing environmental problems.

Cultivated land in the Indus Irrigation Scheme is increasingly unproductive[222], with 4.5 million hectares (about 30 percent of the total irrigated area) affected by high salinity,[223] and in Sindh, approximately 2.5 million hectares are waterlogged. There is significant overlap between flooded lands and these areas. People have moved into floodplains and drained wetlands for agricultural and urban use, substantially increasing their exposure to floods. Even after the devastating floods of 2010 and 2011, people continued to rebuild in the same hazard-prone areas (steep slopes, inside or along riverbeds) without attention to safe construction, as seen, for example, in Swat valley in Khyber Pakhtunkhwa.

Overall, Pakistan's pollution management system can be described as undeveloped and "leaky" – it allows for the direct release of all types of waste, without treatment, into the environment, posing significant human exposure risks. Most industrial estates lack treatment plants, with many releasing their contaminated effluent into stormwater drains. The Indus River is the second most plastic-polluted river in the world, carrying about 164,000 tonnes of plastic annually.[224] While agricultural land contamination data is not readily available, proxy figures suggest that it is common. Intensive fertilizer use has resulted in eutrophication of natural water bodies and toxic algal blooms. Pakistan is a major consumer of toxic

220 Government of Pakistan (Finance Department). 2022. Pakistan Economic Survey 2021-2022.
221 The Food and Agriculture Organization of the United Nations (FAO). 2020. 2019 Forestry Sector Review: Pakistan. FAO. Islamabad.
222 Pakistan makes poor use of its water endowment. Four major crops (wheat, rice, sugarcane, and cotton) account for nearly 80 percent of all water use, but generate less than 5 percent of GDP.
223 Qureshi, Asad Sarwar, and Chris Perry. 2021. "Managing Water and Salt for Sustainable Agriculture in the Indus Basin of Pakistan" Sustainability 13, no. 9: 5303. *https://doi.org/10.3390/su13095303*.
224 M. Arshad and F. Rashid. 2020. Scoping Study for PET Waste Management in Pakistan. World Wildlife Fund-Pakistan.

pesticides, importing approximately 24.1 million tonnes in 2021-22.[225] Recent studies suggest that poor pesticide and fertilizer management is a "major health and environment issue."[226]

Provincial and local government institutions—notably the Environmental Protection Agencies and the Forestry and Wildlife Departments—tasked with supporting the management of renewable natural resources and pollution control, are underfunded and unable to provide the level of support needed to address climate change and environmental challenges. Environmental regulations are often incomplete or outdated, and rarely enforced. Environmental monitoring is limited and fragmented. As a result, Pakistan is ranked 176th (last) on the Yale Country Environmental Performance Index largely because of its excessive pollution burden, which costs the equivalent of 9 percent of GDP and takes 170,000 lives per year.[227] In sum, Pakistan is overly exposed to climate change exacerbated shocks and environmental degradation and pollution.

Assessment of Disaster Effects: Damage and Loss Estimates

Environment sector damages and losses are by their nature difficult to assess, especially in a short period of time as is the case for this PDNA. As such, physical and monetized impacts are expected to be significantly underestimated. For the purposes of this assessment, flood-related environment sector damages include: (i) damage to the natural environment including protected areas, forests, rangelands, wildlife; (ii) damage to the land (landslides, debris flows, erosion, and sedimentation); and (iii) pollution and waste (chemical and hazardous waste spills).

Identified and quantifiable damages are at face value modest, and estimated at PKR 3.9 billion (US$18.3 million). They are entirely assigned to the public sector. Damage to forestry is estimated at PKR 2.4 billion (US$11.2 million), equivalent to about 60 percent of total environmental damages (Table 56). Sindh sustained the highest damage to the forestry sector, amounting to PKR 1.8 billion (US$8.5 million). Damages from landslides and soil erosion in residential areas amounted to PKR 1.1 billion (US$5.2 million), which represents 29 percent of total environmental damages. Damages to protected areas, wildlife, and infrastructure in national parks is estimated at PKR 440.5 million (US$2.1 million) or 11 percent of the total environmental damages reported.

The full extent of the damages associated with forests, biodiversity, land, and pollution cleanup is yet to be fully accounted for and requires more detailed investigations. The cost to clean up material from mudslides and debris flows has not been included. The impact of changes in stream morphology in the form of bank cutting and loss of valuable riverine and orchard lands, creating accretion of debris and gravel problems, have not been incorporated. Remote sensing analysis in Khyber Pakhtunkhwa (KP), for example, provides clear evidence of large-scale riverbank erosion, but no damages were reported through the PDNA process, and it is not feasible to cost the damages without field verification. Bird deaths caused by the floods were registered in KP. However, no systematic assessment of the impact of habitat disturbance on wildlife populations or indicator species has been made, which requires follow-up study. While no strandings of the endangered Indus River dolphins have been reported, there is a risk that this may occur as floodwaters recede or canals are closed.

225 Government of Pakistan (Finance Department). 2022. Pakistan Economic Survey 2021-2022.
226 Khan, Muhammad Imran, Muhammad Shoukat, Sardar Alam, Hafiz Arif, Nabeel Niazi, Muhammad Azam, Safdar Bashir, Imran Ashraf, and Rashad Qadri. 2020. "Use, Contamination and Exposure of Pesticides in Pakistan: A Review." Pakistan Journal of Agricultural Sciences. 57. 131-149.
227 World Bank. 2019. Opportunities for a Clean and Green Pakistan: A Country Environmental Analysis.

Several contaminated sites were reported but no environmental surveys or pollution testing have been done to assess the release of chemical and hazardous wastes, nor their cleanup costs. For example, during site visits by the PDNA team in Karachi, contaminated industrial effluent was reported to have overflowed on the streets for several days from two of the largest industrial estates. While in interior Sindh, provincial authorities reported that an open dump of obsolete pesticides and four oil exploration sites were impacted by the floods. Quantitative landslide and erosion damage to residential areas was only available for one of the Special Regions and Balochistan, although anecdotally, landslides were also reported in KP.

An assessment of environment sector income and livelihoods losses, including the loss of ecosystem services and their benefits to rural households has only been partially attempted, based on initial literature estimates. This requires further study. Total assessed losses are estimated at PKR 6.4 billion (US$29.9 million), which is about 170 percent of the total amount of damages. Approximately 99 percent of losses are from the forestry sector, estimated at PKR 6.3 billion (US$29.3 million). Protected areas account for only 1 percent of losses, which are valued at PKR 42.9 million (US$0.2 million).

The gap in the valuation of environmental losses highlights the importance of investing in environmental monitoring and strengthening of natural capital accounts. Environment sector damages and losses are likely significantly higher—potentially at least 3–5 times higher—with the burden largely falling on poor rural households most affected by the floods and dependent on natural resources.

TABLE 56. DAMAGE AND LOSS ESTIMATED FOR THE ENVIRONMENT SECTOR

Damage Identified (to physical assets and infrastructure)				
	Protected Areas (acres)	Forestry (acres)	Landslides/ Soil Erosion (acres)	Total (PKR Million)
Balochistan	296	1,002	876	670
KP*	6,370	5,440	n.r.	346
Punjab**	n.r.	3,598	n.r.	461
Sindh***	n.r.	60,759	400,000	1,816
Special Regions	n.r.	n.r.	543	645
Total (PKR Million)	6,666	70,799	401,419	3,938
Total (US$ Million)				18.3

Loss Identified (to physical assets and infrastructure)				
	Protected Areas (acres)	Forestry (acres)	Landslides/ Soil Erosion	Loss (PKR Million)
Balochistan	296	1,002	N/A	116
KP	191	5,440	N/A	516
Punjab	n.r.	3,598	N/A	324
Sindh	n.r.	60,759	N/A	5,468
Special Regions	n.r.	-	N/A	n.r.
Total (PKR Million)	**487**	**70,799**		**6,424**
Total (US$ Million)				**29.9**

Note:

*Landslides reported within forests are included under forest damage.

**Damages reported only to infrastructure.

***Impacts were reported in Nara Desert Wildlife Sanctuary but no details were provided.

n.r. means no figures were reported.

Based on the housing sector assessment, it is estimated that approximately 553 million cubic feet (Table 57) of potentially reusable debris (fire bricks, concrete) has been created from damage to the housing sector.[228] It is expected that most of this debris will be used onsite by the individual homeowners in the reconstruction of their homes. This has been the experience for past flood disasters in Pakistan and serves as a good example of sustainable local reuse and recycling of housing material. The localized utilization of debris means a reduced burden on natural resources (less quarrying for natural raw materials in the recovery phase), as well as reduced transport requirements for debris removal (less trucking and fuel demand as well as reduced emissions).

TABLE 57. PRELIMINARY ESTIMATES OF DEBRIS QUANTITIES IN THE IMPACTED PROVINCES

	Balochistan	KP	Punjab	Sindh	Special Regions	Total
Total Burnt Brick Debris (million cubic feet)	20	18	14	414	0.35	**466**
Total Concrete Debris (million cubic feet)	4	4	2.4	77	0.07	**87**

228 This refers to debris from pukka houses, and does not include debris from katcha houses (mudbrick houses).

Linking the Effects to the Human Impact

Damages to forests, rangelands, fertile topsoil, and biodiversity from the floods will mainly impact the poor given their heavy reliance on natural resources for their livelihoods and food security. Increased pressure on natural resources—hunting/poaching, timber extraction, agricultural encroachment on protected areas—will likely substantially increase as displaced persons exploit available resources for their subsistence. Exposure to contamination risks and overflowing industrial effluents have mainly occurred in and around industrial areas, where poor migrant workers typically congregate. Damaged protection measures, including recently established forestry schemes designed to reduce flood and landslide risks, will likely increase the vulnerability of downstream communities. The floods' impairment of the collection of large quantities of solid waste and the large numbers of carcasses of domestic animals have increased the risks of disease outbreaks. The loss of valuable land from landslides and debris flows will impact the livelihoods of local communities. Finally, the reconstruction will generate a significant demand for construction materials, which implies an increase in quarrying activities that will further deplete natural resources and potentially increase the risk of landslides, thereby further exacerbating underlying vulnerabilities.

Recovery Needs and Strategy

Recovery needs to address the immediate damages stemming from this disaster are estimated at PKR 35.2 billion (US$164 million), to be implemented over a five-year period (Table 58). To avoid double counting, investments in climate-resilient infrastructure, such as roads, railways, irrigation works, and power lines, to withstand shocks from extreme climate impacts are assumed to have been separately captured in the respective sectors, as they are not easily apportioned. They are therefore not included under the recovery needs identified here.

Environmental recovery actions primarily include rehabilitation of damaged tree nurseries, reforestation, landslide stabilization, revegetation of riverbanks, removal of debris flows in sensitive areas, building of structures to manage hill torrents, soil conservation measures to reduce erosion, and reconstruction of protected area and environmental administration infrastructure. These measures will also help to protect critical infrastructure from environmental degradation (e.g. reduced sedimentation in dams, water treatment plants) and extreme weather events.

The cleanup of natural drainage systems and urban surface drains blocked with solid waste and silt is needed in high-risk areas vulnerable to urban flooding to reduce the risk of toxic industrial effluent overflow reoccurring during extreme weather events. The reuse of debris from damaged homes and roads should be encouraged and promoted as best practice, and where possible, supported with supplies of the necessary manual tools and equipment to demolish the houses, such as sledgehammers to break up the brick and concrete material and shovels and wheelbarrows to move the debris. Demonstrations of debris recycling technologies should be carried out to strengthen debris management capacities. The reuse of recycled aggregate in making new building blocks and road foundations will also reduce the natural resource and climate burden of the reconstruction. The value of recycling the estimated 553 million cubic feet of potentially usable debris created from this flood disaster into road base is assessed to have a monetary value of PKR 19.7 billion (US$91.7 million).

Livelihoods support measures to reduce pressure on natural resources will be needed to support wildlife conservation. Awareness-raising campaigns to engage communities in the effective implementation of conservation measures will also be needed, which will require working with community-based organizations. Regular monitoring of canals is needed to protect any stranded dolphins.

Data sparsity has been a serious constraint, which has downplayed the importance of the environment in this PDNA. A detailed post-disaster environmental assessment therefore needs to be conducted to study how environmental degradation aggravated this flood disaster and the environmental impacts caused by the disaster to capture key learnings and inform decision-making processes. Specifically, more detailed site investigations need to be carried out of reported chemical spills, and inundated oil fields and warehouses containing pesticides and hazardous substances, and suitable containment and remedial measures proposed.

Post-disaster reconstruction is likely to create a massive environmental footprint due to the significant demand for construction materials, development of new settlements to relocate people away from high-risk areas, and the rapid pace of reconstruction. It is therefore critical that environmental safeguards are reinforced through the application of environmental impact assessments (EIAs) of major reconstruction projects.

TABLE 58. SUMMARY OF RECOVERY NEEDS FROM DAMAGES AND LOSSES CAUSED BY THE 2022 FLOODS

Region	Brief Justification of Needs from the Analysis of Effects and Impacts	Needs in PKR Million (US$ Million)
Balochistan	Rehabilitation of damaged forest and protected areas, including tree nurseries, landslide stabilization, debris flow removal, assessment and cleanup of contaminated sites, and construction debris management. Strengthen provincial climate change and environmental governance capacities including regulating EIAs and conducting further technical studies.	2,662 (12)
KP		3,982 (19)
Punjab		2,662 (12)
Sindh		23,430 (109)
Special Regions		1,804 (8)
Cross-Provincial (BBB and other aspects integrated in recovery needs)	Guidance and support to provincial environmental administrations in overseeing the reconstruction process.	660 (3)
Total		**35,200 (164)**

Recovery interventions are grouped into three main components and are detailed in Table 59:

1. **Ecosystem-based adaption for integrated flood risk management in vulnerable watersheds:** This comprises: (i) restoring damaged forests (urban and rural), rangelands, wetlands, and protected areas, including infrastructure; and (ii) nature-based solutions for flood management and water retention to supplement "grey" infrastructure and non-structural measures proposed by the Water and Irrigation and DRR and Resilience sectors. Actions would include undertaking small-scale green civil works (gabion walls, flood torrent diversions, repair of leaky dams) to slow stormwater and repairing small-

scale on-site water storage structures and Karezs (underground irrigation tunnels) for coping with droughts.

2. **Pollution management, including to address solid and wastewater management:** There is an immediate need to remove sediment and waste from blocked drainage channels and flooded areas and infrastructure. Improved collection and management systems for solid waste and debris are required. Management of contaminated sites, including pollution containment measures, may also be needed.
3. **Strengthening of environmental and climate change governance:** This involves reinforcing environmental and climate change institutional capacities to respond to the floods, including through more detailed environmental assessments; oversight and enforcement of environmental requirements (EIAs) of the reconstruction; and improved data collection and monitoring systems.

TABLE 59. SUMMARY OF PRIORITIZED INTERVENTIONS TO ADDRESS ENVIRONMENTAL RECOVERY NEEDS

Intervention/Activity	**Short** (Up to 12 months)	**Intermediate** (Up to 3 years)	**Long** (Up to 5 years)	**Priority** (Rank 1-5)	**Cost in PKR Million** (US$ Million)
1. Ecosystem restoration and adaptation					
Emergency package of nature-based solutions and adaptive management in high-risk watersheds impacted by floods and landslides. Includes afforestation, repairing nurseries, buildings, and infrastructure of the line departments. Requires flood risk management and land-use planning assessment for ecosystems-based adaptation and investment preparation.	X			1	5,500 (26)
Upscaling of ecosystem-based adaptation through nature-based solutions and green infrastructure in critical watersheds with the highest rates of vulnerability to flooding or drought		X	X	2	16,500 (77)
				Subtotal	**22,000 (102)**
2. Pollution reduction and waste management					
Emergency cleanup and climate resilience measures for flood-related contaminated sites, solid waste and silt removal, and debris recycling support.	X			1	6,600 (31)
				Subtotal	**6,600 (31)**
3. Strengthening of environmental and climate change governance					
Comprehensive environmental impact assessment and monitoring of flood disaster impacts, including: wildlife, contaminated water and land, soil salinity, and sand and gravel quarrying.	X			1	1,100 (5)

Intervention/Activity	Short (Up to 12 months)	Intermediate (Up to 3 years)	Long (Up to 5 years)	Priority (Rank 1-5)	Cost in PKR Million (US$ Million)
Strengthening of the technical capacities of federal and provincial climate change and environmental administrations to fulfill their mandate, including overseeing EIAs of the reconstruction process. Reconstruct damaged administration buildings and equipment.	X	X	X	1	5,500 (26)
				Subtotal	**6,600 (31)**
				Total	**35,200 (164)**

Note: **1 = the highest priority, 5 = the lowest priority.

Building a Resilience Strategy

Pakistan continues to pursue a development model that does not fully factor in emerging risks of climate change and environmental degradation. It is noteworthy that general observations suggest that where the environment was protected with less disturbed or mature vegetation, damage to human life and property from the floods was generally less.[229] Pakistan should focus on addressing the underlying drivers of environmental degradation and on adapting to climate change by capitalizing on its renewable natural capital, which contributes 13–15 percent of per capita wealth and up to 70 percent of the wealth of the poor.[230] Pakistan needs to embrace a new development paradigm with cost-effective ecosystem-based adaptation as one of its core pillars, alongside traditional "grey" infrastructure.

To obtain an appreciable level of resilience to climate change-induced disasters and check the pace of environmental degradation and pollution, investments in the three recovery components discussed above would need to be scaled up to at least PKR 389 billion (US$1.8 billion) over the next five years. Given the low baseline from which the environment sector needs to be built, annual investments should increase by at least 15 percent per annum above inflation. These actions are aligned with the Government's stated policy objectives, including the ecological restoration agenda as envisioned in the "Living Indus Initiative," and are outlined below.

1. Ecosystem-based restoration and adaption in vulnerable landscapes and watersheds: Scaling up actions to reduce community exposure to climate change shocks by reducing flood and seasonal drought risks is needed. The main action areas to focus on are the reduction of flood runoff through ecosystem-based adaptation measures, the restoration of high-risk watersheds, and the mitigation of landslides by stabilizing slopes. Landscape management and integrated water resources management approaches, such as watershed management at multiple scales, and recreating "room for the river" where feasible through appropriate land-use planning and enforcement should be a key element in building a resilient flood protection system. These approaches, if wisely applied, would also help transform floods into an

229 As highlighted in consultations with the International Union for Conservation of Nature (IUCN) from their field observations.
230 World Bank. 2021. Changing Wealth of Nations.

opportunity for recharging aquifers, harvesting rainwater, and restoring wetland ecosystems, which play a critical role in sustaining rural livelihoods and are crucial in coping with droughts. At the same time, existing national environmental rehabilitation programs that contribute to ecosystem-based restoration and adaptation need to be supported and expanded, including mangrove restoration, the Ecosystem Restoration Initiative, Recharge Pakistan, the 10 billion Tree Tsunami Program, the Miyawaki Forests, GLOF Risk Reduction, and REDD+ Indus delta.

In implementing this landscape and ecosystem restoration program, Pakistan should aim for PKR 34 billion (US$158 million) of investment per annum over five years. The program would be broadly managed through provincial wildlife, forestry and rangelands, food security, and irrigation departments and planning and development boards, as well as larger nongovernmental organizations that have demonstrated capacity and experience.

2. Pollution reduction and sustainable waste management: The strengthening of pollution controls, especially for land and water, including solid waste management (collection and landfilling as well as eliminating single-use plastics, recycling construction and demolition waste), and the treatment of municipal and industrial effluent is urgently needed. Upscaling and climate proofing solid waste and wastewater treatment facilities and urban surface sewers are overdue. Small-scale effluent treatment plants should be installed in housing and industrial estates. These would significantly reduce the environmental load of continued effluent disposal to watercourses and provide an opportunity to recycle wastewater, thereby alleviating water shortages and reducing water consumption costs. Enhancing the capacities of local government and provincial environment departments on waste and pollution management is critical to ensuring action on pollution and waste. This includes the updating and enforcement of water-use and effluent disposal standards and regulations.

In implementing this pollution mitigation and health agenda, Pakistan should start at PKR 28 billion (US$130 million) of investment per annum over five years to be implemented in close cooperation with local authorities and the private sector.

3. Strengthening environment and climate change governance: The underfunded federal and provincial environment and climate change departments need to be properly financed and their technical capacities strengthened to support implementation of the environment and climate change agenda. Focus areas for support include: (i) restoration of natural capital and conservation and sustainable use of biodiversity linked to jobs, building resilience, and productive ecosystems; (ii) pollution management to reduce the health, economic, and environmental burden, which has reached unsustainable levels. Policy, target setting, environmental monitoring and compliance requirements need to be set and enforced. (iii) Building federal and provincial capacity in natural capital accounting (Pakistan Bureau of Statistics) to report on the value of natural capital and the development of legal and fiscal instruments to encourage private sector investment (Finance Ministry) is equally needed. Finally, (iv) proper decision support systems should be developed for eco-sensitive and risk-informed land-use planning and development (provincial planning departments).

To strengthen environmental governance capacity, the comprehensive upgrading of the federal and provincial environment and climate change departments is required, for which Pakistan should aim to allocate at least an additional PKR 16 billion (US$74 million) of investment per annum over five years.

Policy recommendations: The Government of Pakistan and provincial authorities should prioritize the following policy actions:

- Mainstreaming landscape management, ecosystem-based adaptation and nature-based solutions into Pakistan's land-use, and national flood and water resources management policies and frameworks.
- Promoting community resource management approaches to enhance ecosystem functioning and reduce risks from flooding and drought.
- Updating pollution and waste management policy and legislation, including recognizing the value of waste as a resource with development benefits. Local authorities require revenue-raising capabilities to build the required solid waste and wastewater infrastructure and manage the relevant services. This should be supplemented by innovative circularity-based management processes, guided by the 3Rs of waste management—Reduce, Reuse, and Recycle. Private sector investment and public-private partnerships for sanitation services should be facilitated.

Environmental Framework for the PDNA: A draft environmental framework document has been prepared to provide guidance on environmental safeguards for sectors undergoing reconstruction and rehabilitation to ensure that environmental considerations, including climate proofing, are built into the design and implementation phases. The framework defines the environmental and social screening and assessment requirements for individual projects and will guide implementing agencies in identifying the appropriate type of assessment to be carried out in compliance with national as well as donor agency requirements.

Limitations

Key limitations on data assessment and verification were largely due to time and access constraints, accentuated by the geographic spread of the impact and flood conditions, which restricted the level and scope of data collection. This included:

- Incomplete data collection forms and lack of explanation on the quantitative damages reported.
- Lack of monitoring and sampling over the wide geographical area of the flood impact.
- Difficulties in assessing chemical spills, especially where they were washed off during the flood event.
- Remoteness and inaccessibility of areas where environmental damage may have occurred.
- Limited time for engagement with civil society and nongovernmental organizations on environmental damages.
- Limited application of satellite remote-sensing services to assess environmental damages.
- Data provision was often anecdotal and qualitative with inadequate evidence.

Disaster Risk Reduction and Resilience

Pre-floods Context and Baseline

The geography, topography, economic environment, rapid urbanization, and high population of Pakistan exacerbate the country's vulnerability to natural disasters. Floods have been a standard phenomenon in Pakistan, with average annual damage and loss from floods estimated at US$1.5 billion.[231] Women are disproportionately vulnerable to disaster events due to gaps in literacy rates and mobile phone ownership, which limits their access to lifesaving early warning information.

The National Disaster Management Act 2010 provided the legal foundation for establishing a disaster management system at the national, provincial, and district levels, including the existing disaster management authorities (DMAs) at the national and provincial levels (NDMA, PDMAs). District Disaster Management Authorities (DDMAs) have been established in selected districts; however, with limited resources and capacity and ad hoc staffing, the district authorities remain ineffective. The Federal Flood Commission (FFC) was established in 1977 to coordinate flood risk management at the national level. The current 10-Year National Flood Protection Plan IV was developed by the FFC in 2017 with a total estimated cost of PKR 332.2 billion (approximately US$1.5 billion). The plan comprises structural and non-structural measures as well as technical studies, monitoring, and supervision for flood risk management and reduction.

The National Disaster Risk Reduction Policy 2013 provides an overall guiding framework for disaster risk reduction (DRR) and relevant development plans and programs to address both natural and human-made hazards. The Climate Change Policy was approved in 2012, followed by the Climate Change Act, which was enacted in 2017 to establish the Climate Change Council, the Climate Change Authority, and the Climate Change Fund. The Climate Change Council, recently operationalized, is mandated to approve, oversee, and monitor implementation of adaptation and mitigation policies by federal and provincial ministries, divisions, departments, and agencies across all sectors. In response to growing national and international concern about climate risks and vulnerabilities, the Planning Commission has been augmenting its capacity to mainstream climate change by taking initiatives such as developing the Handbook on Climate Risk Screening for Policy Planning. It includes guidance and revised templates of key planning documents.

Rescue 1122 is the emergency helpline service established in all provinces, including the Special Regions, to enhance the government's responsiveness to emergencies and disasters. In the case of Punjab, the PDMA has currently tasked the Punjab Emergency Service (Punjab Rescue 1122) as the disaster response force to carry out flood relief. Currently, there is no dedicated mechanism that could be deployed for rescue operations during catastrophes. The Ministry of Defense and NDMA can call upon the services of the Armed Forces, the Civil Armed Forces, or other agencies for disaster management.

The Pakistan Meteorological Department (PMD) issues hydrological or terrestrial information in addition to weather news to ensure the safety of transport, mitigate disasters, and warn against the impact of climate change exacerbated weather events. Public warnings (weather alerts) are directly transmitted

231 The World Bank Group and the Asian Development Bank. 2021. Country Risk Profile: Pakistan.

from the PMD to the NDMA, the PDMAs, other related agencies, and the media through text messages, email, fax, and the PMD website. Subsequently, the PDMAs send special warnings, flood warnings, and timely, urgent information to the DDMAs and relevant stakeholders by using all available means of communication. The Pakistan Water and Power Development Authority (WAPDA), which is responsible for the integrated and rapid development and maintenance of water and power resources in the country, has been operating a total of 86 flood forecasting telemetry stations in the country.

The National Disaster Risk Management Fund (NDRMF) was established in 2016 as a government-owned, non-banking financial intermediary to provide funding for DRR projects through matching grants of up to 70 percent for a range of structural and non-structural interventions carried out by United Nations agencies, international nongovernmental organizations (INGOs), and public entities.

Pakistan faces a significant "protection gap" vis-a-vis disaster risks that have not been addressed through DRR investments or transferred through risk financing. The federal government has contingency funding of about US$10–20 million to respond to national emergencies.[232] However, these arrangements are insufficient to cover even limited losses associated with seasonal monsoon floods or the emergency response costs of a once-in-five-year flood. Private insurance solutions for these risks are also insufficient, since they have achieved only minimal market penetration of less than 2 percent.[233]

Assessment of Disaster Effects: Damage and Loss Estimates

The DRR sector assets are mostly soft in nature, such as laws, codes and standards, risk assessments, plans, awareness raising, and capacity building. Based on consultations with the NDMA, the PDMAs, and the FFC, there have been no reports of damage from the floods to DRR infrastructure, such as buildings, equipment, furniture, or vehicles. However, the PMD, WAPDA, and the Khyber Pakhtunkhwa (KP) government did report damage to early warning system observatories and equipment. Out of the 97 staffed weather observatories and 85 automatic weather stations operated by the PMD, 47 were damaged. These facilities are required to monitor and forecast weather conditions, and their malfunction can seriously limit the ability of the authorities to issue early warnings. Economic loss from the disruption of early warning systems has not been assessed as no further significant weather-related catastrophe has been reported, but the impaired early warning capacity has grave implications for the future. No damage or loss data for private sector DRR assets were available. The proposed replacement costs of the early warning equipment were compared with the ongoing procurement contracts of different agencies. Some PMD records were also examined to ascertain the pre-flood status of the early warning equipment. No losses were calculated, since no disruptions of disaster response services were reported for the sector.

Total damages of PKR 1.02 billion (US$4.7 million) have been estimated for the DRR and Resilience sector; 97 percent of the damage was reported by the PMD. Damage to flood protection structures has been included under the Water Resources and Irrigation sector. Table 60 presents the damage reported by the PMD, the WAPDA, and provincial governments.

232 Asian Development Bank. 2019. The Enabling Environment for Disaster Risk Financing in Pakistan. Country Diagnostics Assessment.

233 The World Bank Group and the Asian Development Bank. 2021. Country Risk Profile: Pakistan.

TABLE 60. DAMAGE ESTIMATED FOR THE DRR AND RESILIENCE SECTOR (PUBLIC SECTOR ONLY)

Province/Region	Damaged Physical Assets and Infrastructure	Damage in PKR Million (US$ Million)
Federal/Cross-Provincial - Pakistan Meteorology Department		
Balochistan	9 weather observatories partially damaged	985 (4.6)
	2 weather observatories completely destroyed	
KP	10 weather observatories partially damaged	
Punjab	1 weather observatory partially damaged	
	2 weather observatories completely destroyed	
Sindh	13 weather observatories partially damaged	
	2 weather observatories completely destroyed	
Cross-Provincial	47 environmental offices, equipment, and monitoring networks (air quality, water quality, hydrometeorological stations, etc.)	
Special Regions	8 weather observatories partially damaged	
Federal/Cross-Provincial - Water and Power Development Authority		
6 water level sensors		4.0 (0.02)
4 turbidity meter sensors		3.2 (0.01)
1 RQ-30 discharge measurement system		4.0 (0.02)
Civil works		1.9 (0.009)
Hydrology Irrigation Division Peshawar - Khyber Pakhtunkhwa		
31 flood gauges damaged or washed out		20.0 (0.09)
TOTAL		**1,018 (4.7)**

Linking the Effects to the Human Impact

Performance of the DRR system

In contrast to the 2010, 2012, and 2014 floods, the disaster management entities at the federal level were fully established and operational in 2022. Despite capacity constraints and gaps because of a lack of resources or dedicated expertise, the institutions were supporting disaster risk management (DRM) activities and had gained sufficient experience based on a decade of their existence. At the start of the 2022 monsoon season, the NDMA undertook a comprehensive monsoon contingency planning exercise, which included all major federal and provincial stakeholders, including the PDMAs, concerned ministries and departments, and the army, as well as the international community.

Neither the PMD nor the World Meteorological Organization had forecast the actual scale of the rainfall in their national and regional outlooks. The actual rainfall at the end of August was 300–500 percent more

than the seasonal average, and significantly higher than the seasonal forecast.[234] The NDMA/PDMAs took some time to gear up their response and reach out to the affected areas, which highlighted the need for strengthened DDMAs with dedicated staff to provide on-the-ground information and resources for an expedited response. Flood warnings during the floods were issued by the provincial and district authorities, however receptiveness to these warnings varied in every community. The PDMAs also faced issues and challenges with procurement and supply chain management of essential relief items, which could be improved through long-term agreements, prequalification of suppliers, and up-to-date market surveys.

While both the NDMA and the FFC have their long-term plans prepared in the form of the National Disaster Management Plan 2012-2022 (NDMP) and the National Flood Protection Plan IV (NFPP-IV), respectively, this disaster highlights the lack of financing for DRR and the consequent unfunded disaster management plan activities and investments. While the NFPP-IV has received some insignificant amounts from various sources, the NDMP has yet to receive any support, even though almost 10 years have passed since its approval. The NDRMF was established to mobilize funds from multiple avenues in the DRR space, but unfortunately it has not been able to make the headway planned or efficiently utilize available resources to improve risk reduction efforts.

In addition to the lack of resources, the capacity of these entities, especially the DMAs at the federal and provincial levels, remains an issue. The absorptive capacity of the agencies for donor programs is also limited. Important pillars of DRR, such as multi-hazard risk assessments and fiscal resilience, continue to be deprioritized because of capacity, coordination, and resource constraints. Multi-hazard risk and vulnerability mapping has been carried out for several geographical scales and hazards, particularly for the most vulnerable districts.[235] However, they are not often readily available or accessible, and have had limited practical application for planning and investment of critical infrastructure or land use.

Over the last 10 years there have been several risk assessments in Pakistan at various tiers of government, however, the data and analysis obtained have yet to be uploaded to a centralized platform so that it is available to decision-makers and policy planners to inform the development process. Similarly, several fiscal resilience options and solutions have been presented to the government for consideration and preparation of a comprehensive fiscal resilience strategy, however the initiatives have not seen traction with the DMAs and the Ministry of Finance.

Lastly, there has been considerable investment in community-based DRM (CBDRM) in the country in the aftermath of the 2010 floods. However, those trained and, in some cases, equipped, communities have not been effectively linked with local- and district-level government entities and this valuable resource could not be effectively utilized during the disaster. There is a need to develop dedicated, tailor-made CBDRM programs for women and other vulnerable segments that are disproportionately impacted by these disasters.

Human impact

The limited preparedness of the DMAs for climate-induced disasters and the inability of international and national weather forecasting agencies to correctly predict the scale of the rains in Pakistan resulted in a significant loss of lives and livelihoods, and damage to property, which could have been partially avoided. The Sindh and Balochistan PDMAs were not fully prepared to deal with an emergency caused

234 Consultation interviews with stakeholders.
235 Punjab Disaster Management Authority. 2019. Multi-Hazard Vulnerability Risk Assessment (various districts). Lahore.

by unusually heavy rains. Search and rescue operations were constrained and even helicopter sorties could not help the trapped people in some cases. Remote villages in the south and west and people in the hills and valleys in the north of the country faced problems in accessing search and rescue services and relief goods and services. This resulted in an unfortunate loss of lives, and delayed access to health services, especially for women and girls. An outbreak of disease in shelter camps or another disaster could intensify vulnerabilities and stretch the capacities of the DRM functionaries.

Recovery Needs and Strategy

The PDNA DRR sector team conducted a series of discussions with the federal and provincial agencies and other stakeholders to ascertain the sector needs and inform policy recommendations. In addition, the team reviewed 118 programs and actions that were to be implemented in the NDMP, and several presentations, plans, and background documents shared by the stakeholders. The team engaged with stakeholders on environment, climate change, and public policy. Stakeholders were also requested to advise on the urgency of actions among the population, time sequencing, geographic priority, and build-back-better (BBB) considerations. The DRR dimension, not damage and loss, was the main driver of the identified needs and priorities, as shown in Table 61.

TABLE 61. SUMMARY OF IDENTIFIED NEEDS AND PRIORITIES FOR THE DRR SECTOR

Damaged Physical Assets and Infrastructure	Damage in PKR Million (US$ Million)	Brief Justification of Needs from the Analysis of Effects and Impacts	Needs in PKR Million (US$ Million)
Federal/Cross-Provincial			
PMD	985 (4.6)	• Repair the damaged offices and equipment to ensure the PMD has functioning offices to monitor weather conditions and issue early warnings.	24,200 (113.0)
WAPDA	13.1 (0.06)	• Replace all damaged equipment to ensure proper monitoring of floods.	
NDMA		• Invest in capacity and budget for risk assessment to allow effective risk mapping. • Identify and implement disaster risk financing solutions to better prepare for and meet the fiscal impacts of disasters. • Prioritize funds to implement the NDMP, without which disasters will continue to cause widespread damage and loss.	770 (3.6)
FFC		• Provide funds for key interventions to implement the NFPP-IV to significantly reduce damage and loss, including loss of life. Include nature-based and ecosystem-based solutions in plans. • Strengthen institutional and capacity building of the FFC to urgently implement the NFPP-IV. • Provide funds to implement the National Plan for Flood Telemetry System, especially in Sindh and Balochistan to monitor floods and reduce damage and loss.	407 (1.89)

Damaged Physical Assets and Infrastructure	Damage in PKR Million (US$ Million)	Brief Justification of Needs from the Analysis of Effects and Impacts	Needs in PKR Million (US$ Million)
Ministry of Climate Change/ Ministry of Planning Development & Special Initiatives		• Build capacity, raise awareness, and invest in nature-based solutions and ecosystem-based adaptation and resilience measures to better manage floods and water resources.	440 (2.0)
Provinces			
PDMA, Balochistan Planning & Development Dept		• Conduct multi-hazard vulnerability and risk assessments in non-coastal areas where no risk assessment exists to improve disaster response and climate resilience. • Link DDMAs with community self-help groups to provide effective early warning dissemination, evacuation, and response. • Mainstream climate change extremes and climate resilience in planning, implementation, and monitoring and evaluation.	2,706 (12.6)
Hydrology Irrigation Division KP PDMA, KP Planning & Development Dept	20 (0.09)	• Replace all damaged gauges to ensure proper monitoring of river water flow. • Conduct multi-hazard vulnerability and risk assessments in vulnerable districts of KP to improve disaster response and climate resilience. • Link DDMAs with community self-help groups to provide effective early warning dissemination, evacuation, and response. • Mainstream climate change extremes and climate resilience in planning, implementation, and monitoring and evaluation.	2,684 (12.5)
PDMA, Punjab Planning & Development Dept		• Provide training to community organizations on CBDRM and link them with DDMAs and the PDMA. • Provide capacity for early warning and management of flash floods in mountainous areas as well as urban floods, since major cities are at risk of inundation from heavy rainfall. • Mainstream climate change extremes and climate resilience in planning, implementation, and monitoring and evaluation.	1,430 (6.7)

Damaged Physical Assets and Infrastructure	Damage in PKR Million (US$ Million)	Brief Justification of Needs from the Analysis of Effects and Impacts	Needs in PKR Million (US$ Million)
PDMA, Sindh Planning & Development Dept		• Formulate or update land-use laws and monitoring to avoid construction in flood-prone areas. • Improve data and information sharing through better integration of management information systems. • Link DDMAs with community self-help groups to provide effective early warning dissemination, evacuation, and response. • Mainstream climate change extremes and climate resilience in planning, implementation, and monitoring and evaluation.	2,013 (9.4)
List of losses *(forgone income, additional costs)*		• In addition to the provision of humanitarian relief supplies in the affected areas, the Government has allocated a sum of PKR 70 billion from the federal budget for the provision of cash grants to the flood-affected population.	
Needs for human impact, BBB, and others		• The costs are calculated taking into consideration premiums for BBB, climate resilience, inflation, and exchange rate depreciation; a premium of approximately 40 percent is applied to the base cost.	
Total			**34,650 (161.3)**

Recovery strategy

As a result of the review of major legislative and policy instruments, federal- and provincial-level planning documents, and consultations with a diverse range of stakeholders working in disaster and climate resilience, the priority actions identified are listed in Table 62. The DRM actions comprise investment in enhancing the forecasting and early warning capacity of the PMD, strengthening the risk information available for the entire country, and strengthening the capacities of the DMAs at the federal, provincial, and especially, the district levels, and linkages with community self-help groups trained and equipped for first response in times of disasters. There is also a need to equip the DMAs so they can cope with increased climate variability and respond to a diverse range of resulting disasters, such as flash floods and urban flooding, in addition to riverine floods. A sizable portion of these actions are covered under the NDMP and NFPP-IV.

TABLE 62. SUMMARY OF PRIORITIZED INTERVENTIONS TO ADDRESS DISASTER RISK REDUCTION NEEDS

Intervention/Activity	**Short** (Up to 12 months)	**Intermediate** (Up to 3 years)	**Long** (Up to 5 years)	**Priority** (Rank 1-5)	**Cost in PKR Million** (US$ Million)
1. Prepare the second NDMP and upgrade the NFPP-IV, including a prioritized subproject roadmap.	X			1	407 (1.89)
2. Provide training on all stages of disaster response and humanitarian assistance.	X			3	880 (4.1)
3. Undertake detailed and localized multi-hazard vulnerability and risk assessments and integrate the data into local-level decision support systems for effective warnings and responses.		X		4	2,200 (10.2)
4. Strengthen and build the capacity of the DDMAs and prepare district disaster management plans and link them with NGOs and communities.		X		1	660 (3.1)
5. Mainstream DRM in planning, implementation, and monitoring through the capacity enhancement of public officials.		X		5	550 (2.6)
6. Build the capacity of communities using a CBDRM approach and link them with the DDMAs and PDMAs to enhance disaster response at the community level.		X		4	2,200 (10.2)
7. Strengthen hydrometeorological monitoring, forecasting, and early warning systems; install or replace meteorological radars and automatic weather stations nationwide; and expand urban flood monitoring systems in major cities.			X	1	24,200 (112.7)
8. Upgrade public evacuation shelters along with routes and inform and train communities on timely and organized evacuation in disasters.			X	3	1,353 (6.3)
9. Integrate DRR and nature-based and ecosystem-based climate resilience into public sector approvals, planning, implementation, and monitoring and evaluation.			X	2	2,200 (10.2)
Total					34,650 (161.3)

The sector recovery is driven by the principles of sustainability, climate resilience, BBB, pro-poor and pro-vulnerable, balanced between the visible and invisible recovery, and driven by communities. Recovery actions have been linked with national DRM and DRR plans such as the NFPP-IV, and the NDMP. Preparation of the second NDMP has been recommended to integrate plans of various partners and stakeholders working on DRM and DRR. The sector interventions are designed to provide core support to the proposed DRM, DRR, and climate resilience measures proposed in other sectoral recovery plans, such as housing. In addition, the National Adaptation Plan being formulated by the Ministry of Climate Change, along with the updated Nationally Determined Contribution (NDC 2021) and the recently launched the Living Indus Initiative provide strategies and priority interventions for climate change adaptation and resilience building.

As a cross-cutting issue, the DRR and Resilience sector strategy intersects with other key sectors. During the preparation of the PDNA, a DRR and Resilience Guidance note was prepared and distributed to help integrate DRR and resilience into sector-level recovery needs and strategies. Key members from the DRR sector team contributed to sector discussions and reports to support the mainstreaming of DRR and resilience into those respective strategies.

The country will require significant technical and financial support to implement the envisaged DRR and resilience works, as the proposed budgets (along with those covering physical infrastructure, such as flood embankments in the Water and Irrigation sector) far exceed the government's recent expenditures on DRR-related issues. Technical support should be sought through consulting services and financial support could be sought from multilateral and bilateral agencies through development partner coordination. Potential funding sources could include the Green Climate Fund, Global Environment Facility, World Bank, Asian Development Bank, JICA, AIIB, Islamic Development Bank, IFAD, ECHO, and other development partners. The initial proposed updating of the NDMP and NFPP-IV will guide the approaches and the prioritization of investment subprojects and interventions, and identify further studies, mapping, and modeling required for detailed program design.

It is recommended that government entities responsible for DRM and DRR functions be systematically linked with community self-help groups, for example those organized by the rural support programs, and several national and international NGOs. These informal groups are politically neutral and driven by community interests. All DMAs need to compile a database of contacts and profiles of these groups in their respective jurisdictions and train them in DRR, disaster response, and climate resilience to dramatically increase their outreach. The early warning systems of the PMD also need to be linked with these groups for direct dissemination of local warnings and forecasts.

Limitations

The assessment was limited by the lack of available baseline data and time to extensively coordinate with other sectors. As the PDNA methodology relies on secondary data collection, the broad geographical spread and constraints prevented the team from fully verifying the findings. Data was not available on private sector damage and loss, such as buildings, equipment, and supplies of NGOs working on DRR or DRM issues.

Appendices

Appendix 1: Monetary Poverty

Approach

The impact on household welfare will come through at least four channels:

- loss of household income due to destroyed harvest, killed livestock, or inactivity of businesses;
- loss of assets, including homes, livestock, productive equipment, and household durables;
- shortages of food due to lost food stocks, poor harvests, and rising food prices; and
- loss of human capital, given significant threat of disease outbreaks and food shortages, and prolonged school closures, with attendant learning losses.

Assumptions

- Poverty rates are derived from household consumption Y and based on the national poverty line.
- Estimates focus on the direct consequences of the flood on poverty and do not account for second order effects, including implications for growth and productive capacity of households.
- Between 2018 and 2022, the population has increased from 207 to 228 million (excluding Special Regions). Accordingly, population weights are updated using historical provincial population growth rates.

Model

The simulation model calculates the following:

$$\widehat{Y}_{i,t} = Y_{i,0} \cdot \prod_S (1 - z_{i,s}) \quad \text{with} \quad z_{i,s} = (\beta_s | X_{i,s}, \delta_{s,d})$$

- Y_{it} is total consumption of household i for period t (0 is baseline, and 1 flood scenario)

- $z_{i,s}$ is the percent decrease in household consumption of household i due to a shock s which is a function of:
  - β_s is the percent decrease in household consumption due to a shock s calibrated to the literature and in consultation with sectoral colleagues

- Conditional on:
  - X_i, s characteristics of household i; $X_{i,s}$ = 1 if household i has characteristics which make them vulnerable to shock s (directly observed from household survey)
  - $\delta_{s,d}$ exposure to shock s in province d, (assigned to subset of households in district based on share of district affected), where:

- $\delta_{s,d}$ = damages based on administrative reports baseline scenario
- $\delta'_{s,d}$ = exposure based on geospatial data as a robustness check
- Conditional on their characteristics X_i, s, households were assigned a probability $\delta_{s,d}$ of experiencing the shock within their district. A uniform distribution was used with 500 iterations.

Data

Household characteristics X are available from HIES 2018–19, which is the official survey to measure monetary poverty using the national poverty measurement methodology. By design, the survey is representative on the province level (urban/rural), but all households can be mapped into districts and tehsils. The following characteristics were used to determine whether a particular household i would be affected by channel s:

- Livelihoods: If at least one member of the household worked in agriculture, manufacturing construction, or services.
- Assets: whether a household lived in a mudbrick home or owned any livestock.
- Consumption decile: household's ranking in terms of consumption expenditure, to determine the effect of food inflation.

Government estimates were imputed based on available administrative reports.[236] These included the following:

- Population: reported percentage of population affected per province.
- Livestock: number of livestock lost as percent of reported number of livestock per province in 2020/21.
- Agricultural land: estimated value of crops lost as percent of total (not available for KP at time of analysis).
- Built-up area: number of katcha houses reported destroyed or damaged as percent of estimated number in baseline, per province.

Damage Calibration

The damage to the households β_s relates to the consumption loss attributable to shock s. It was calibrated based on consultations with sectoral experts and drawing on references in the literature.[237]

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236 Damages from the flood are reported on the NDMA website (*http://cms.ndma.gov.pk/*) and were collated with administrative data to establish baseline values.

237 Salvucci, Vincenzo, and Ricardo Santos. 2020. "Vulnerability to Natural Shocks: Assessing the Short-term Impact on Consumption and Poverty of the 2015 Flood in Mozambique." Ecological Economics 176: 106713; Chen, Huili, Zhongyao Liang, Yong Liu, Q. Liang, and Shuguang Xie. 2017. "Integrated Remote Sensing Imagery and Two-dimensional Hydraulic Modeling Approach for Impact Evaluation of Flood on Crop Yields." Journal of Hydrology 553: 262–275.

- Damage to livelihoods was calibrated by occupation and sector in consultation with International Labour Organization colleagues [5 percent; 25 percent]; differences reflect mobility across sectors depending on their initial profile (see Table 63).
- Damage to buildings was based on the share of consumption households dedicate to housing costs [20 percent].
- Damage to livestock in terms of loss to welfare [10 percent].

The effect of inflation was benchmarked to the CPI published by the Pakistan Bureau of Statistics, calculating cumulative food inflation for July, August, and September 2022. The effects of inflation were distributed to households in accordance with the share of food consumption per decile, reflecting that poorer households spend proportionally more on food. We assumed no substitution and that 50 percent of inflation could be attributed to the floods.

TABLE 63. DAMAGE TO LIVELIHOOD PARAMETERS

Livelihoods	Distribution (HIES, rural)[238]	Damage
Self-employed	16 percent	5 percent
Paid employee: construction	13 percent	5 percent
Paid employee: manufacturing	7 percent	5 percent
Paid employee: services	19 percent	5 percent
Paid employee: agriculture	10 percent	15 percent
Own cultivator	22 percent	25 percent
Sharecropper	7 percent	25 percent
Contract cultivator	3 percent	25 percent
Livestock owners	4 percent	25 percent

Exposure: Geospatial vs NDMA

As a robustness check, flood maps were overlaid with built-up areas and land-cover data to estimate the extent of exposure to buildings and arable land by district and construct $\delta'_{s,d}$. The estimates presented here come from an assessment of exposed population, built-up and agricultural land, and production (crops and livestock). The information was then aggregated at the tehsil level (Adminlevel 3) and merged into the HIES data.

Table 64 summarizes the inputs used to calculate the exposure parameters $\delta_{s,d}$, which is based on NDMA reports, and $\delta'_{s,d}$, which is based on geo-spatial data. These sometimes differ substantially. Geospatial population exposure estimates are much lower for KP and Balochistan because the geo-spatial estimates use standing water and do not account for damages from flashfloods. The lower livestock estimates from NDMA suggest either incomplete data or that many owners were able to relocate their livestock to higher ground.

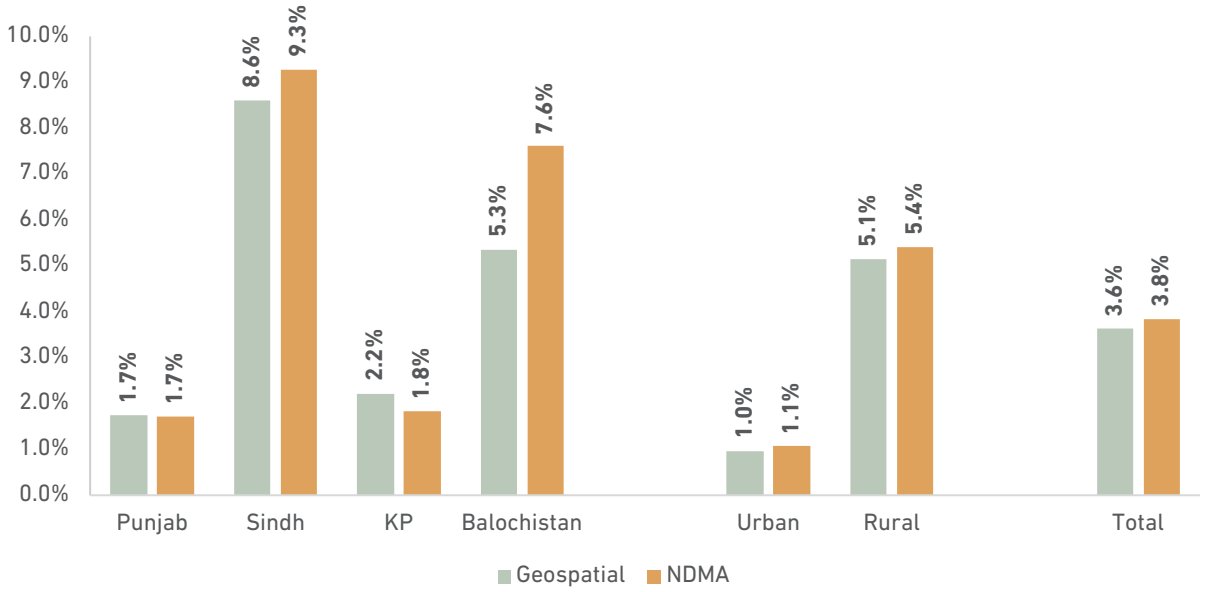
238 does not add to 100 due to rounding.

TABLE 64. REPORTED EXPOSURE: GEOSPATIAL VERSUS NDMA REPORTS

Province	Population		Agriculture		Built-up Area		Livestock	
	Geospatial	NDMA	Geospatial	NDMA	Geospatial	NDMA	Geospatial	NDMA
Punjab	4%	5%	17%	2%	6%	1%	17%	0%
Sindh	25%	28%	39%	55%	30%	25%	36%	3%
KP	2%	11%	6%	N/A	2%	2%	5%	0%
Balochistan	7%	60%	14%	22%	9%	13%	12%	7%
National	9%	15%	20%	15%	11%	7%	19%	1%

However, as highlighted in Figure 9, the difference in predicted outcomes across models is relatively minor, as the effects are concentrated in calamity-hit districts and affected households with characteristics rendering them vulnerable to overlapping sets of losses through various shocks. The exception is Balochistan, where the government reports a much larger share of the population affected than is suggested from geospatial data on flood exposure.

FIGURE 9. SIMULATED CHANGES IN NATIONAL POVERTY RATE (PERCENTAGE POINTS, POINT ESTIMATES)



Source: World Bank staff calculations.

Source of Geospatial Exposure Data

The remotely sensed flood extent detected using Sentinel 1, Sentinel 2, and visible infrared imaging radiometer suite (VIIRS) satellite data from the United Nations Institute for Training and Research (UNITAR) were combined over the period July 12–August 29 to obtain a description of the cumulative floodwater extent. This extent was used as mask to filter the data representing exposure categories. The modeling of water hazard intensity parameters (e.g., water depth, velocity, duration of submersion, sediment load) is not yet available for this event, which hinders any reliable calculation of impact. The numbers therefore express the total exposed value for each category. Sources for the Geospatial estimates are summarized in Table 65 below.

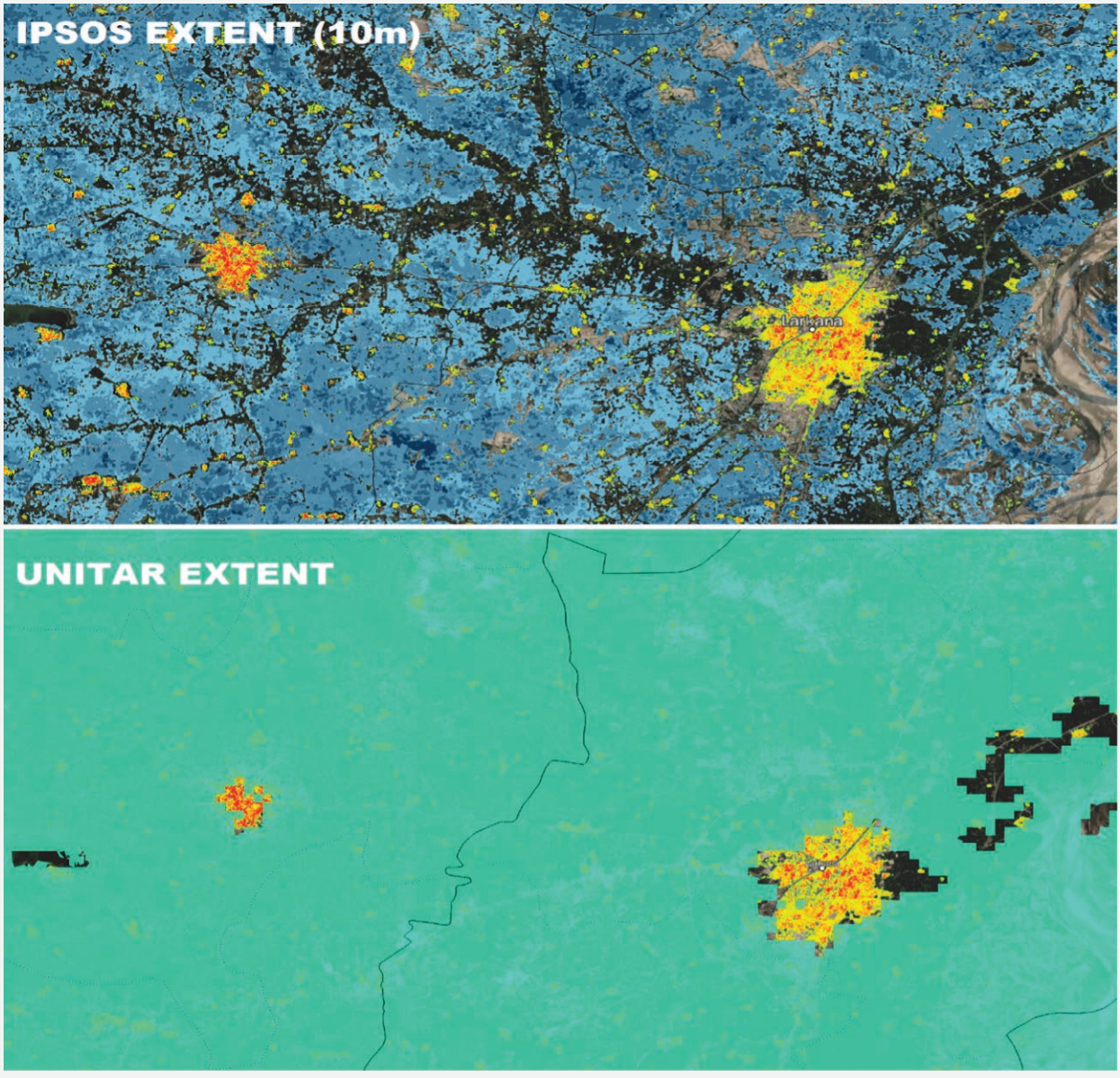
TABLE 65. INPUT DATA USED TO PRODUCE GEOSPATIAL EXPOSURE ESTIMATES

Item	Description
Flood Extent from 12/07 to 29/08 (MAXIMUM)	Sum of individual extent layers obtained from UNITAR. Includes extents for individual events in the period as detected from Sentinel 1, Sentinel 2, and VIIRS. Used to identify total flood extent.
Population Layer	The World Settlement Footprint 2019 provides information on global human settlements using data from the Copernicus Sentinel-1 and Sentinel-2 missions trained on Google Earth engine. Used to estimate the number of people living within the flood extent.
Built-up	World Settlement Footprint, 2019. Ratio of built-up (buildings) presence in a cell. Used to estimate the built-up area located within the flood extent.
Agricultural Land	ESA, 2020 global land cover filtered for agricultural classes. Used to estimate the area of agricultural land located within the flood extent.
Crop Production	FAO Global Agro-Ecological Zoning, v4, 2015. Total annual production (1,000 tons) for 26 crop types. Year 2015 (2014–16 average). Used to estimate agricultural production exposed to the floods.
Livestock	FAO Gridded Livestock of the World, 2010. Total number of animals for eight categories (chicken, duck, goat, sheep, cattle, buffalo, horse, pig). Used to estimate livestock production exposed to the floods.
Administrative Boundaries	ADM0 (country), ADM1 (provinces), ADM2 (districts), ADM3 (tehsil) from the United Nations Office for the Coordination of Humanitarian Affairs, 2022. Used to aggregate exposure and impact estimates.

TEXTBOX 1. SATELLITE IMAGERY AND REMOTE SENSING

Several sets of satellite imagery were made available from multiple sources, including UNITAR (VIIRS, Sentinel 1, and Sentinel 2), which provided a mix of 0.3-kilometer (VIIRS) and 30-meter (Sentinel 1 and 2) resolution data; and Ipsos (Sentinel 1), which provides 10-meter resolution. All Sentinel-derived data (UNITAR and Ipsos) have the same issue of bad water detection in urban areas. But because UNITAR is upscaled and simplified, those urban gaps end up filled (see Figure 10). As a result, analysis conducted by overlaying the Ipsos layers with population density significantly undercounts the number of people directly affected, estimating a total of 2.4 million for the whole country. In contrast, estimates from the UNITAR layer are of 17.4 million people impacted, much closer to the official estimates provided by the NDMA. For the purpose of our analysis, we considered households to be flood-affected if they were adjacent to or surrounded by standing water. We therefore rely on the estimates derived from the UNITAR data for the analysis outlined.

FIGURE 10. DIFFERENCE IN COVERAGE BETWEEN UNITAR AND IPSOS LAYERS



Appendix 2: Living Conditions and Multidimensional Poverty

Conceptual Framework and Methodology

Poor and vulnerable households are disproportionally affected by natural hazards and disasters. They are more susceptible and vulnerable to idiosyncratic and covariate shocks such as natural disasters, man-made crises, and economic shocks. Vulnerability is closely linked to poverty, inequality, and inadequate access to basic services, resources, and livelihoods, among other factors. To estimate the impact of floods on people's living conditions and access to basic services, the assessment will use the existing Multidimensional Poverty Index. The MPI identifies deprivations across three dimensions: living standards, health, and education, showing the number of people who are multidimensionally poor and the number of deprivations that poor households face. It is a valuable tool to compare districts and see how different factors influence vulnerability as well as inform programming for long-term flood management policy.

Data: The MPI uses the PSLM 2019–20, which is representative of the district level and using 2022 population projections.

Dimensions: The official MPI tool has three dimensions and 15 indicators. The dimensions are education, health, and living standards. The education domain has three indicators, health has four indications, and living standards has eight indicators (see Table 62 for more details). The estimation of MPI using PSLM 2019–20 will inform the pre-flood situation of the deprivations faced by the population. To estimate the impact of the 2022 floods, shocks were given to the set of MPI variables at the household level to the residents of 71 flood-affected districts based on the assumptions.

Assumptions: The assumptions are led by the data on damages and losses received from the Provincial Disaster Management Authority (PDMA) and NDMA. The PDMA websites have data on injuries and losses at the district level, guiding the analysis and setting the assumptions for shocks. The proposed assumptions are:

Education:
- Child school attendance: deteriorates by 15 percentage points.
- School quality: deteriorates by 15 percentage points.

Health:
- Access to health facilities: deteriorates by 15 percentage points.
- Immunization: deteriorates by 20 percentage points.
- Antenatal care: deteriorates by 30 percentage points.
- Assisted delivery: deteriorates by 30 percentage points.

Standard of Living:
- Water: deteriorates by 10 percentage points.
- Sanitation: deteriorates by 10 percentage points.
- Walls: deteriorates by 30 percentage points.
- Overcrowding: deteriorates by 15 percentage points.

- Electricity: deteriorates by 15 percentage points.
- Assets: deteriorates by 10 percentage points.
- Land and livestock (only for rural areas): deteriorates by 30 percentage points (only for livestock, we are not giving shock to land).

Note: The assumptions mentioned above may be revised afterdata is received from PDMA and NDMA and consultation with stakeholders.

Limitations: The major limitation is that the variables not used in the official MPI cannot be included. For example, the official MPI does not have nutrition indicators, so a separate analysis will be carried out to calibrate the impact of the flood.

Multidimensional Poverty Index (MPI) Results by Indicator

TABLE 66. MPI VALUES: POVERTY ESTIMATES

Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate Affected percent population, (households)
National	37.8 percent (12.3 million)	43.7 percent (14.2 million)
Punjab	28.0 percent (4.9 million)	29.2 percent (5.1 million)
Sindh	44.7 percent (3.9 million)	54.9 percent (4.7 million)
KP	47.6 percent (2.5 million)	60.6 percent (3.1 million)
Balochistan	70.2 percent (1.1 million)	81.1 percent (1.3 million)

Source: United Nations Children's Fund (UNICEF) staff calculations.

TABLE 67. MPI VALUES: SELECTED DRINKING WATER INDICATOR ESTIMATES

Indicator	Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate affected percent population, (households)
Deprived if the household has no access to an improved source of water according to SDG standards, considering distance (less than a 30-minute return trip): tap water, hand pump, motor pump, protected well, mineral water	National	11.3 percent (3.4 million)	15.5 percent (4.9 million)
	Punjab	5.4 percent (2.0 million)	6.2 percent (2.7 million)
	Sindh	12.0 percent (0.5 million)	21.2 percent (0.5 million)
	KP	19.3 percent (0.6 million)	26.3 percent (1.1 million)
	Balochistan	37.5 percent (0.3 million)	45.8 percent (0.4 million)

Source: UNICEF staff calculations.

TABLE 68. MPI VALUES: SELECTED SANITATION INDICATOR ESTIMATES

Indicator	Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate affected percent population, (households)
Deprived if the household has no access to adequate sanitation according to SDG standards: flush system (sewerage, septic tank and drain), privy toilet seat	National	17.9 percent (5.7 million)	21.4 percent (6.9 million)
	Punjab	10.9 percent (3.1 million)	11.6 percent (3.8 million)
	Sindh	25.9 percent (0.9 million)	32.2 percent (1.0 million)
	KP	15.3 percent (1.3 million)	22.9 percent (1.7 million)
	Balochistan	57.5 percent (0.2 million)	63.8 percent (0.4 million)

Source: UNICEF staff calculations.

TABLE 69. MPI VALUES: SELECTED ASSETS INDICATORS ESTIMATES

Indicator	Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate affected percent population, (households)
Deprived if the household has unimproved walls (mud, uncooked/mud bricks, wood/ bamboo, other)	National	17.3 percent (5.5 million)	19.6 percent (6.2 million)
	Punjab	7.9 percent (3.0 million)	8.3 percent (3.4 million)
	Sindh	27.1 percent (0.7 million)	31.2 percent (0.7 million)
	KP	18.7 percent (1.4 million)	23.6 percent (1.6 million)
	Balochistan	61.2 percent (0.3 million)	64.7 percent (0.4 million)
Deprived if the household has no access to electricity	National	3.9 percent (1.4 million)	13.2 percent (4.4 million)
	Punjab	2.2 percent (0.7 million)	3.8 percent (2.3 million)
	Sindh	8.7 percent (0.2 million)	25.8 percent (0.3 million)
	KP	2.5 percent (0.5 million)	18.9 percent (1.3 million)
	Balochistan	4.4 percent (0.04 million)	30.2 percent (0.3 million)
Deprived if the household does not have more than two small assets	National	32.5 percent (10.7 million)	34.3 percent (11.3 million)
	Punjab	25.3 percent (5.7 million)	25.6 percent (6.0 million)
	Sindh	43.8 percent (2.2 million)	46.5 percent (2.2 million)
	KP	36.1 percent (2.3 million)	39.9 percent (2.4 million)
	Balochistan	41.4 percent (0.6 million)	47.1 percent (0.6 million)
Deprived if the household is deprived in land and livestock	National	34.0 percent (10.8 million)	36.0 percent (11.4 million)
	Punjab	31.1 percent (6.0 million)	31.6 percent (6.3 million)
	Sindh	28.1 percent (2.7 million)	31.2 percent (2.7 million)
	KP	48.5 percent (1.5 million)	52.4 percent (1.6 million)
	Balochistan	40.7 percent (0.8 million)	45.3 percent (0.8 million)

Source: UNICEF staff calculations.

TABLE 70. MPI VALUES: SELECTED HEALTH INDICATORS ESTIMATES

Indicator	Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate Affected percent population, (households)
Access to health facilities/ clinics/ Basic Health Units (BHU)	National	31.4 percent (9.9 million)	34.9 percent (11.1 million)
	Punjab	30.5 percent (5.5 million)	31.3 percent (6.1 million)
	Sindh	26.1 percent (2.6 million)	33.0 percent (2.7 million)
	KP	34.3 percent (1.3 million)	40.3 percent (1.7 million)
	Balochistan	52.6 percent (0.5 million)	58.9 percent (0.6 million)
Immunization	National	11.2 percent (3.6 million)	16.8 percent (5.5 million)
	Punjab	7.8 percent (2.0 million)	8.9 percent (3.0 million)
	Sindh	15.3 percent (0.7 million)	25.9 percent (0.8 million)
	KP	11.3 percent (0.8 million)	21.7 percent (1.3 million)
	Balochistan	25.2 percent (0.2 million)	38.1 percent (0.3 million)
Antenatal care	National	8.8 percent (2.8 million)	17.4 percent (5.6 million)
	Punjab	6.5 percent (1.5 million)	8.0 percent (3.1 million)
	Sindh	8.1 percent (0.6 million)	25.0 percent (0.7 million)
	KP	14.9 percent (0.4 million)	29.5 percent (1.3 million)
	Balochistan	13.7 percent (0.2 million)	37.3 percent (0.5 million)
Assisted delivery	National	5.6 percent (1.7 million)	14.6 percent (4.7 million)
	Punjab	3.7 percent (1.0 million)	5.2 percent (2.6 million)
	Sindh	3.6 percent (0.3 million)	21.3 percent (0.4 million)
	KP	11.7 percent (0.2 million)	27.2 percent (1.1 million)
	Balochistan	12.4 percent (0.2 million)	36.1 percent (0.4 million)

Source: UNICEF staff calculations.

TABLE 71. MPI VALUES: SELECTED EDUCATION INDICATORS ESTIMATES

Indicator	Region	Baseline (PSLM 2019–20) percent population, (households)	Estimate Affected percent population, (households)
Child school attendance	National	18.0 percent (5.9 million)	21.6 percent (7.1 million)
	Punjab	11.7 percent (3.2million)	12.4 percent (3.8 million)
	Sindh	25.2 percent (1.0 million)	31.6 percent (1.1 million)
	KP	23.6 percent (1.3 million)	30.1 percent (1.6 million)
	Balochistan	29.6 percent (0.4 million)	39.0 percent (0.5 million)
School quality	National	40.5 percent (13.2 million)	42.7 percent (13.9 million)
	Punjab	32.8 percent (7.1 million)	33.2 percent (7.5 million)
	Sindh	49.3 percent (2.8 million)	53.2 percent (2.9 million)
	KP	47.7 percent (2.5 million)	51.9 percent (2.8 million)
	Balochistan	52.9 percent (0.7 million)	58.7 percent (0.8 million)

Source: UNICEF staff calculations.

TABLE 72. PAKISTAN'S MPI DIMENSIONS, INDICATORS, DEPRIVATION CUT-OFFS, AND WEIGHTS

Dimension	Indicator	Deprivation Cut-off	Weights
Education	Years of schooling	Deprived if no man or no women in the household has completed 5 years of schooling	1/6 = 16.67 percent
	Child school attendance	Deprived if any school-aged child is not attending school (between 6 to 11 years of age)	1/8 = 12.5 percent
	School quality	Deprived if child is not going to school because of quality issues (not enough teachers, school are far away, too costly, no male/female teachers, substandard school), or is attending school but remains dissatisfied with services	1/24 = 4.17 percent
Health	Access to health facilities/ clinics/ Basic Health Units (BHU)	Deprived if health facilities are not used at all, or are only used once in a while, because of access or constraints (too far away, too costly, unsuitable, lack of tools/staff, not enough facilities)	1/6 = 16.67 percent
	Immunization	Deprived if any child under the age of 5 is not fully immunized according to vaccinations calendar (households with no child under 5 are considered non-deprived)	1/18 = 5.56 percent
	Antenatal care	Deprived if any women in the household who have given birth in the last 3 years did not receive antenatal check-ups (households with no women who have given birth are considered non-deprived)	1/18 = 5.56 percent
	Assisted delivery	Deprived if any women in the household has given birth in the last 3 years attended by untrained personnel (family member, friend, traditional birth attendant, etc.) or in an inappropriate facility (home, other) (households with no women who have given birth are considered non-deprived)	1/18 = 5.56 percent

Dimension	Indicator	Deprivation Cut-off	Weights
Standard of Living	Water	Deprived if the household has no access to an improved source of water according to SDG standards, considering distance (less than a 30 minute return trip): tap water, hand pump, motor pump, protected well, mineral water	1/21 = 4.76 percent
	Sanitation	Deprived if the household has no access to adequate sanitation according to SDG standards: flush system (sewerage, septic tank, drain), privy toilet seat	1/21 = 4.76 percent
	Walls	Deprived if the household has unimproved walls (mud, uncooked/ mud bricks, wood/bamboo, other)	1/42 = 2.38 percent
	Overcrowding	Deprived if the household is overcrowded (4 or more people per room)	1/42 = 2.38 percent
	Electricity	Deprived if the household has no access to electricity	1/21 = 4.76 percent
	Cooking fuel	Deprived if the household uses solid cooking fuels for cooking (wood, dung cakes, crop residue, coal/charcoal, other)	1/21 = 4.76 percent
	Assets	Deprived if the household does not have more than two small assets (including radio, TV, iron, fan, sewing machine, video cassette player, chair, watch, air cooler, bicycle) or no large asset (refrigerator, air conditioner, tractor, computer, motorcycle), and has no car	1/21 = 4.76 percent
	Land and livestock (only for rural areas)	Deprived if the household is deprived in land and livestock.: • Deprived in land: the household has less than 2.25 acers of non-irrigated land and less than 1.125 acres of irrigated land • Deprived in livestock: the household has less than 2 cattle, fewer than 3 sheep/goats, fewer than 5 chickens, and no animal for transportation (urban households are considered non-deprived)	1/21 = 4.76 percent

Source: Government of Pakistan 2016. Multidimensional Poverty in Pakistan, National MPI Report, Federal Ministry of Planning, Development and Special Initiatives (MPDSI), OPHI, UNDP (2016).

Appendix 3: Nutrition Regression Analysis for Stunting

TABLE 73. RESULTS OF BINARY LOGISTIC REGRESSION FOR STUNTING OF CHILDREN UNDER FIVE

Co-variables	Odd Ratios	Std. Err.
Child's Age in Months (Continuous)		
	1.022***	0.0024
Child's Sex [Male as reference]		
Female	0.916	0.0705
Child's Birth Order (Continuous)		
	1.060**	0.0274
Birth Interval [< 24 months as reference]		
≥ 24 months	0.859*	0.0732
Morbidity [No as reference]		
Yes	1.440***	0.1144
Mother's Body Mass Index (BMI) (Continuous)		
	0.966***	0.0080
Mother's Education [No Education as reference]		
Primary	0.786**	0.0902
Middle	0.566***	0.0910
Secondary	0.589***	0.0844
Higher	0.332***	0.0565
Mother's Age at Birth (Continuous)		
	0.979**	0.0094
Wealth Index [Poorest as reference]		
Poorer	0.759**	0.0895
Middle	0.559***	0.0776
Richer	0.679**	0.1070
Richest	0.604***	0.1122

Co-variables	Odd Ratios	Std. Err.
Household Size (Continuous)		
	1.016*	0.0090
Basic Drinking Water [No as reference]		
Yes	0.675***	0.0774
Improved Sanitation [No as reference]		
Yes	0.848*	0.0805
Constant	2.432***	0.7480

Note: *** expresses 1 percent, ** expresses 5 percent, and * expresses 10 percent level of significance. Number of observations: 3,295.

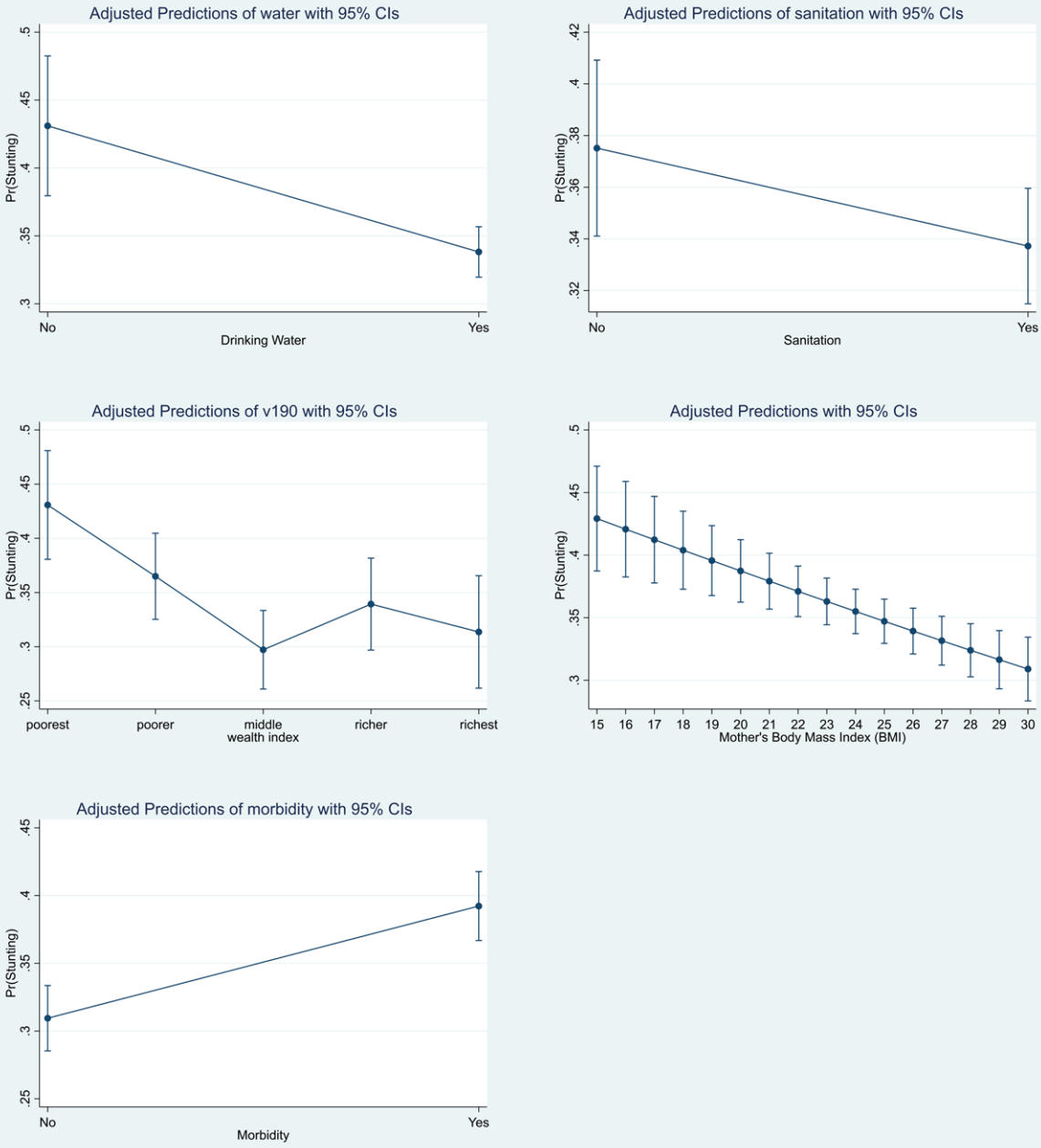
TABLE 74. RESULTS OF MARGINAL EFFECTS FOR STUNTING OF CHILDREN UNDER FIVE

Co-variables	Marginal Effects (dy/dx)	Std. Err.
Morbidity		
No	0.310	0.0123
Yes	0.392	0.0130
Mother's BMI		
15	0.429	0.0214
16	0.421	0.0195
17	0.412	0.0176
18	0.404	0.0159
19	0.396	0.0142
20	0.387	0.0127
21	0.379	0.0114
22	0.371	0.0103
23	0.363	0.0095
24	0.355	0.0091
25	0.347	0.0090
26	0.339	0.0093
27	0.332	0.0100
28	0.324	0.0108
29	0.316	0.0119
30	0.309	0.0130

Co-variables	Marginal Effects (dy/dx)	Std. Err.
Wealth Index		
Poorest	0.431	0.0256
Poorer	0.365	0.0203
Middle	0.297	0.0185
Richer	0.339	0.0217
Richest	0.314	0.0265
Basic Drinking Water		
No	0.431	0.0262
Yes	0.338	0.0095
Improved Sanitation		
No	0.375	0.0174
Yes	0.337	0.0114

Note: *** expresses 1 percent, ** expresses 5 percent, and * expresses 10 percent level of significance. Number of observations: 3,295.

FIGURE 11. PLOTS OF MARGINAL EFFECTS



Methodology

The coefficient of explanatory variables explains how different factors contribute to children's nutritional status and which factors are more important.

TABLE 75. OPERATIONAL DEFINITIONS OF VARIABLES

Variables	Definitions
Dependent Variable	
STUNT (Stunting)	1 if the child is stunted (-2 SD below the reference), 0 otherwise
Explanatory Variables	
AGE (Child's age in months)	Child's age in completed months
SEX (Child's sex)	1 for female, 0 for male
BORD (Child's birth order)	Child's birth order
BINT (Birth interval)	1 for => 24 months, 0 for < 24 months
MOBD (Morbidity)	1 if child is suffered from diarrhea, fever, or acute respiratory infection in last 2 weeks, 0 otherwise
MBMI (Mother's BMI)	Mother's BMI
MEDU (Mother's education)	0 no education, 1 for primary, 2 for middle, 3 for secondary, 4 for higher
MAGEB (Mother's age at birth)	Mother's age at the time of birth in complete years
WEALTH (Wealth index)	0 for poorest, 1 for poorer, 2 for middle, 3 for richer, and 4 for richest
HHS (Household size)	Number of household members
WATER (Basic drinking water)	1 if household have an improved source of drinking water on premises or it will take less than 30 minutes round trip to fetch water, 0 otherwise
SANI (Improved Sanitation)	1 if household have an improved source of toilet facility and does not share with another household, 0 otherwise

Estimation equation (1) used in the present study using the logistic regression model:

$$STUNT = f(AGE_{ij}, SEX_{ij}, BORD_{ij}, BINT_{ij}, MOBD_{ij}, MBMI_{ij}, MEDU_{ij}, MAGEB_{ij}, WEALTH_{ij}, HHS_{ij}, WATER_{ij}, SANI_{ij}) \quad \ldots\ldots\ldots (1)$$

Where STUNT is the malnutritional (stunting) status of child and xj are the child and parental characteristics such as age, gender, birth order, birth interval, wealth index water, and sanitation, etc. For estimation, we used a logit model that is prevalent for malnutrition analysis of children.

Limitations:

- We cannot use those variables not coved by the PDHS 2017–18.
- The study assumes that the explanatory variables contribution will remain the same during this period and does not change with time.

Appendix 4: Food Security

Methodology

The food insecurity estimates are based on the Integrated Food Security Phase Classification (IPC) analysis, extrapolation of the IPC, and data from the MSRNA. As per preliminary results of IPC acute food insecurity analysis (September–December 2022) for 28 districts, around 5.74 million people in IPC Phase 3 and above are living in 18 flood-affected districts (Balochistan: 10 districts; Sindh: 8 districts). The results from the 18 IPC analyzed flood-affected districts are extrapolated for 40 non-IPC analyzed flood-affected districts from Balochistan, Punjab, and Sindh using flood damages and losses data from the government and findings from the MSRNA. The overall extrapolated IPC analysis for 58 flood-affected districts (18 districts directly analyzed and 40 districts extrapolated) estimated 12.3 million people are in IPC Phase 3 and above in Balochistan, Punjab, and Sindh. Because of a lack of IPC analysis, MSRNA data (percentage of households whose livelihood source has been affected by the floods) is used for the remaining 26 affected districts (17 districts in KP and nine in the Special Regions), which estimates that 2.3 million people are food insecure in these areas.

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