

District Vulnerability Index for Pakistan (DVIP)

Harnessing Multisectoral Data to Inform
Equitable Policy and Climate Action

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Data Statement

All data used in this research are derived from the final reports of publicly available sources. Details of these sources are provided in the Data and Methods section of this report.

Research Team:

G.M Arif
Saima Bashir
Waqas Imran
Muhammad Khalil
Wietze Lindeboom
Ali Mohammad Mir
Maqsood Sadiq
Zeba A. Sathar (*T.I.*)

Population Council

3rd Floor, NTC Building (North), Sector F-5/1
Islamabad, Pakistan
Tel: +92 51 920 5566
Email: info.pakistan@popcouncil.org

To learn more:

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Acronyms and Abbreviations

AJK	Azad Jammu and Kashmir
BHU	Basic Health Unit
BL	Balochistan
CDC	Centers for Disease Control and Prevention
CRU TS	Climatic Research Unit gridded Time Series
DG Khan	Dera Ghazi Khan
DI Khan	Dera Ismail Khan
DVIP	District Vulnerability Index for Pakistan
EMIS	Education Management Information System
FATA	Federally Administered Tribal Areas
GB	Gilgit–Baltistan
GLOFs	Glacial Lake Outburst Floods
GPS	Global Positioning System
HDI	Human Development Index
HH	Household
ICA	Integrated Context Analysis
ICT	Islamabad Capital Territory
J&K	Jammu and Kashmir
K Abdullah/Saifullah	Killa Abdullah/Saifullah
Khi.	Karachi
Kr. Shahdadt	Kambar Shahdadt
km	kilometer(s)
km ²	Square kilometers
KP	Khyber Pakhtunkhwa
LHW	Lady Health Worker
M Bahauddin	Mandi Bahauddin
mm	Millimeters
MNCH	Maternal, neonatal and child health facility
MPI	Multidimensional Poverty Index
N/S Waziristan	North/South Waziristan
NDMA	National Disaster Management Authority
NR	National ranking
PB	Punjab
PBS	Pakistan Bureau of Statistics
PIE	Pakistan Institute for Education
PR	Provincial ranking
PSLMS	Pakistan Social and Living Standards Measurement Survey
Sh. Benazirabad	Shaheed Benazirabad
SD	Sindh
SDG	Sustainable Development Goals
SoVI	Social Vulnerability Index
sq.	Square
TM Khan	Tando Muhammad Khan
UN	United Nations
UNDP	United Nations Development Programme
WFP	World Food Programme

Executive Summary

Pakistan’s highly heterogeneous population faces significant development challenges, including unequal resource distribution and disparities in access to services, which create varying levels of vulnerability across communities. While existing studies have primarily examined vulnerability through climate, economic, or other disaster lenses, they often overlook underlying structural and systemic factors.

This study aims to address that gap by developing an index that incorporates domains of vulnerability typically underrepresented in analyses of Pakistan. The **District Vulnerability Index for Pakistan (DVIP)** builds on established social vulnerability indices, adapting their frameworks to Pakistan’s district-level context.¹ It is based on six distinct and widely defined domains (Table ES.1). Nearly all of the twenty-one indicators within these domains are oriented to capture access to essential resources and opportunities, and the use of indicators of actual behavioral *outcomes* is restricted as far as possible.

The index is designed to enable measurement and comparison of relative vulnerability across districts. Using the DVIP, we have ranked districts by their overall and domain-specific vulnerability levels. Additionally, we illustrate how the DVIP can be paired with various types of hazard risk data, such as climate stress, to inform policy and guide targeted action.

Table ES.1: Domains, Indicators, and Data Sources of the District Vulnerability Index for Pakistan

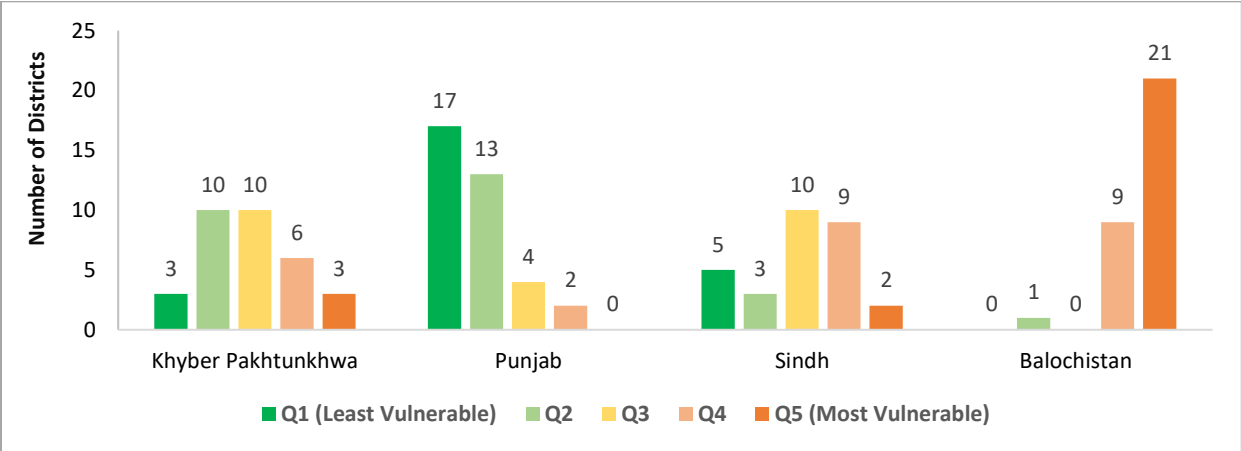
DOMAIN	INDICATOR	SOURCE
Housing	• Percentage of <i>kacha</i> and semi- <i>pakka</i> houses	Population and Housing Census 2023
	• Percentage of households with no toilet facility	
	• Percentage of households with unimproved drinking water sources	
	• Percentage of households with one room	
Communication and Transportation	• Average distance (km) of mouzas from a metaled road	Pakistan Mouza Census 2020
	• Average distance (km) of mouzas from a transport facility	
	• Percentage of households without a landline or mobile phone	Pakistan Social and Living Standards Measurement Survey 2019–20
Livelihoods	• Percentage of population aged 15–60 engaged in agriculture sector	Population and Housing Census 2023
	• Percentage of population aged 15–60 working as unpaid family helpers	
	• Unemployment to population ratio	

¹ For foundational approaches, see Rajib Acharya and A. Porwal, “A Vulnerability Index for the Management of and Response to the COVID-19 Epidemic in India: An Ecological Study,” *Lancet Global Health* 8, no. 9 (2020): e1142–e1151, [https://doi.org/10.1016/S2214-109X\(20\)30300-4](https://doi.org/10.1016/S2214-109X(20)30300-4); and Barry E. Flanagan et al., “A Social Vulnerability Index for Disaster Management,” *Journal of Homeland Security and Emergency Management* 8, no. 1 (2011), <https://doi.org/10.2202/1547-7355.1792>.

DOMAIN	INDICATOR	SOURCE
Access to Health Services	<ul style="list-style-type: none"> Average distance (km) of mouzas from a basic health unit Average distance (km) of mouzas from a private doctor Average distance (km) of mouzas from a maternal and child healthcare facility 	Pakistan Mouza Census 2020
	<ul style="list-style-type: none"> Percentage of rural households not visited by a Lady Health Worker in last 30 days 	Pakistan Social and Living Standards Measurement Survey 2019-20
Access to Public Education	<ul style="list-style-type: none"> Average distance (km) of mouzas from boys' high/higher secondary school Average distance (km) of mouzas from girls' high/higher secondary school 	Pakistan Mouza Census 2020
	<ul style="list-style-type: none"> Number of primary schools per 10 sq. km Number of high/higher secondary schools per 10 sq. km 	Pakistan Institute for Education (PIE), School Directory 2020–21
Demographics	<ul style="list-style-type: none"> Percentage of young children (aged <5) in population Percentage of elderly population (aged ≥69) Ratio of population aged <15 or >64 to working-age population (aged 15–64) 	Population and Housing Census 2023

We ranked Pakistan’s districts based on their scores across various vulnerability domains, and then overall vulnerability scores derived from the combined domains. Stark provincial differences emerged: most districts in the highest vulnerability quintile are located in Balochistan, while the least vulnerable are concentrated in Punjab (Figure ES.1).

Figure ES.1: Number of Districts in Each National Vulnerability Quintile (Qs), by Province



Islamabad (ICT) not shown in figure, which is in Q1 (Least Vulnerable)

Among the twenty least vulnerable districts, thirteen are in Punjab, four in Sindh, two in Khyber Pakhtunkhwa (KP), and *none* in Balochistan. In contrast, the most vulnerable category includes two former FATA districts in KP, only one in Sindh, none in Punjab, and an alarming seventeen in Balochistan.

The five least vulnerable districts in the country are the four urban districts of Karachi in Sindh, followed by Lahore in Punjab. Conversely, the five *most* vulnerable districts include Washuk, Khuzdar, Kohlu, and Zhob in Balochistan, and Kohistan in KP.

As expected, domain-specific scores generally mirror the pattern of overall vulnerability, with the majority of the most vulnerable districts in Balochistan. In the twenty worst-performing districts in the **housing** domain, over 65 percent of households live in temporary or makeshift structures; half lack toilet facilities; and 40 percent have no access to improved water facilities. In districts like Sohbatpur (Balochistan), 75 percent of households live in one-room dwellings. In Jhal Magsi, also in Balochistan, an extraordinary 97 percent of households reside in *kacha* or *semi-pakka* homes.

The **communication and transportation** domain also highlights widespread disconnection in Balochistan. Many contiguous districts severely lack adequate access to roads, transport, or telephone services within reachable distances. These deficits severely limit crisis response, emergency relief efforts, and resilience-building at household, community, and district government levels. In contrast, much of Punjab, particularly its northern and central regions, has relatively strong infrastructure in this domain

In the **livelihoods** domain, fifteen of the twenty lowest-ranked districts are in Balochistan. KP and Balochistan also exhibit the highest unemployment rates and the largest proportions of unpaid family workers, reflecting fragile and precarious livelihoods.

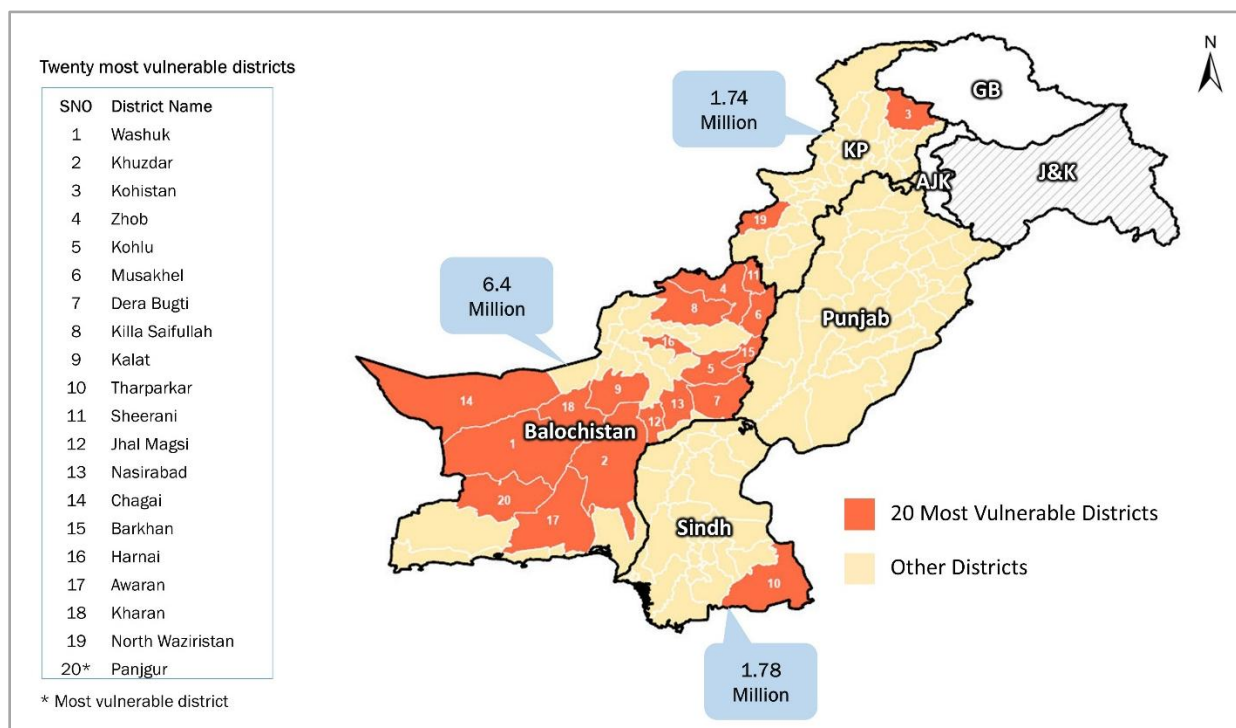
Both KP and Balochistan also stand out as more vulnerable in the **access to health** domain, with lower accessibility of health facilities and limited doorstep community health outreach, and also wide disparities in health access between districts within the province. In the most vulnerable districts, the average distance to the nearest health facility exceeds 30 kilometers. When coupled with poor transportation and communication infrastructure, this severely hinders access to essential services to meet basic health needs, especially maternal and child healthcare.

In terms of **access to public education facilities**, Karachi stands out with the highest density of primary and high/higher secondary schools, though this may be due in part to its high population density. The most vulnerable districts are concentrated in Balochistan, where low school density and long travel distances are likely exacerbated by vulnerability in the transportation domain. Notably, across all provinces except Punjab, girls tend to face greater distances to high/higher secondary schools than boys.

Many districts in Balochistan and Khyber Pakhtunkhwa score poorly in the **demographics** domain, although Tharparkar (Sindh) ranks as the most vulnerable. High fertility, measured by the proportion of children under age 5, is a key driver of demographic vulnerability. While high fertility pervades across Pakistan, some districts lag far behind in the fertility transition, contributing to unusually large families. This pattern likely intersects vulnerability in other domains, such as access to education, and health services.

Using population data from the 2023 Housing and Population Census, we estimate that nearly 10 million Pakistanis live in the twenty most vulnerable districts—about 2 million are women of reproductive age, and a similar number are children under five (Figure ES.2). More than half of this population resides in Balochistan, making up over 40 percent of the province’s total population.

Figure ES.2: Twenty Most Affected Districts and Their Population



Source: Developed by authors based on DVIP ranking results and 2025 Housing and Population Census.

To demonstrate the utility of the DVIP in conjunction with hazard assessments, we assessed district-level climate risks, applying binary scoring to four key indicators: **temperature change**, **rainfall change**, **flood hazard**, and **drought hazard**. Each indicator was assigned a value of 0 (low/no risk) or 1 (high risk) based on predefined thresholds. These binary scores were then summed to produce a composite climate risk score (range: 0–4), where higher values indicate greater exposure to multiple climate stressors.²

Using Pearson’s correlation coefficient, we found a strong positive association between the rise in temperature and higher drought risk, as well as a negative association between changes in heat and rainfall changes. Flood risk does not have strong associations with either heat or drought but is negatively associated, though weakly, with rises in rainfall (Table ES.2).

² Climate risk indicators were derived from: World Bank, Climate Change Knowledge Portal (2019), <https://climateknowledgeportal.worldbank.org/> (for temperature and rainfall data); and National Disaster Management Authority (NDMA) and World Food Programme (WFP), Integrated Context Analysis (ICA) on Vulnerability to Food Insecurity and Natural Hazards Pakistan (Islamabad: Government of Pakistan, 2017) (for drought and flood hazard data).

Table ES.2: Pearson's Correlation Coefficient between the DVIP and Climate Indicators

	DVIP	Change in temperature	Change in Rainfall	Drought Risk	Flood Risk
DVIP	1	0.5509*	-0.2657*	0.3086*	0.0293
Change in temperature	0.5509*	1	-0.7254*	0.4893*	0.0717
Change in Rainfall	-0.2657*	-0.7254*	1	-0.447*	-0.201*
Drought Risk	0.3086*	0.4893*	-0.447*	1	-0.0534
Flood Risk	0.0293	0.0717	-0.201*	-0.0534	1

*p≤0.05.

Importantly, we find a statistically significant positive association between vulnerability and temperature changes and the drought hazard index, a negative association with rainfall increase, and no association with the flood hazard score (Table ES.3). There is a positive association between the aggregate climate risk score and the vulnerability ranking of districts. In fact, the districts that fall into the two more vulnerable quintiles have an average climate score of 2 or more, while the lowest quintile in vulnerability has an average score of less than 1. This shows the strong probability that the districts most vulnerable already will also experience greater exposure to changes in temperature, rainfall, flooding, and drought.

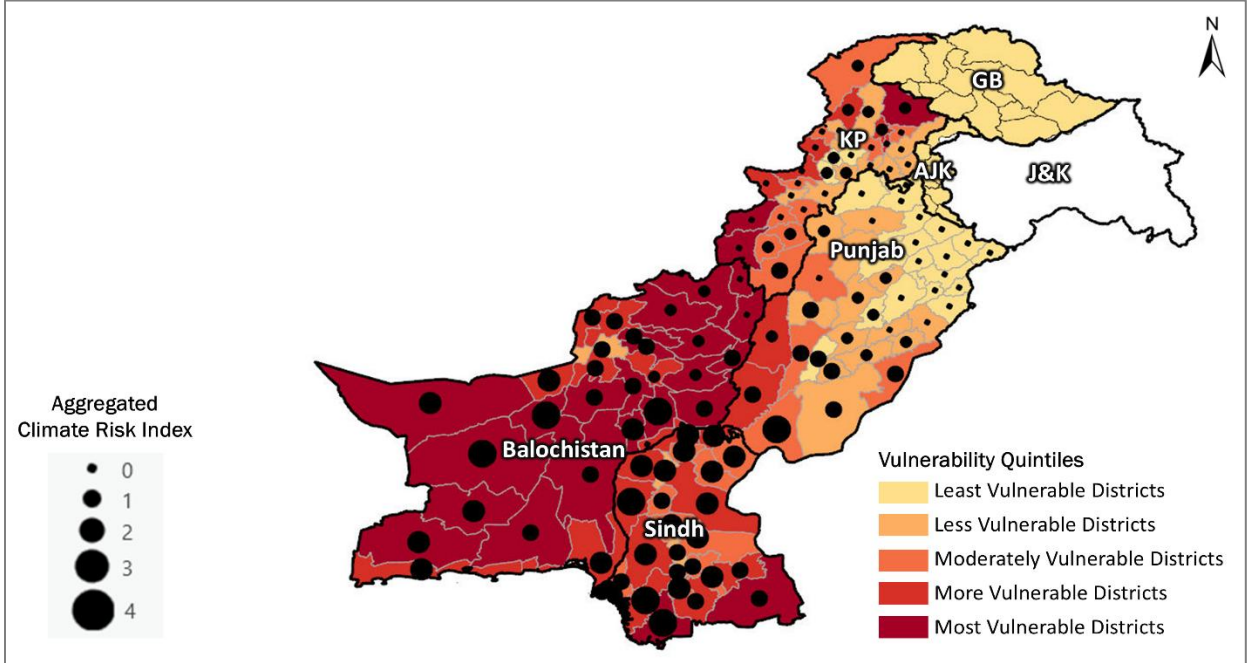
Table ES.3: Specific and Aggregated Climate Risks by DVIP Ranking Quintile

DVIP Ranking Quintiles	Average Temperature Change, 1970–80 to 2006–16	Average Rainfall Change, 1970–80 to 2006–16	Flood Risk Score	Drought Risk Score	Aggregated Climate Risk Score (0-4)
First	0.39	54.28	1.65	1.52	0.57
Second	0.44	71.36	1.80	2.08	0.85
Third	0.55	54.42	2.00	2.20	1.57
Fourth	0.79	26.10	2.13	2.26	2.00
Fifth	0.88	14.75	1.54	2.33	2.04

Source: Authors' calculations.

When climate risk indicators are juxtaposed against the overall vulnerability rankings of districts, the data show a considerable overlap of high climate risk (aggregate scores or 3 or 4) and greater vulnerability (Figure ES.3). However, climate risk and vulnerability are not always positively associated. For example, several urban districts have high climate risks but low vulnerability. Moreover, specific climate risks can be in opposite directions within the same district. We can safely conclude that low vulnerability reduces, and high vulnerability exacerbates, the eventual impact of hazards posed.

Figure ES.3: Spatial Distribution of Overall Vulnerability, by Ranking Quintile, in Combination with Climate Risk Exposure Across the Districts of Pakistan



Note: Aggregated index is Aggregated Climate Risk Score (0–4).

By exploring the correlation of climate risk scores with DVIP results, we were able to identify districts carrying the double burden of high climate stress and high vulnerability, as well as some of the pathways by which climate change interacts with existing vulnerabilities. For example, the findings reinforce that districts that are highly dependent on agriculture for livelihoods, have limited access to basic services, and face geographic isolation are at greater risk of damage and destruction when faced with climate risk.

While our assessment of climate risks was restricted to only four climate indicators and a less granular, district level, we believe this exercise nevertheless served its purpose in demonstrating some of the statistical and geospatial approaches for pairing the DVIP with district-level assessments of any type of hazard. This pairing allows for a better understanding of the intersection of vulnerability and external threats. Deeper probes are possible, for example, by examining the associations of specific domains with overall vulnerability or with specific hazard risks. It is also possible to extend the DVIP’s data architecture by incorporating government and other systems of data collection, such as education and health systems statistics. The DVIP’s district-level granularity is a strength, and future iterations could incorporate sub-district data to further refine targeting.

The results of the DVIP point to the strong need for addressing the root causes of vulnerability with political priorities focused on tackling poverty, improving access to education and healthcare (including family planning), and ensuring equal economic opportunities for marginalized populations. The DVIP can serve as a valuable tool along this journey, harnessing the information available in public datasets to enable the crafting and implementation of workable strategies that target the right populations with the most-needed interventions. The index’s ability to integrate with external hazard assessments also makes it ideal for identifying the districts in greatest need and for guiding the risk management, adaptation, and resilience-building measures required to negotiate these challenges.

Acknowledgements

We extend our heartfelt gratitude to everyone who contributed their valuable time and expertise to the research report, **District Vulnerability Index for Pakistan (DVIP): Harnessing Multisectoral Data to Inform Equitable Policy and Climate Action**.

The research for this report has spanned several years. The development of a Vulnerability Index for Pakistan was initiated some years ago, supported by unrestricted funds from the Population, Environmental Risks, and Climate Crisis (PERCC) Initiative of the Population Council. Support from the Foreign, Commonwealth & Development Office (FCDO), Government of the United Kingdom has been used to finalize the report.

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1. Introduction

Pakistan, the world's fifth most populous country, is characterized by a rich tapestry of ethno-linguistic groups, varied topography, and distinct socioeconomic landscapes. The country faces significant development challenges, including unequal resource distribution, disparities in basic service delivery, and related socioeconomic deprivation. These varying levels of resource distribution and development lead to numerous impoverished and vulnerable population subgroups (Vecchi and Hussain 2006).

The concept of vulnerability is defined and operationalized in various ways, often linked to resilience, risk, exposure, sensitivity, and coping capacity (Füssel and Klein 2006, Cutter and Finch 2008). For example, the United Nations Development Programme (UNDP) defines vulnerability as “a human condition or process resulting from physical, social, economic, and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard” (UNDP 2004, Arab Water Council/World Food Programme 2022). Similarly, the Center for Disease Control and Prevention (CDC) conceptualizes social vulnerability as “the degree to which a community exhibits certain social conditions, including high poverty, low percentage of vehicle access, or crowded households, among others, that may affect that community's ability to prevent human suffering and financial loss in the event of a disaster” (CDC 2022). Fussel (2012) defines social vulnerability as the inability of individuals, groups, or communities to cope with and adapt to external stress affecting their livelihoods and wellbeing. Taking this idea further, Schellnhuber et al. (2016) propose the term “differential social vulnerability,” describing it as “the varying degree of adverse effects that different individuals and social groups in a specific location may suffer from the climate stressors they are exposed to.”

Vulnerability inversely affects the ability of systems, communities, and households to absorb and recover from the impact of disruptive events—such as epidemics, climate-related disasters, economic shocks, or other catastrophic events—without fundamental changes in their function or structure. This capacity is typically termed resilience. Resilience is itself influenced by a community's access to rights, resources, and assets, with wealthier households often better equipped to mitigate risks (Proag 2014, Dodman et al. 2009). The relationship between resilience and vulnerability represents distinct yet interrelated concepts for measuring transformation and adaptation (Miller et al. 2010).

Social and economic systems are commonly identified as underlying factors that create and exacerbate vulnerability, impacting populations' ability to cope with serious risks (Gunaratne et al. 2023, Cardona 2004, Frank and Apollonia 2015, Wisner 2016). Studies have highlighted how pre-existing socioeconomic and demographic inequalities linked to poverty, education, employment, access to public services, communication, infrastructure, and health compound the risks faced by marginalized groups (Arab Water Council/World Food Programme 2022, Madajewicz 2020, Brooks 2003, Cutter et al. 2003). Birkmen et al. (2022) note that the adverse impacts of climate change, development deficits, and inequality exacerbate each other.

Since vulnerability is highly context-specific, analyses based on local knowledge and data allow for a more accurate understanding. While extensive literature exists on social vulnerability globally, research focusing on Pakistan remains limited. Existing Pakistani studies have primarily examined vulnerability through the lens of climate change or natural hazards, such as floods (Hamidi et al. 2022, Mengal et al. 2021, Rana and Routray 2018, Rahman and Salman 2013). Many studies rely on established indices, such as the CDC Social Vulnerability Index and Cutter's (2023) Social Vulnerability

Index (SoVI) (Hamidi et al. 2022, Mengal et al. 2021, Khalid et al. 2021). However, these indices are often not comprehensive as they tend to overlook structural and systemic factors, which are crucial for identifying individuals or groups made vulnerable by socioeconomic and political systems (Biswas and Nautiyal 2023).

Acknowledging the high level of socioeconomic inequities and differential levels of development that exist across the districts of Pakistan (Jamal 2016), some studies have adopted a district-based approach to examine vulnerability (e.g., Rafiq and Blaschke 2012, Rahman and Salman 2013, Baig et al. 2021). However, they primarily focus on environmental hazards and climate change, paying limited attention to other contributing factors.

Various indices are available for measuring socioeconomic progress, particularly at the national level, such as the Gender Parity Index and the United Nations Sustainable Development Goals (UN SDG) Index. Most of these present a report card for global goals around gender, climate, poverty, and the environment. Most indices used in earlier studies have focused on individual-level factors to measure vulnerability.

Recognizing the importance of a disaggregated scorecard beyond a single national aggregated picture, the UNDP (2024) created a district-level Human Development Index (HDI). This index looks at three key areas: health (immunization and satisfaction with health services), education (years of schooling), and living standards (based on household conditions). Using an adaptation of global best practices, these indicators are combined into a single score for Pakistan. The HDI is constructed at the district level and is a good tool for gauging human development performance across the country.

Similarly, the Multidimensional Poverty Index (MPI) is a good gauge of poverty-related indicators (PBS 2020). It moves away from an income-related measure of poverty to encompass different aspects of quality of life, such as education, health outcomes, housing, access to clean water, and even Internet use. Data are drawn mainly from the series of the Pakistan Social and Living Standards Measurement Surveys. This index relies on outcomes such as enrollment for education and immunization for health and tries to capture household rankings by a multidimensional definition of what can be considered poor or non-poor.

Recently, during the COVID-19 pandemic, Acharya and Porwal (2020) constructed a detailed vulnerability index to understand how different states in India were affected. They combined data on income levels, living conditions, healthcare access, and disease patterns from various sources to reflect the many factors that shaped people's risk during the pandemic. The metric construction of this index differs from the HDI and MPI indices. This vulnerability index provides a relative ranking of districts and states rather than an absolute measure of vulnerability. It also incorporates elements of access to health, education, and transport access, which are underplayed in the other indices.

We have used this latter approach to construct a vulnerability index for Pakistan in the present study. Almost all indicators are designed to capture access to key resources and opportunities, and we have restricted the use of indicators based on actual behavioral *outcomes* as much as possible. Our contribution expands upon and explores domains of vulnerability that are usually underrepresented in previous analyses in Pakistan.

The index is based on six distinct and widely defined domains that capture the systemic and structural factors underlying vulnerability in Pakistan’s population, including housing, communication and transportation, livelihoods, access to health services, access to public education, and demographics. It is designed to measure and enable comparison of both domain-specific and overall vulnerability at the district level. Moreover, it can be paired with data on any type of hazard risk, such as climate stress, epidemics, or economic crises, to guide policy and action.

Study Objectives

The specific objectives of the study are to:

- **Construct a District Vulnerability Index for Pakistan (DVIP)** that harnesses publicly available data to capture the multidimensional drivers of vulnerability at the district level. These drivers include structural inequities related to socioeconomic status, access to basic services and infrastructure, and demographic composition.
- **Demonstrate an analytical approach for pairing the DVIP with district-level assessments of external hazards—including, but not limited to, climate change**—in order to better understand the relationship between local vulnerabilities and external threats. This approach aims to identify the regions and populations most in need of support and to inform risk management and broader development interventions based on localized barriers and needs.

Study Design

The study was designed to create a composite index of vulnerability at the district level in Pakistan. This index can facilitate general development interventions and crisis responses in various public policy contexts, such as public health, climate adaptation, disaster risk management, and livelihood security. In addition, we aimed to demonstrate how the index can be paired with hazard data to understand the correlation between local vulnerability and external risks. For this purpose, we chose climate change, which poses urgent and well-documented stress across the country.

Accordingly, our study consists of two components:

1. **In the first and primary component, we computed a composite index of vulnerability at the district level: which we call the “District Vulnerability Index for Pakistan” (DVIP).** This index is based on twenty-one indicators across six domains: housing, communication and transportation, livelihoods, access to health services, access to public education, and demographics. We used a percentile ranking method to compute both domain-specific and overall vulnerability scores. The results provide an overview of relative vulnerability at the district level.
2. **In the second component, we demonstrated the DVIP’s application by exploring the interplay of vulnerability and selected climate-related risks at the district level.** To do this, we first computed climate risk scores for each district and then examined the correlation with the vulnerability scores.

Outline of Report

Section 2 of this report describes in detail the methodology employed in the construction of the District Vulnerability Index for Pakistan. We introduce the indicators and data sources used, explain the rationale for their inclusion based on evidence about contributing factors in vulnerability, and describe the index construction process in detail.

In Section 3, we begin with outlining the context of vulnerability in terms of the absolute values of the twenty-one indicators used in the DVIP. We then present the domain-wise and overall vulnerability index, describing the variations in vulnerability within and across provinces. Choropleth maps illustrate the spatial distribution of domain-specific and overall vulnerability at the district level.

In Section 4, we present a demonstration of how DVIP results can be paired with district-level hazard data for better targeted interventions. We first assess district-level climate risks, applying binary scoring to four key indicators, and then use statistical and geospatial methods to examine the correlation between vulnerability, as measured by the DVIP, and climate risk scores at the district level.

Finally, in Section 5, we discuss the implications emerging from our analysis and the scope for further development and utilization of the DVIP.

2. Methodology

This section presents the methodology used to construct the DVIP and rank districts. It describes the domains and indicators of the index, along with the rationale for their inclusion based on evidence of relevance, as well as strengths and limitations, of available data sources. We then describe the construction of the index and finally discuss its strengths and limitations. The method used for the second component of the study—pairing the DVIP with climate data—is outlined alongside the findings of that analysis in Section 4.

Selection of Domains, Indicators, and Data Sources

The DVIP is based on twenty-one indicators across six domains: housing, communication and transportation, livelihoods, access to health, access to public education, and demographics (Table 2.1). The following sections discuss the rationale for including each domain, and the indicators and data sources used.

Table 2.1: Domains, Indicators, and Data Sources of the District Vulnerability Index for Pakistan

DOMAIN	INDICATOR	SOURCE
Housing	• Percentage of <i>kacha</i> and semi- <i>pakka</i> houses	Population and Housing Census 2023
	• Percentage of households with no toilet facility	
	• Percentage of households with unimproved drinking water sources	
	• Percentage of households with one room	
Communication and Transportation	• Average distance (km) of mouzas from a metaled road	Pakistan Mouza Census 2020
	• Average distance (km) of mouzas from a transport facility	
	• Percentage of households without a landline or mobile phone	Pakistan Social and Living Standards Measurement Survey 2019–20
Livelihoods	• Percentage of population aged 15–60 engaged in agriculture sector	Population and Housing Census 2023
	• Percentage of population aged 15–60 working as unpaid family helpers	
	• Unemployment to population ratio	
Access to Health Services	• Average distance (km) of mouzas from a basic health unit	Pakistan Mouza Census 2020
	• Average distance (km) of mouzas from a private doctor	
	• Average distance (km) of mouzas from a maternal and child healthcare facility	
	• Percentage of rural households not visited by a Lady Health Worker in last 30 days	Pakistan Social and Living Standards Measurement Survey 2019-20

DOMAIN	INDICATOR	SOURCE
Access to Public Education	<ul style="list-style-type: none"> • Average distance (km) of mouzas from boys' high/higher secondary school • Average distance (km) of mouzas from girls' high/higher secondary school 	Pakistan Mouza Census 2020
	<ul style="list-style-type: none"> • Number of primary schools per 10 sq. km • Number of high/higher secondary schools per 10 sq. km 	Pakistan Institute for Education (PIE), School Directory 2020–21
Demographics	<ul style="list-style-type: none"> • Percentage of young children (aged <5) in population 	Population and Housing Census 2023
	<ul style="list-style-type: none"> • Percentage of elderly population (aged ≥69) 	
	<ul style="list-style-type: none"> • Ratio of population aged <15 or >64 to working-age population (aged 15–64) 	

km=kilometers, sq.=square.

Notes: The term “*kacha*” refers to houses built with temporary or flimsy materials like mud, bamboo, thatch, and straw. “*Semi-pakka*” refers to a structure with both durable (*pakka*) and *kacha* components. A “*mouza*” is a specifically defined territorial unit in Pakistan, for which provincial revenue departments maintain a distinct revenue record, including a cadastral map.

Housing

Housing conditions reflect the economic and living conditions of the community at large. When homes are partially or completely constructed from temporary or flimsy materials, it often indicates that families lack access to public services and are more susceptible to the effects of housing vulnerabilities (Suglia et al. 2015). Poor people or households tend to rely on informal settlements, increasing their vulnerability to hazards, especially during pandemics (Williams et al. 2019). Houses made of mud or low-quality material are more prone to damage during floods and extreme weather events (Cutter 2003, Qasim et al. 2016).

Similarly, overcrowded housing conditions are associated with adverse health outcomes such as respiratory diseases—including asthma—cardiovascular diseases, injuries, mental health-related problems, and the transmission of communicable diseases, including COVID-19 (Acharya and Porwal 2020). When whole families are confined to a single room, they are more vulnerable to these risks, especially when this situation is coupled with limited access to health services.

Poor sanitation facilities also increase susceptibility to multiple hazards. Households without sanitation facilities and access to clean water are at a greater risk of developing infectious diseases, including diarrheal diseases, as well as stunting and malnutrition among children (Acharya and Porwal 2020, Freeman et al. 2017, Dwivedi et al. 2018, Gera et al. 2018, Kamau and Njiru 2018). Women and girls are particularly vulnerable, especially when they must relieve themselves or wash in the open; inaccessible toilets and bathrooms render women vulnerable to various forms of gender-based violence (Kayser et al. 2021, Islam Jitu and Masud 2025, Khalid et al. 2024).

Such vulnerabilities pertaining to housing are captured in the DVIP by the following four indicators:

- Percentage of “*kacha*” and “*semi-pakka*” houses;³
- Percentage of households with no toilet facility;
- Percentage of households with unimproved drinking water sources; and
- Percentage of households with one room.

We used the Population and Housing Census 2023 for data for all four indicators. These data are publicly available and can be downloaded from the website of the Pakistan Bureau of Statistics.

Communication and Transportation

Communication and transportation are essential for development, interconnectedness, and trade. They are also critical throughout all phases of disaster risk management, including prevention, preparedness, response, mitigation, recovery, and reconstruction. Many rural communities are located far from paved roads or lack convenient access to public transportation. These distances complicate access to educational institutions, healthcare facilities, and markets. Furthermore, the absence of a phone—whether mobile or fixed—leaves people disconnected from essential information and public services. In some districts, these infrastructural deficiencies can trap communities in a state of disparity, making them severely vulnerable (Kaiser and Barstow 2022). Infrastructure access—determined by factors such as distance from metaled roads and access to communication networks such as TV and the internet—is a key indicator for measuring a community’s vulnerability. For example, Li and colleagues (2023) observed that people with poor access to road and communication infrastructure experience a disproportionate burden of poor health due to climate change. Similarly, Madajewicz (2020) suggests that physical infrastructure and access to information are important indicators of social vulnerability and resilience.

The DVIP includes the following three indicators to capture vulnerability arising from the communication and transportation domain:

- Average distance of mouzas⁴ from a metaled road;
- Average distance of mouzas from a transport facility;⁵ and
- Percentage of households without a landline or mobile phone.

The data source for the first two indicators in this domain is the Pakistan Mouza Census 2020. Conducted by the Agriculture Census Wing of the Pakistan Bureau of Statistics, the Mouza Census provides information on different socioeconomic indicators, such as the availability of health facilities, education, and sports facilities. It also provides data on essential infrastructure in localities and the

³ The term “*kacha*” refers to houses built with temporary or flimsy materials like mud, bamboo, thatch, and straw. “*Semi-pakka*” refers to a structure that has a foundation and walls built from permanent and durable (*pakka*) materials like bricks and concrete, but where the roof is made of *kacha* materials.

⁴ A *mouza* is a specifically defined territorial unit in Pakistan, for which provincial revenue departments maintain a distinct revenue record, including a cadastral map. It may contain one or more population settlements, or none.

⁵ Here, transport facility refers to any type or form of engine-driven public and/or private vehicle, e.g., bus, wagon, rickshaw, etc. Animal-driven vehicles are not included.

accessibility of roads, markets, police stations, and other social developments. In the absence of such facilities, the average distance to access nearby facilities is also measured (in kilometers).

We used the Pakistan Social and Living Standards Measurement Survey (PSLMS) 2019–20 to construct the third indicator.⁶

Livelihoods

Livelihoods include the various activities households undertake to ensure a sustainable living. Employment in mainstream sectors generates and distributes incomes among the wider population (UNDP 2009) and is thus the most powerful means for sustainable livelihoods and reduction of vulnerability. On the other hand, high unemployment rates or a large informal sector workforce increase community vulnerability. Elevated unemployment rates among adults of working age intensify strains and reduce the ability of families to prepare for the future or recover from difficulties (Feng et al. 2024).

Moreover, those in the informal sector or working as unpaid family helpers are at a higher risk of being laid off or losing their income in a catastrophic event compared to those in higher-paid jobs in the formal sector (Bartik et al. 2020). Similarly, individuals working in agriculture are especially vulnerable to the adverse effects of climate change on the sector, such as floods, droughts, and changes in temperature and rainfall patterns (Thomas 2021). Agriculture workers and others who work outdoors, such as construction workers, are also more prone to heat-related illnesses and stress (Khayat et al. 2022).

The following three indicators represent vulnerability in the livelihoods domain in the DVIP:

- Percentage of population aged 15–60 engaged in the agriculture sector;
- Percentage of population aged 15–60 working as unpaid family helpers; and
- Unemployment to population ratio.⁷

Data for all three indicators in this domain are derived from the Population and Housing Census 2023.

Access to Health Services

Access to health services is an important dimension of human wellbeing. In many developing countries like Pakistan, access to healthcare services is often limited, particularly in rural areas. This limitation is especially acute for marginalized population groups such as women, the elderly, persons with disabilities, children, and people from poor households. Inadequate healthcare services and lack of access further exacerbate existing social disadvantages.

Health outcomes are heavily influenced by distance from health facilities and access to health-related information. The availability and accessibility of health services at the nearest possible location are strong determinants of health status and population vulnerability (Bolorani et al. 2021; Wang et al.

⁶ The specific indicator used from PSLMS 2019–20 is: *Percentage of households without a: Fixed Line or Mobile Phone (no mobile or landline)*.

⁷ This is the ratio of population unemployed to total population of districts (aged 10 years or more).

2021; Acharya and Porwal 2020). It is essential to take into account spatial accessibility, such as proximity to health centers, to understand inequities in healthcare access. We have therefore used a distance-based approach to assess healthcare access.

It is also observed that access to primary healthcare facilities is associated with better health, lower healthcare costs, and reduced hospitalization (Kringos 2017). Moreover, an effective local healthcare system can contribute significantly to sharing health-related information and advisories during and after crises such as pandemics or floods. In such instances, community health workers, such as the Lady Health Workers (LHWs) in Pakistan, serve as a protective factor for maternal and child health. An evaluation of the LHW program found improved maternal and child health indicators in communities under their care, especially those previously underserved or unserved by the formal healthcare system. The role of LHWs during emergencies such as the 2005 earthquake, the 2010 floods, the COVID-19 pandemic, and the 2022 floods in Pakistan has also been crucial (Kamran and Mir 2023).

Accordingly, the DVIP captures vulnerability in the health domain using the following indicators:

- Average distance of mouzas from a basic health unit;
- Average distance of mouzas from a private doctor;
- Average distance of mouzas from a maternal and child healthcare facility; and
- Percentage of rural households not visited by a Lady Health Worker in the last 30 days.

We used the Pakistan Mouza Census 2020 for the first three indicators,⁸ and the Pakistan Social and Living Standards Measurement Survey 2019–20 for the fourth indicator. It is important to note that the Mouza Census provides information only for rural areas and urban centers. We assumed that the distance from health facilities in urban centers is zero (or less than 1 kilometer). All distances are measured in kilometers.

Access to Public Education

Education plays an important role in reducing vulnerabilities both directly and indirectly. It equips individuals with knowledge and skills and improves their socioeconomic status, as educated people generally have higher earnings. Moreover, educated individuals and households have better access to, and are better able to process, material, informational, and social resources, which can help reduce vulnerability (Hoffmann and Blecha 2020, Rafiq and Blaschke 2012).

However, access to education is not always guaranteed. In certain regions, schools are located at distances that discourage attendance—particularly for girls—further exacerbating and perpetuating gender-based inequalities (Permanyer and Boertien 2019). Even when schools are available, there may not be enough to accommodate the population. Without access to quality education, children lose valuable opportunities, and communities struggle to escape the cycle of vulnerability.

⁸ Notably, while the Mouza Census includes various categories of allopathic medical service providers, such as Population Welfare Centers, Basic/Rural Health Centers, dispensaries of non-governmental organizations, maternity homes, private doctors, hospitals/dispensaries, and midwives, it excludes non-allopathic options like homeopathy and traditional medicine.

Muttarak and colleagues (2014) stress the importance of formal education in reducing vulnerability. Similarly, Ngepah and colleagues (2023) found an inverse relationship between education and poverty and vulnerability in South Africa.

We used the following four indicators to reflect vulnerability in the domain of education:

- Average distance of mouzas from a boys' high/higher secondary school;
- Average distance of mouzas from a girls' high/higher secondary school;
- Number of primary schools per 10 square kilometers; and
- Number of high schools per 10 square kilometers.

Data sources for this domain included the Pakistan Mouza Census 2020 for the first two indicators and the Education Management Information System (EMIS)/School Directory 2020–21, maintained by the Pakistan Institute for Education (PIE), for the latter two indicators.⁹ EMIS collates information from each provincial department, providing comprehensive school-level data segregated by gender, location, and level of institution. It provides information on the total number of institutions and students in a district and serves as a district-level dataset covering Punjab, Sindh, Khyber Pakhtunkhwa (KP), and Balochistan provinces, as well as the Islamabad Capital Territory.

Demographics

The structure of a population both drives and is driven by many factors related to development and wellbeing. Population growth, composition, and distribution are among the most important indicators that can increase or decrease community vulnerability (Cutter and Finch 2008). Rapid population growth acts as a threat multiplier to already existing vulnerabilities and puts people at risk of social and economic marginalization. For instance, having a high proportion of children under 5 years old in the district population indicates high fertility, which places an additional financial burden on households and is negatively correlated with female health and labor productivity.

The proportion of the elderly population can serve as a protective factor in some contexts, as older individuals may have accumulated resources to offset household vulnerability. For instance, Madajewicz (2020) studied vulnerability to coastal flooding and observed that households with elderly members were less vulnerable than households with younger children due to the financial resilience of elderly members. However, in Pakistan, Ali and Kiani (2003) find that lack of financial resources is a major factor affecting the quality of life of the elderly population. Similarly, Alam and Hussain (2020) note the predominance of women in the elderly population and their economic vulnerability due to lack of social security, formal work experience, education, and property rights.

The dependency ratio can either reduce or increase vulnerability. A higher dependency ratio increases household vulnerability, as resources must be diverted to care for dependent populations, reducing the earning and saving capacity of household members involved in elderly care, particularly women. As people age, their healthcare needs increase, placing a greater burden on household caregivers and the health system (Cutter 2003). Bashir et al. (2024) find that poor households with larger families,

⁹ PIE is a division of the Ministry of Federal Education & Professional Trainings, Government of Pakistan.

including children and elderly members, are disproportionately impacted by catastrophic health expenses in Pakistan.

The way a population is structured also plays a big role in shaping what kinds of services are needed. When there are more young children, there is a greater need for schools, childcare, and pediatric healthcare. A larger elderly population means more demand for medical care, social support, and age-friendly infrastructure. If there are not enough people of working age to support these groups, it can put considerable pressure on families and public resources. This is why understanding the balance between age groups is so important for planning services that truly meet everyone's needs (Preston and Stokes 2012).

Three indicators define the demographic domain of vulnerability in the DVIP:

- Percentage of young children (aged <5) in the population;
- Percentage of elderly population (aged ≥69); and
- Dependency ratio, i.e., the ratio of the population aged <15 or >64 to the working-age population (aged 15–64).

We used data from the Pakistan Population and Housing Census 2023 for all indicators in this domain.

Construction of the Vulnerability Index

Each of the twenty-one indicators was computed from its respective data source to produce district-level indicators (The indicators and data sources are listed in Table 2.1 above). To make comparisons meaningful, we organized the indicators so that higher values consistently indicated greater vulnerability.¹⁰ This ensured that the rankings would clearly reflect which districts were more at risk.

Once the data were standardized, we assigned ranks to each district based on their relative position. If two or more districts had the same value for an indicator, they were all assigned the same rank—the lowest one in that group. This approach ensured fairness and consistency in the ranking process.

By applying this method across all twenty-one indicators, we were able to generate a clear picture of how vulnerable the 129 districts are in comparison to one another. It helped us identify areas that were relatively better off and those that may need more targeted attention and support.

Next, we converted the ranks into percentile scores¹¹ to show how each district compares to the others for each indicator. The following formula was used to calculate the percentile rank of each indicator for each district:

$$\text{Percentile Rank (P)} = \frac{\text{Rank}-1}{N-1}, \text{ where 'N' denotes the total number of districts}$$

A percentile rank close to 1 indicated that a district was more vulnerable relative to other districts, while a score near 0 signified lower relative vulnerability.

¹⁰ For the two school density indicators in the access to public education domain (where higher raw values represent lower vulnerability), we inverted the values during index computation.

¹¹ The percentage of districts at or below that rank score.

We then calculated the percentile ranks of districts at two further levels: the domain level and the overall level. For the domain-level ranking, we summed the percentile ranks of all indicators constituting the domain for each district. At the final stage, we calculated each district's overall vulnerability by summing up its domain scores. This approach provided a comprehensive picture of the relative vulnerability of each district.

In the absence of a rationale for using a specific weighting scheme, we assigned equal weights to each indicator when calculating domain vulnerability. Similarly, equal weights were applied to each domain when calculating overall vulnerability. This method is a slight adaptation of the method used by Flanagan and colleagues (2011) in constructing their social vulnerability index.

Based on these computations, we also generated choropleth maps at the district level to visualize the spatial distribution of domain-specific and overall vulnerability. These maps are useful for illustrating the range of vulnerabilities across the country's geographical space, both across and within provinces. Finally, we used the latest population data from the Population and Housing Census 2023 to compute the number of individuals living in the most vulnerable areas, along with some of their key demographic characteristics.

Strengths and Limitations of the DVIP

As indicated above, we used data from multiple sources to construct the district-level vulnerability index for Pakistan, mining and utilizing the most recent data available for all indicators.

An important feature of the DVIP is that it incorporates six distinct dimensions of population and development. These dimensions differ significantly from those used in previously discussed indices and provide a more expressive understanding of population and development. Additionally, we ranked districts and created quintiles to clearly distinguish vulnerability levels among them. In doing so, we drew from the methodology proposed by Acharya and Porwal (2023). This approach allowed us to explain multidimensional vulnerability in broad terms and offer a purposefully simple interpretation of our results for ranked districts.

We introduced several new indicators within each domain, drawing from largely untapped and underused datasets such as the Mouza Census 2020. For instance, we used the indicator “distance to metaled road” to capture vulnerability in the communication and transportation domain. Similarly, we include multiple indicators to assess vulnerabilities arising from limited access to and availability of health and education services. The district served as the unit of analysis, as all indicators are organized at the district level. While the gender dimension of vulnerability is addressed, it is done so in a limited way due to data constraints.

It is important to highlight that the final selection of indicators was influenced by data availability. Each data source has its unique strengths and limitations. For instance, census data offer the advantage of complete population coverage but are often limited in the range of relevant variables. In cases where district-level data were not available, we used averages from household surveys to estimate the indicators. Another challenge was that Mouza Census data are available only for rural areas. These limitations and strengths were carefully weighed in developing a methodologically sound district-level vulnerability index.

To ensure the reliability of the index, we conducted a Cronbach’s alpha test, which yielded a very strong overall score (0.9222). This suggests that the indicators work well together in measuring vulnerability. Most individual domains also demonstrated acceptable reliability (above 0.7), with the exception of the demographics domain, which showed a lower reliability score (0.3673).

The final selection of indicators recognizes the multifaceted nature of vulnerability and the need for policymakers and implementers to design tailored interventions that address the specific needs and challenges faced by districts across different domains.

3. District Vulnerability Ranking

We computed domain-wise and overall vulnerability indices for a total of 129 districts across the four provinces of Pakistan. Our findings, presented in this section and in the appendices, reveal significant variation in vulnerability across districts, both within and between provinces. Below, we first present these variations in terms of the values computed for each of the twenty-one indicators. This provides a context for understanding the levels of vulnerability based on absolute values. We then present the individual domain and overall vulnerability indices, using maps to further illustrate the variations in relative vulnerability.

Setting the Context: Comparison of Districts on Indicators

The scores computed for each district across the DVIP indicators are presented in Appendix A. The range of scores and mean values are summarized in Figures 3.1–3.6, with indicators grouped under the six domains.

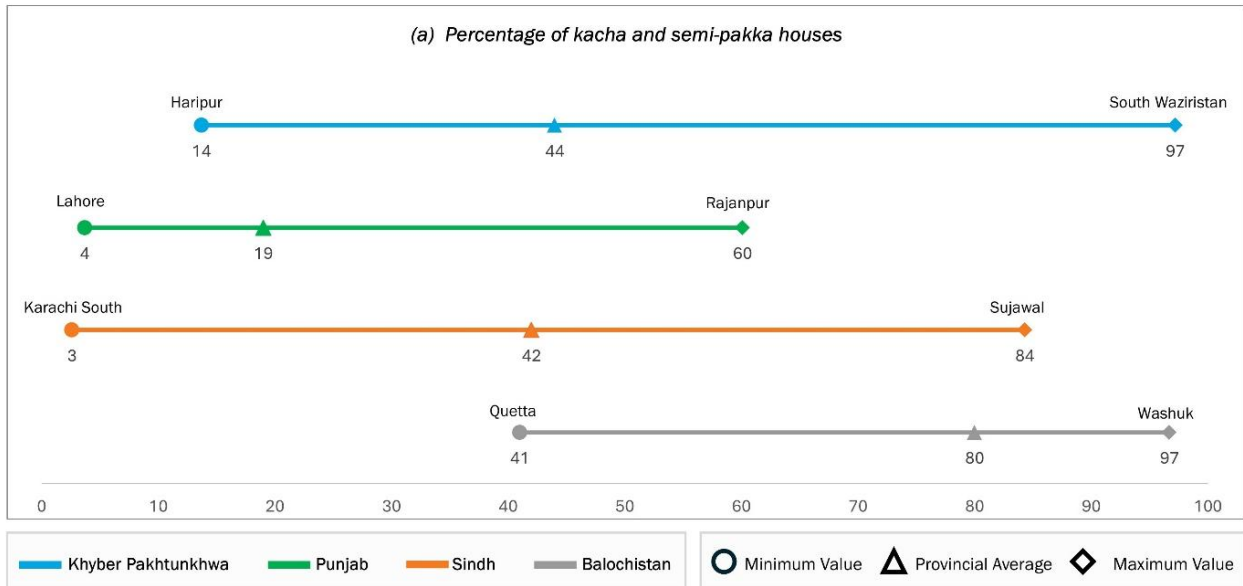
Housing

Although wide variations exist within provinces, districts in Punjab are generally the least vulnerable in the housing domain (Figure 3.1). On the other hand, more than two-thirds of the houses in the districts of Balochistan are makeshift (*kacha* or *semi-pakka*) structures of mud, straw, and bamboo. In Washuk, Kalat, and Jhal Magsi districts (Balochistan) and South Waziristan (KP), nearly all houses are *kacha* or *semi-pakka*. Sindh has the highest percentage of one-room households.

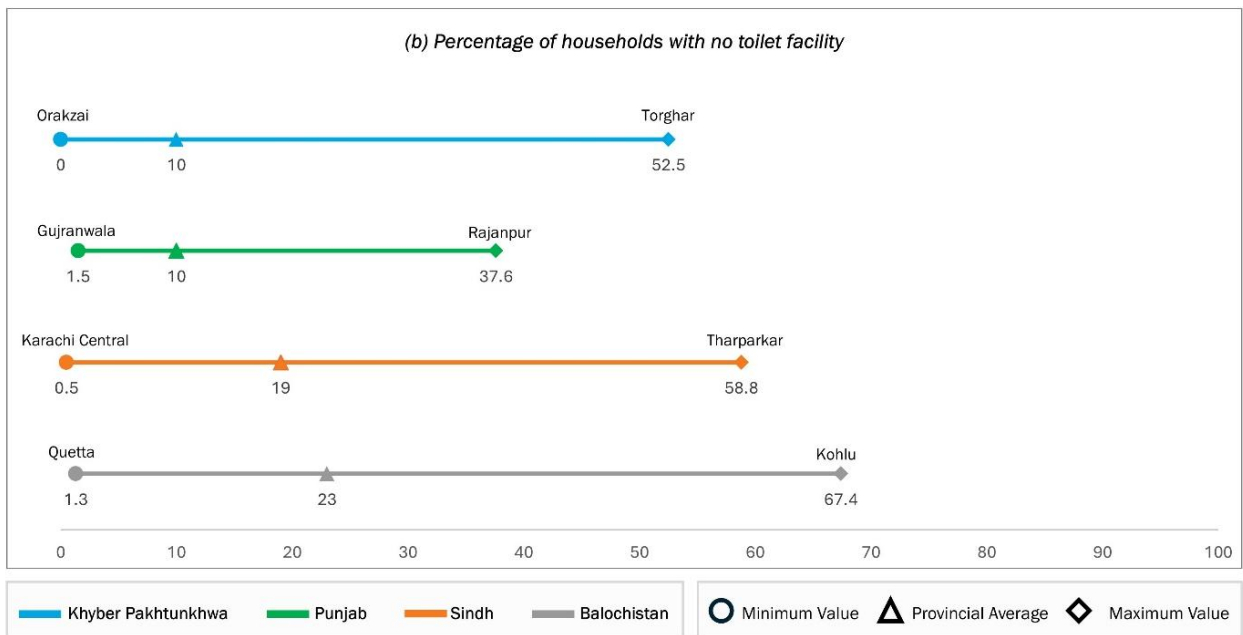
It is important to point out that a substantial proportion of households across Pakistan also lack toilet facilities. Districts in Balochistan, Sindh, and KP score particularly poorly in this respect compared to Punjab, which shows much better availability of toilet facilities. For example, among the worst-performing districts in each province, 38 percent of households in Rajanpur (Punjab) lack toilet facilities compared to about 58 percent of households in Umerkot and Tharparkar districts (Sindh), and 67 percent in Kohlu (Balochistan).

Access to safe drinking water varies greatly across regions. Kachhi (Balochistan) and Kohistan (KP) stand out as the worst-performing districts, with 73 percent and 67 percent of households, respectively, relying on uncleaned water from unimproved sources.

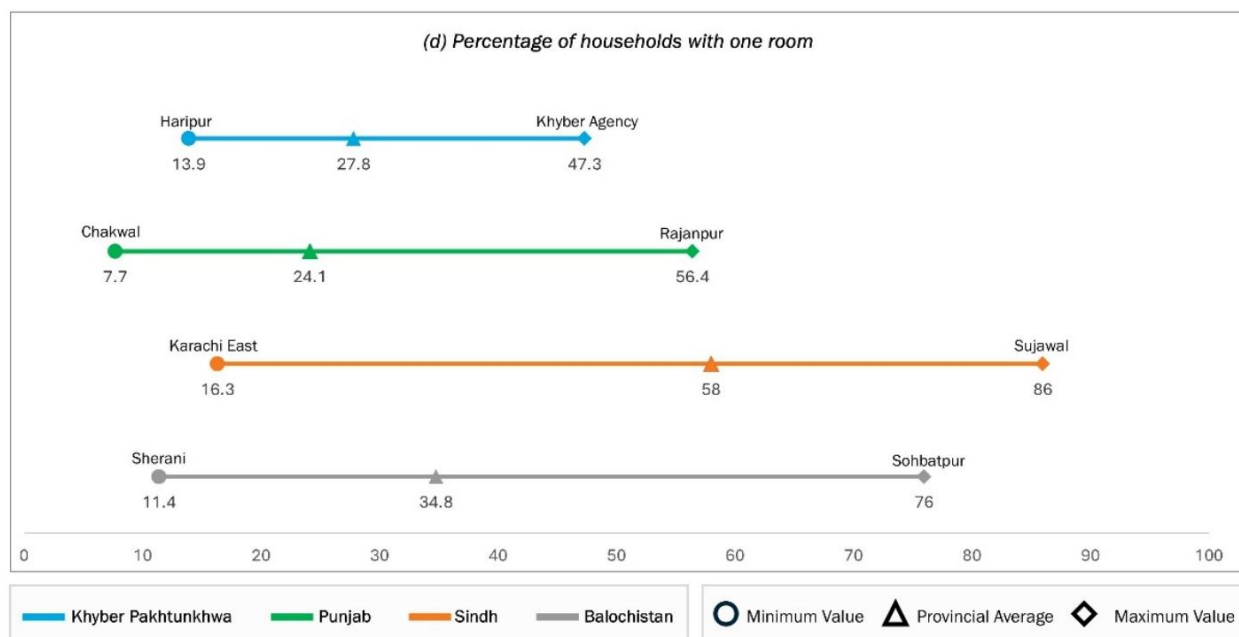
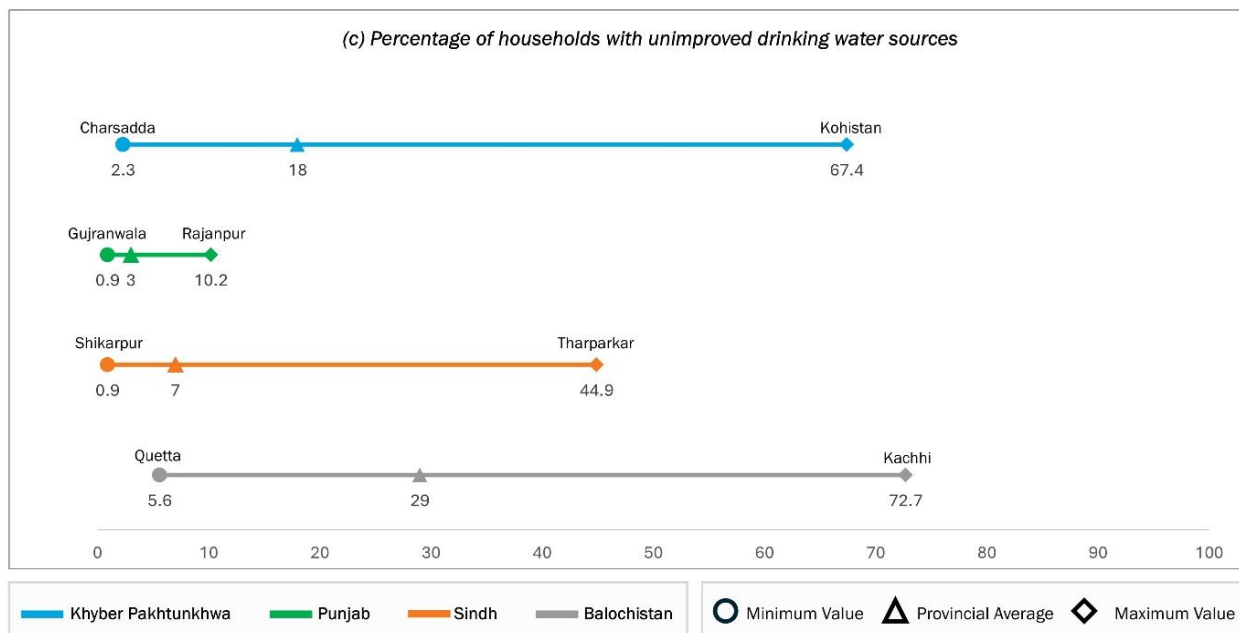
Figures 3.1a and 3.1b: Range and Mean Value of District Vulnerability Indicators in the Housing Domain, by Province



Note: The term “kacha” refers to houses built with temporary or flimsy materials like mud, bamboo, thatch, and straw. “Semi-pakka” refers to a structure that has both durable (pakka) and kacha components.



Figures 3.1c and 3.1d: Range and Mean Value of District Vulnerability Indicators in the Housing Domain, by Province

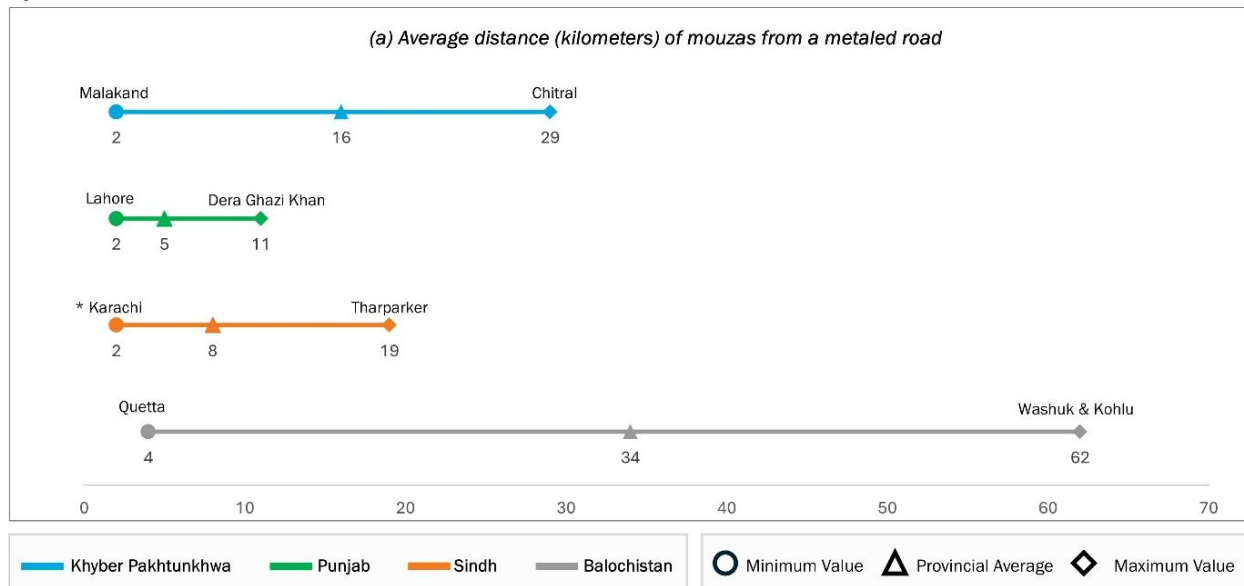


Communication and Transportation

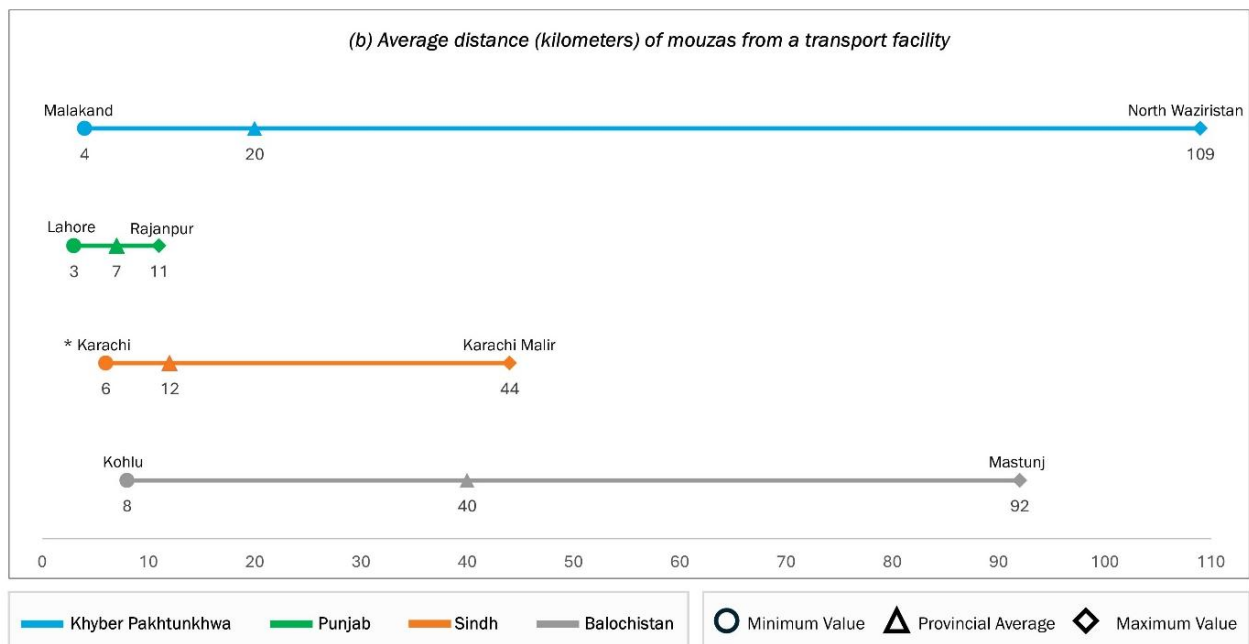
Punjab and Sindh are less vulnerable than Balochistan and KP in terms of access to road and transportation facilities (Figure 3.2). In Balochistan, the average distance from a mouza to a metaled road is 34 kilometers—almost double the national average. Similarly, the average distance from a mouza to a transportation facility is 20 kilometers in KP and 40 kilometers in Balochistan.

Large variations also exist in household access to landline and mobile phone services across provinces. Among the most vulnerable districts on this indicator, half of the houses in Jhal Magsi (Balochistan) lack phone access, compared to less than a fifth in Khanewal (Punjab).

Figures 3.2a and 3.2b: Range and Mean Value of District Vulnerability Indicators in the Communication and Transportation Domain, by Province

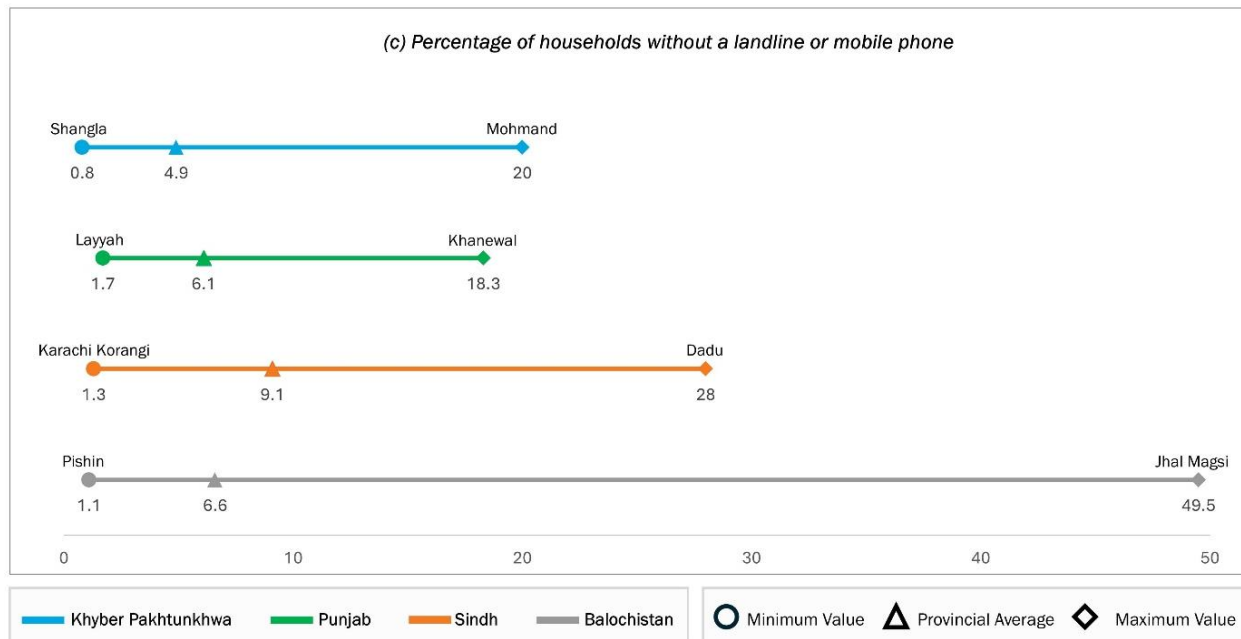


*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central and Karachi East.



*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central and Karachi East.

Figure 3.2c: Range and Mean Value of District Vulnerability Indicators in the Communication and Transportation Domain, by Province



Livelihoods

Figure 3.3 shows inter- and intra-provincial variations in vulnerability in the livelihoods domain. Sohbatpur district in Balochistan has the highest proportion of population working in agriculture (26 percent). Similarly, in Sindh’s Jacobabad district, around one-fifth of the employed population (18 percent) is engaged in agriculture—lower than Sohbatpur but higher than districts in Punjab and KP.

KP and Balochistan have the highest percentages of the population working as unpaid family helpers. For example, 27 percent of people in Panjgur district (Balochistan) and 26 percent in North Waziristan district (KP) work as unpaid family helpers. In contrast, Karachi East in Sindh has the lowest proportion of unpaid family helpers, with less than 1 percent of the working-age population (aged 15–60) engaged in this role.

Unemployment, as measured by the unemployment to population ratio, is quite widespread, with Balochistan and KP having the highest rates. In Balochistan’s Panjgur district, over one-third of the working-age population is unemployed (36 percent), and similarly, in KP’s North and South Waziristan districts, nearly a third are unemployed (30 percent).

Figures 3.3a and 3.3b: Range and Mean Value of District Vulnerability Indicators in the Livelihoods Domain, by Province

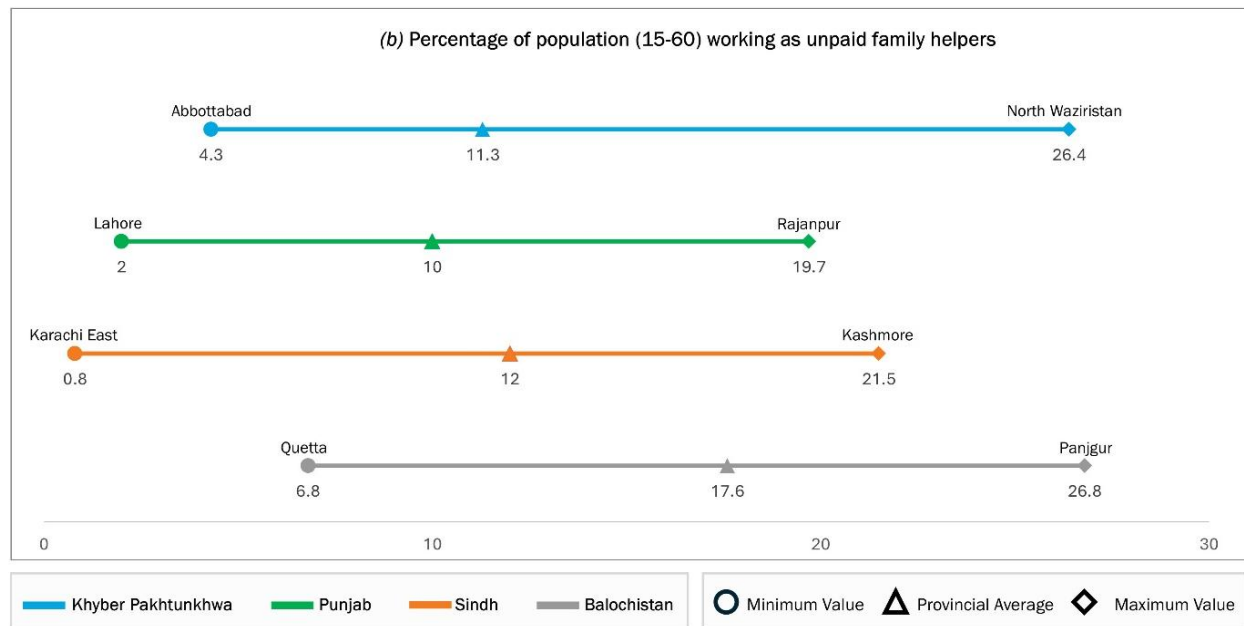
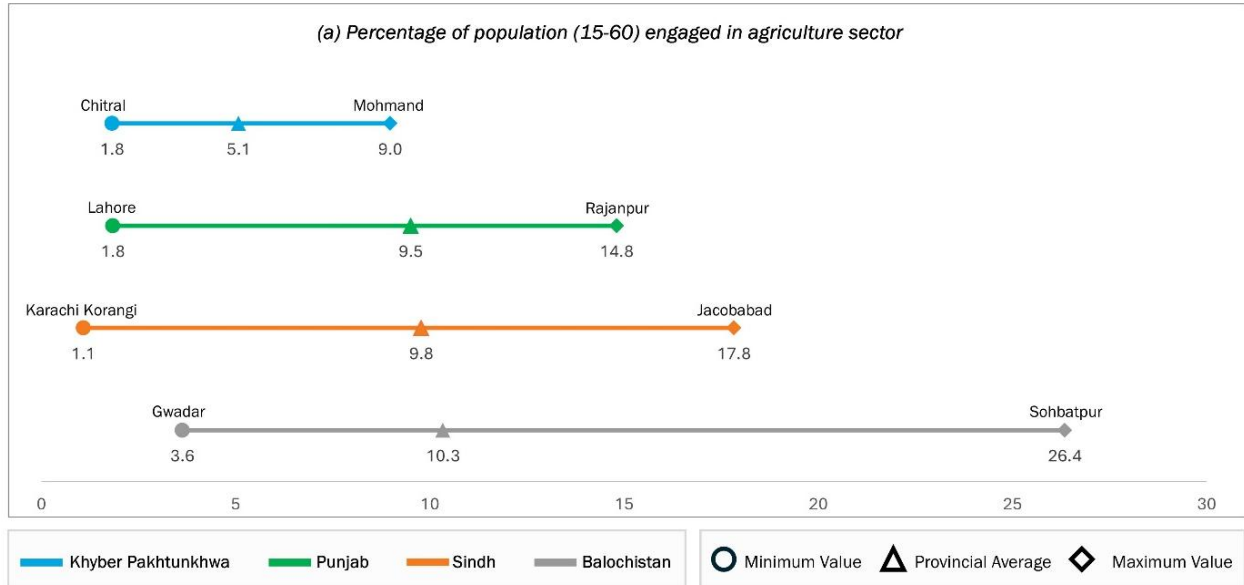
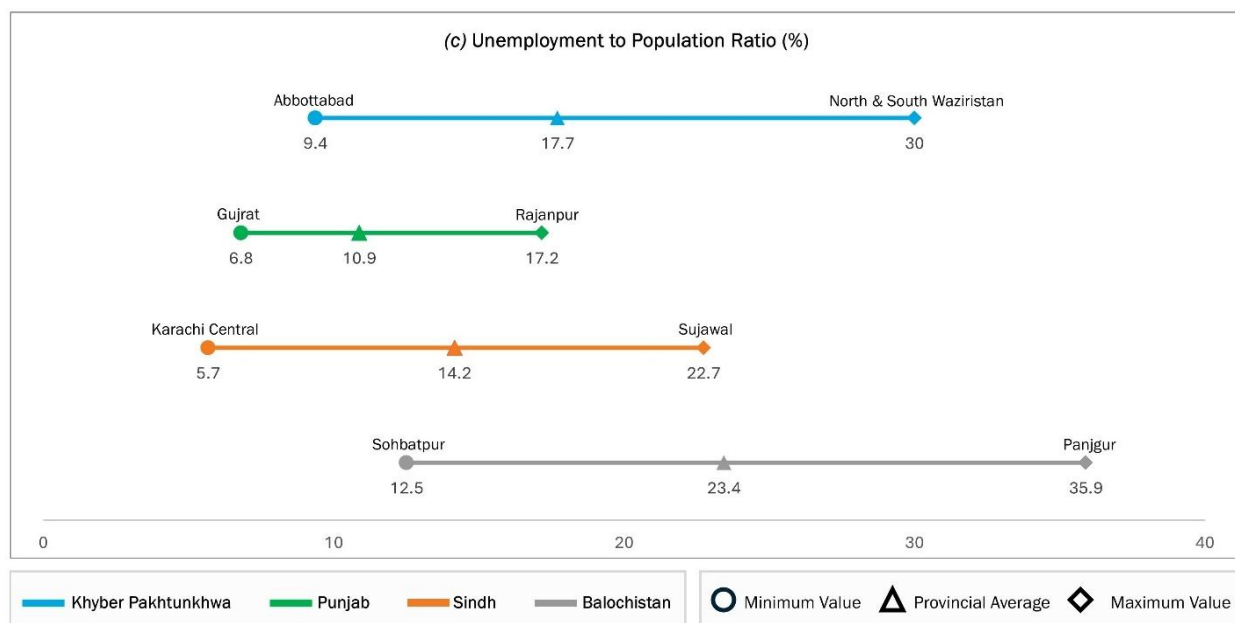


Figure 3.3c: Range and Mean Value of District Vulnerability Indicators in the Livelihoods Domain, by Province



Access to Health Services

As discussed in Section 2 of this report, in the health domain of vulnerability, we used a primarily distance-based approach to capture the availability and accessibility of healthcare services. Figure 3.4 shows significant differences in district populations' access to healthcare services, both within and across provinces. Punjab fairs much better across all four indicators. Among districts in the province, the maximum mean distance to any health facility is 25 kilometers. In contrast, in Balochistan, the maximum mean distance to any health facility is 93 kilometers.

The differences across districts are generally large in KP and Balochistan. We must be cautious in interpreting the results for KP, as the vulnerability range may be extended because of the poor scores of newly merged districts, which were formerly part of the Federally Administered Tribal Areas (FATA).¹² In Balochistan, the average distance to a basic health unit is 31 kilometers, which is far above the national average of 13 kilometers and the averages of other provinces. Comparison of the worst-performing districts on this indicator also reveals a telling inter-provincial gap: the average distance from a mouza to a basic health unit is 15 kilometers in Dera Ghazi Khan (Punjab), compared to 67 kilometers in Kohlu (Balochistan).

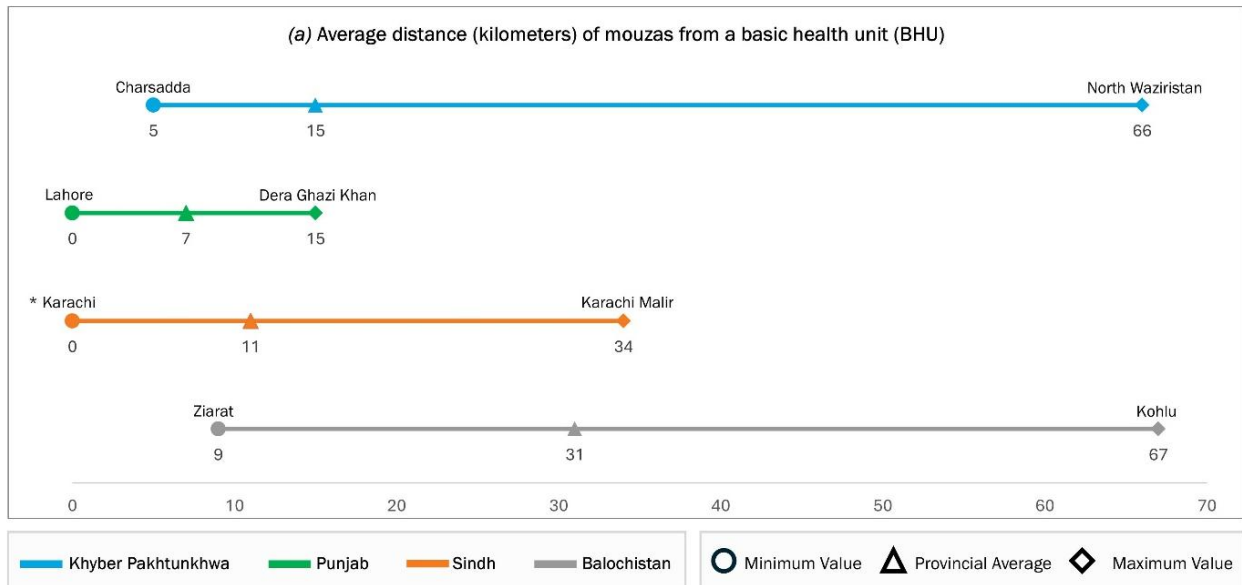
The differences in access to maternal, neonatal, and child health facilities are particularly pronounced in Balochistan and KP. In Balochistan, the average distance from a mouza to such a facility is significantly higher than in other provinces, peaking in Khuzdar at 93 kilometers. Similarly, Kohistan in KP records a distance of 72 kilometers, compared to just 25 kilometers in Dera Ghazi Khan (Punjab)

¹² The newly merged districts are Bajaur, Mohmand, Orakzai, Khyber, Kurram, South Waziristan, and North Waziristan.

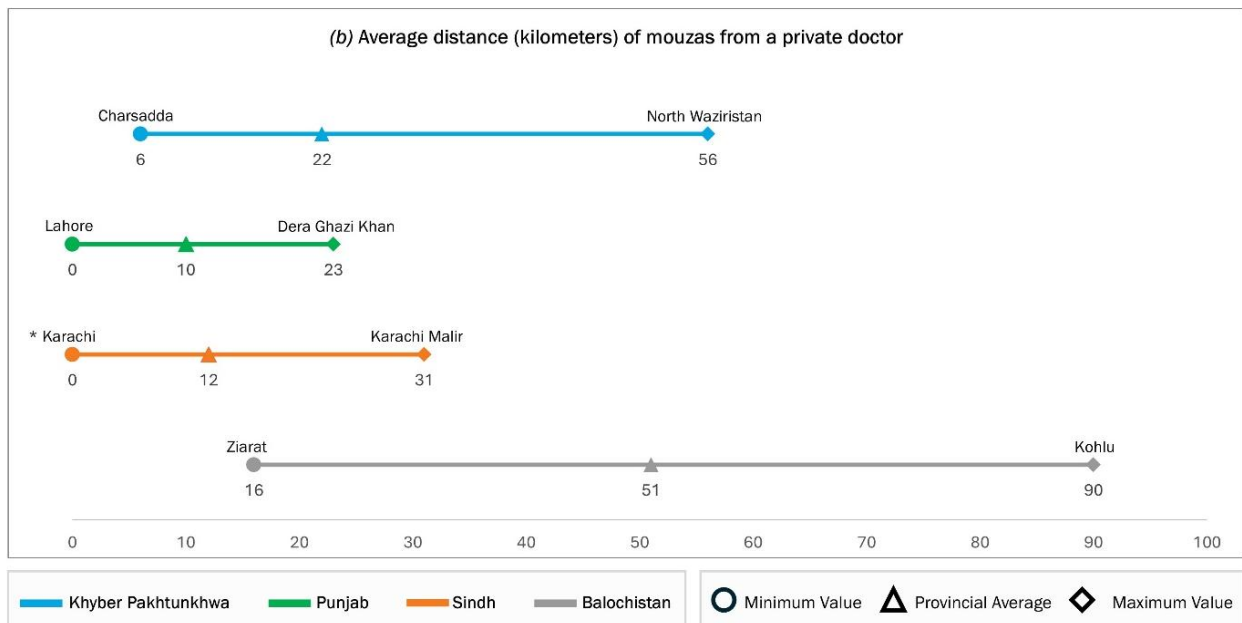
and 31 kilometers in Karachi Malir (Sindh). In addition to provincial differences, this also highlights a stark urban-rural divide in healthcare accessibility.

Similarly, the coverage of LHWs in Punjab and Sindh is comparatively better than in Balochistan and KP, where a large proportion of households are not served by these community health workers.

Figures 3.4a and 3.4b: Range and Mean Value of District Vulnerability Indicators in the Access to Health Services Domain, by Province

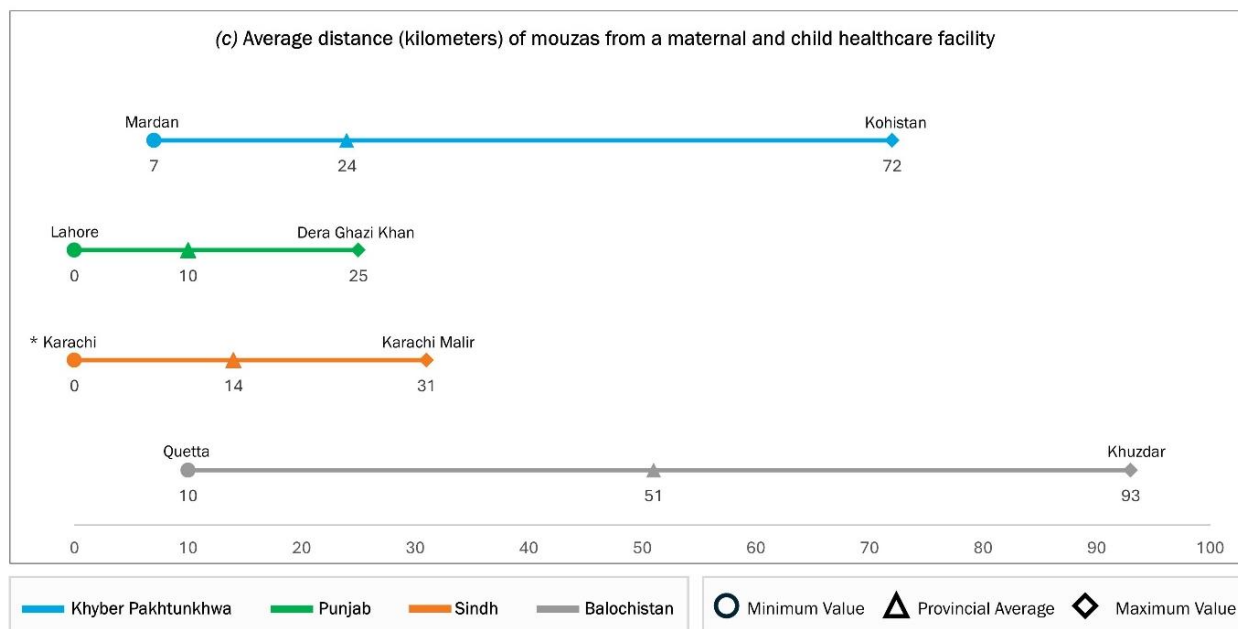


*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.

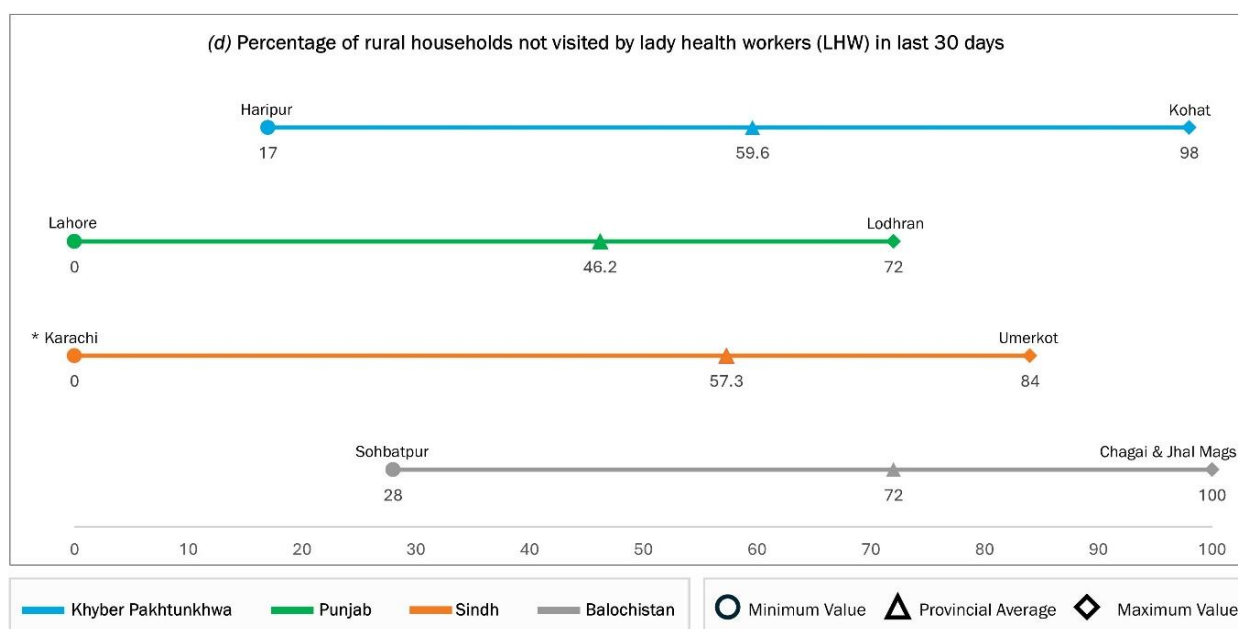


*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.

Figures 3.4c and 3.4d: Range and Mean Value of District Vulnerability Indicators in the Access to Health Services Domain, by Province



*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.



*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.

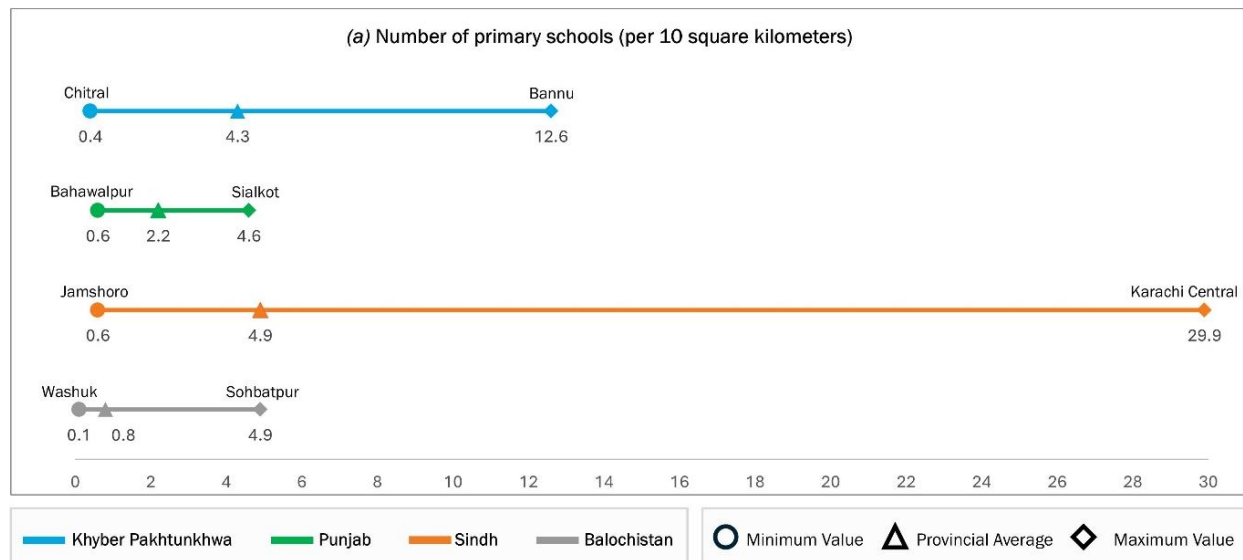
Access to Public Education

There are large variations in the availability and accessibility of public schools across provinces and districts (Figure 3.5).

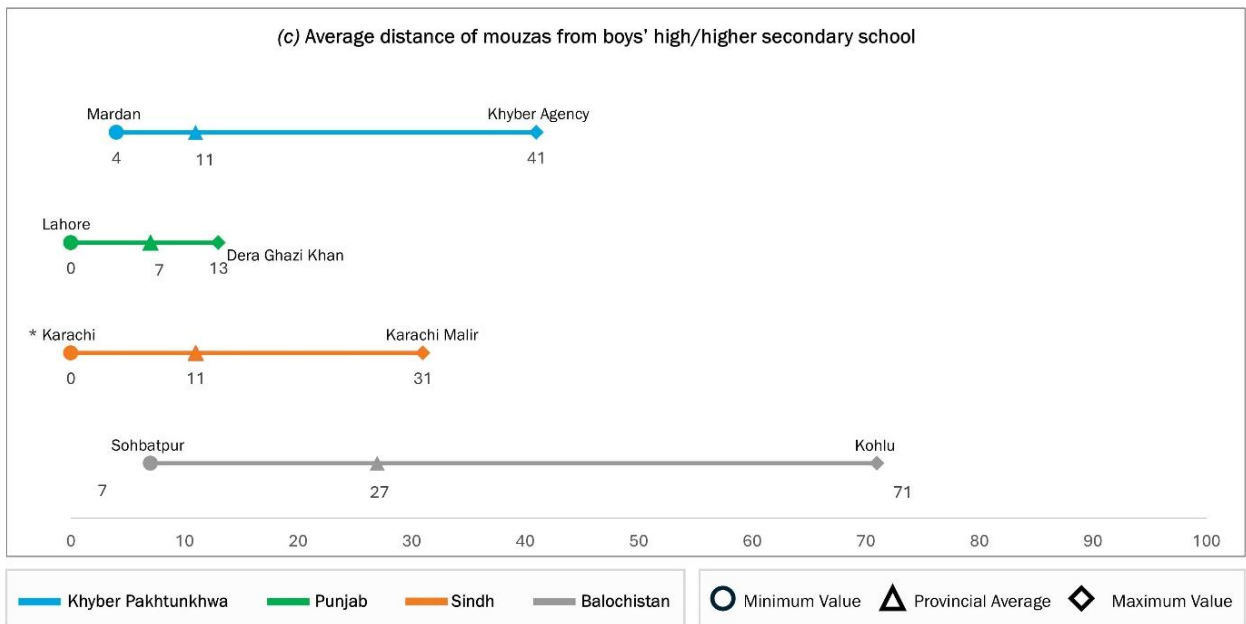
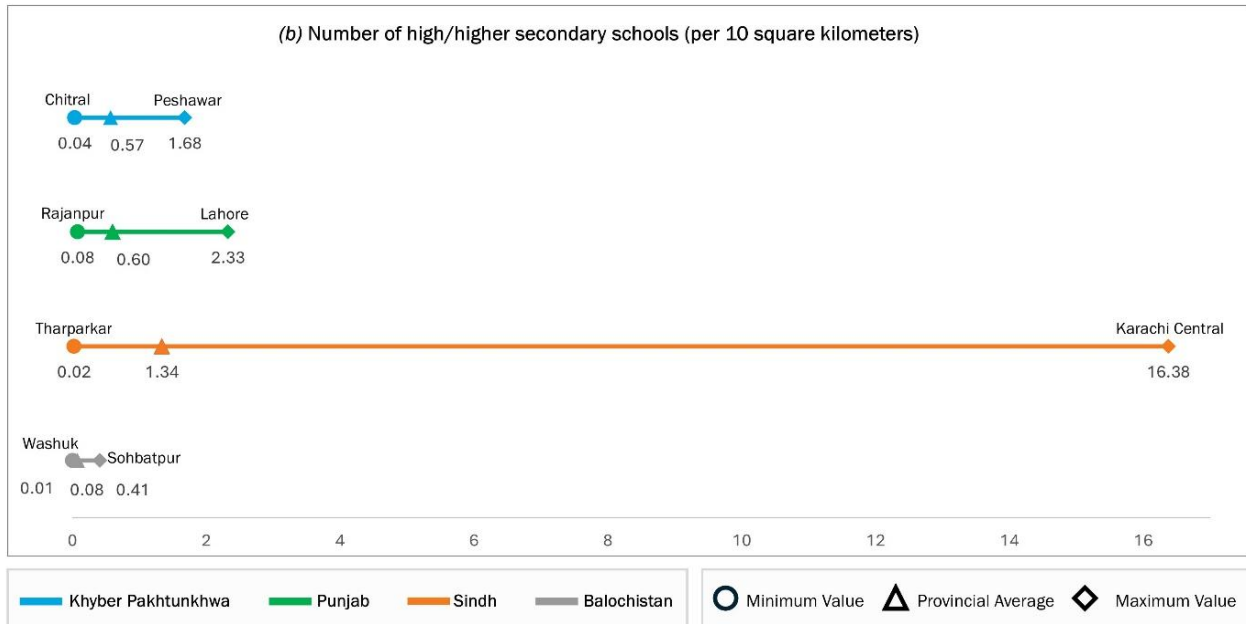
Karachi Central has the highest number of primary and high or higher secondary schools per 10 square (sq.) kilometers, not only in Sindh but in the entire country. This is likely due to the district's high population density and the specific municipal educational infrastructure structure.

On the other hand, KP and Balochistan are the most vulnerable in terms of accessibility of public schools in Pakistan. The average distance from mouzas to a high/higher secondary school for boys is 31 kilometers in Balochistan, which is two and a half times more than the national average of 12 kilometers. These disparities are more acute for girls' high/higher secondary schools in KP. Across all provinces, the average distance to female high/higher secondary schools is higher than to male high/higher secondary schools, except in Punjab. The average distance to female high/higher secondary schools is greatest in KP. This underscores gender inequalities and reasons for the much lower performance of girls in educational enrollment rates.

Figure 3.5a: Range and Mean Value of District Vulnerability Indicators in the Access to Public Education Domain, by Province

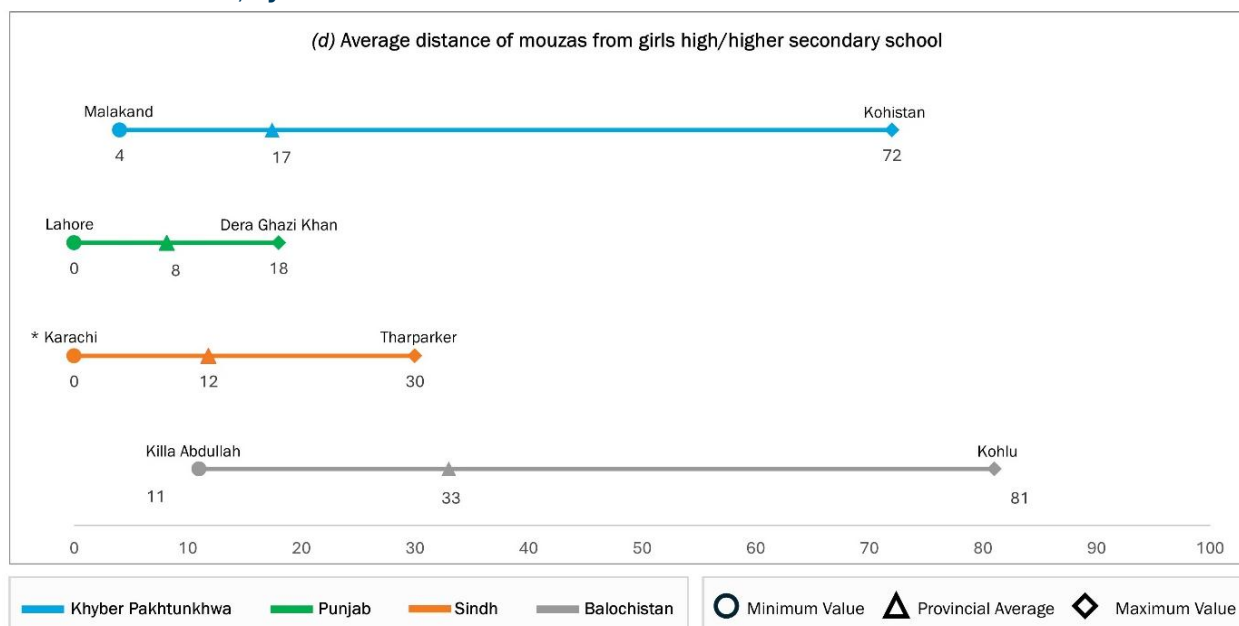


Figures 3.5b and 3.5c: Range and Mean Value of District Vulnerability Indicators in the Access to Public Education Domain, by Province



*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.

Figure 3.5d: Range and Mean Value of District Vulnerability Indicators in the Access to Public Education Domain, by Province



*Refers to districts of Karachi division, including Korangi, Karachi South, Karachi Central, and Karachi East.

Demographics

The following figures show the range of the demographic indicators at the district level in each province. Significant variations exist in the percentage of young children (under five) in the district populations, both within and across provinces (Figure 3.6). This proportion is lowest in Karachi South (10.3 percent) in Sindh and highest in Zhob (25.4 percent) in Balochistan. On average, children under the age of five make up 15.2 percent of Pakistan’s total population. Among the provinces, Balochistan has a higher share of children in this age group (19.6 percent), followed by Sindh, KP, and Punjab.

The share of the elderly population is higher in Punjab (2.6 percent), indicating faster demographic transition in the province. Sherani in Balochistan has the lowest share of the elderly population (0.96 percent), whereas Chakwal in Punjab has the largest share (4.5 percent).

The higher age dependency ratio in Balochistan (108) is driven by a high proportion of children under five, indicating high fertility in the region. The Zhob district in Balochistan has the highest age dependency ratio of 157. In terms of both range and provincial averages, Punjab has distinctly lower age dependency ratios than other provinces. Karachi in Sindh is at par with Jhelum, Punjab’s least vulnerable district, but the average age dependency ratio in Sindh is closer to that of KP.

Figures 3.6a and 3.6b: Range and Mean Value of District Vulnerability Indicators in the Demographics Domain, by Province

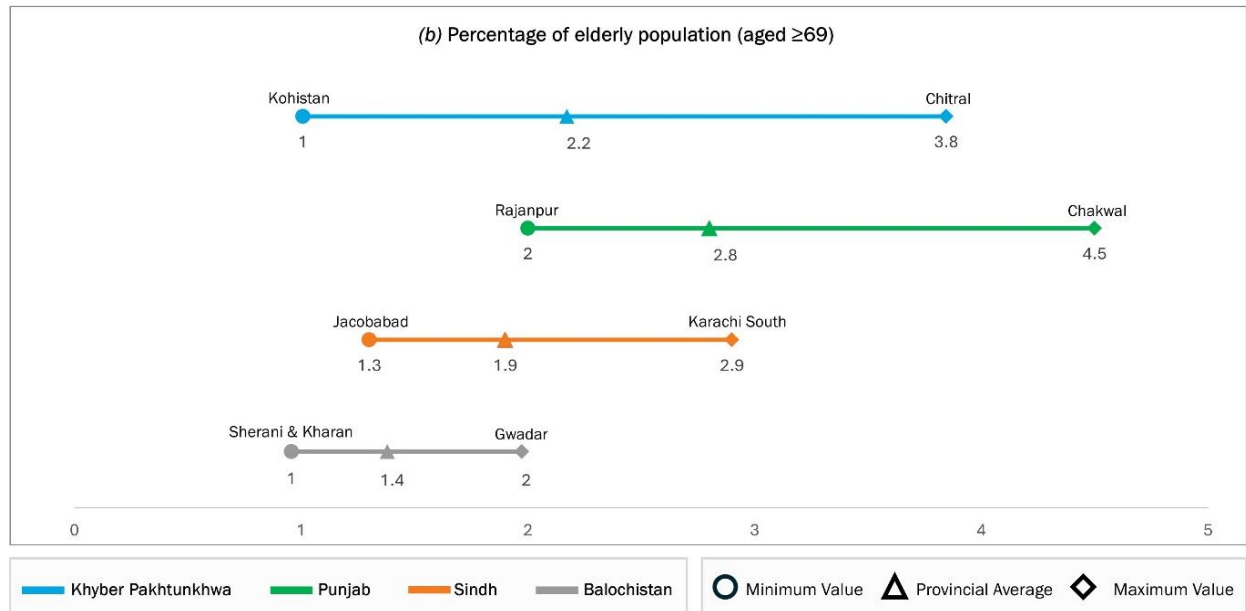
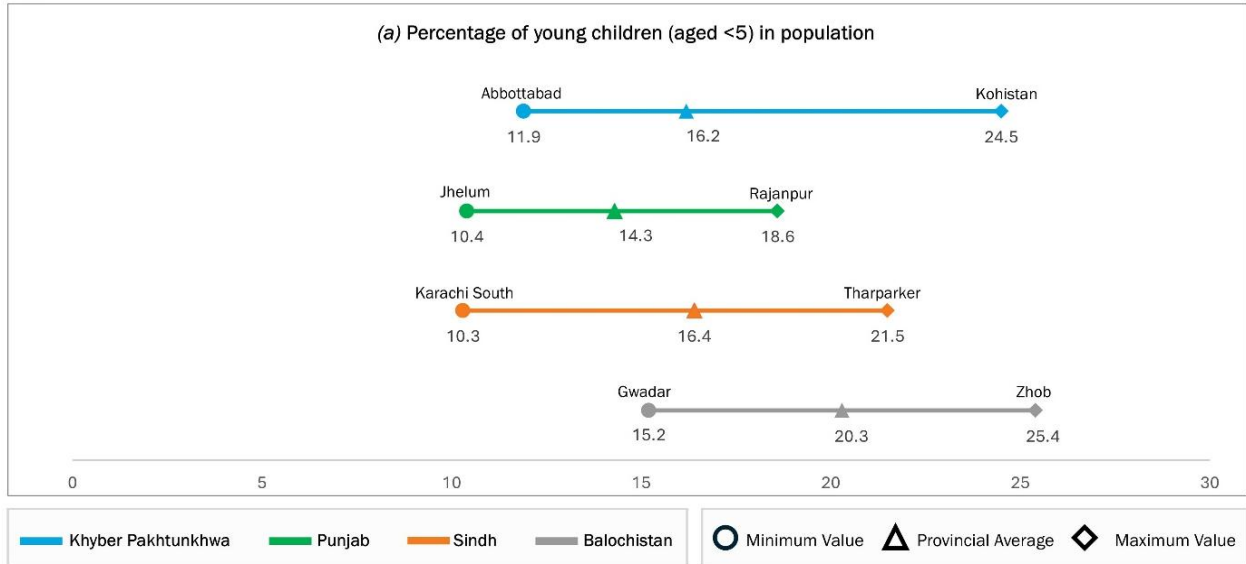
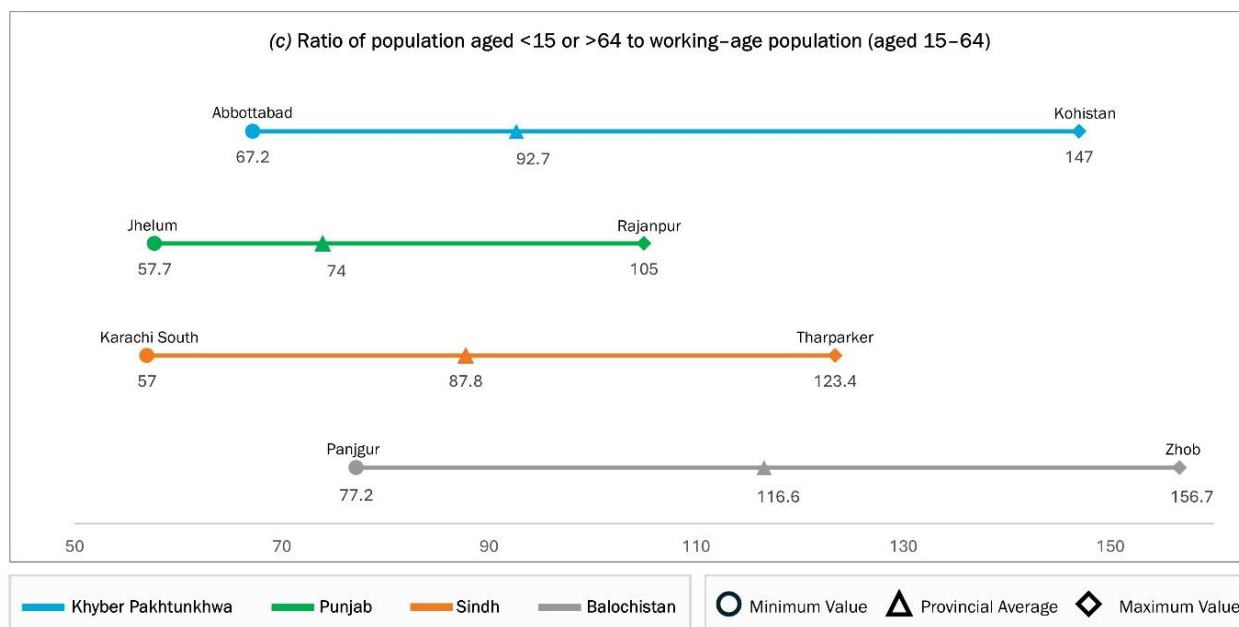


Figure 3.6c: Range and Mean Value of District Vulnerability Indicators in the Demographics Domain, by Province



Domain-wise Vulnerability Index

Next, we present findings of variations in vulnerability across districts by each of the six domains. As explained earlier, after computing the values of the twenty-one vulnerability indicators for each district, we estimated the relative vulnerability of each district through percentile ranking at indicator, domain, and overall level. Domain-specific percentile scores are presented in Table 3.1. Based on these scores, we carried out domain-specific ranking of districts, which is presented in Appendix B. For ease in comparison and analysis, we used the scores to categorize districts into vulnerability quintiles; this categorization is captured in choropleth maps in Figures 3.7 to 3.12 and discussed below.

Housing Domain

Figure 3.7 shows the spatial distribution of vulnerability in the housing domain across districts of Pakistan. A majority of the most vulnerable twenty districts (12 out of 20) belong to Balochistan. Six districts from Sindh (Umerkot, Sujawal, Tharparker, Badin, Thatta and Mirpur Khas) and two districts of KP (Kohistan¹³ and Torghar) also fall within the bottom (i.e., most vulnerable) twenty districts in the housing vulnerability sub-index (Appendix B).

Poor housing structure and amenities drive vulnerability in these districts. For instance, more than 65 percent of households in these districts have a *kacha* or semi-*pakka* structure, which exposes them

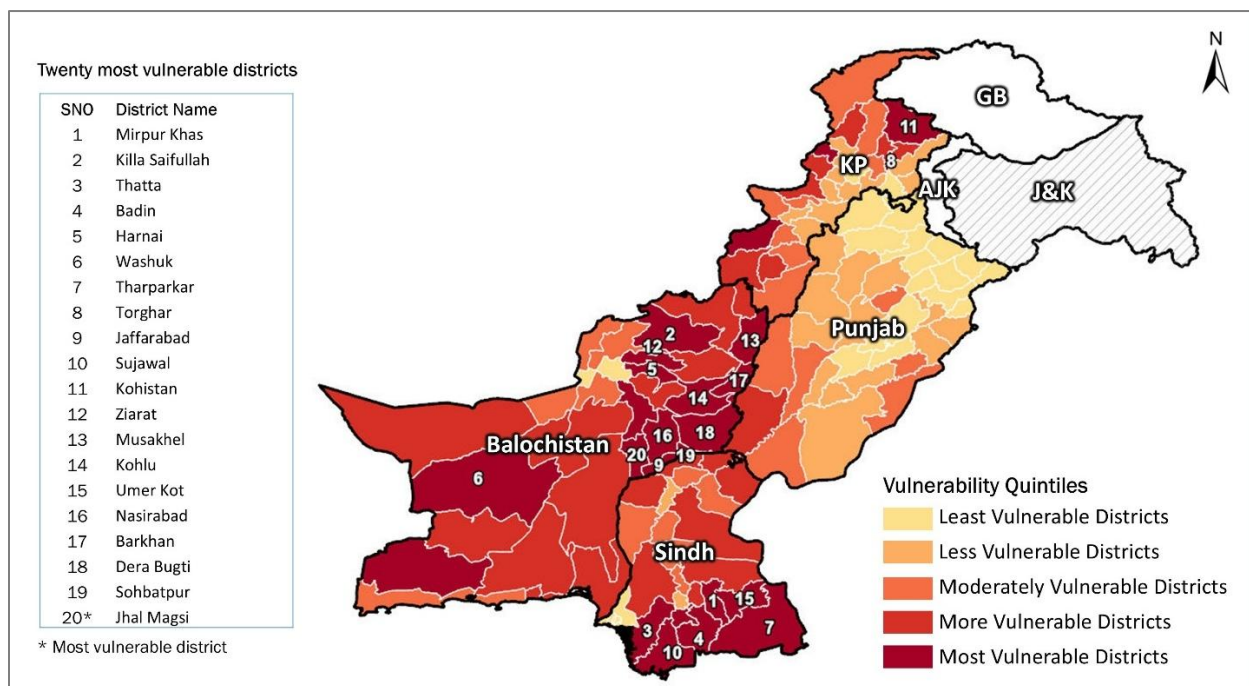
¹³ Notably, the Population and Housing Census 2023 divides Kohistan into three districts, namely Kolai Palas Kohistan, Lower Kohistan, and Upper Kohistan. Since this division does not exist in other data sources, such as the PSLMS and Mouza Census, we have treated Kohistan as one district and the figures reported in this report are the total for all three newly created districts.

to greater risks from climatic hazards. Similarly, about 50 percent of the bottom twenty districts' households are without toilet facilities; the highest proportion of such households is 67 percent, in Kohlu, Balochistan.

Over 40 percent of households in most of the bottom twenty districts lack access to improved drinking water sources. Again, in Kohlu, this proportion rises to 70 percent. Balochistan's Jhal Magsi is the most vulnerable district in terms of housing: almost 97 percent of households have a *kacha* or semi-*pakka* structure, and 61 percent do not have access to improved drinking water sources.

There is a considerable proportion of families living in just one room across Pakistan. Given the regional differences in areal spread of the population, this indicator can take on slightly different interpretations. While it mainly reflects poverty and crowding of households, it also indicates the area available to build housing structures. Balochistan fares badly on this indicator, but districts in Sindh also rank quite poorly. While 75 percent of households in Sohbatpur, Balochistan, consist of only one room, 70 percent of households in Umerkot in Sindh are also single-room dwellings.

Figure 3.7: Spatial Distribution of Vulnerability in the Housing Domain across Districts of Pakistan, by Ranking Quintile

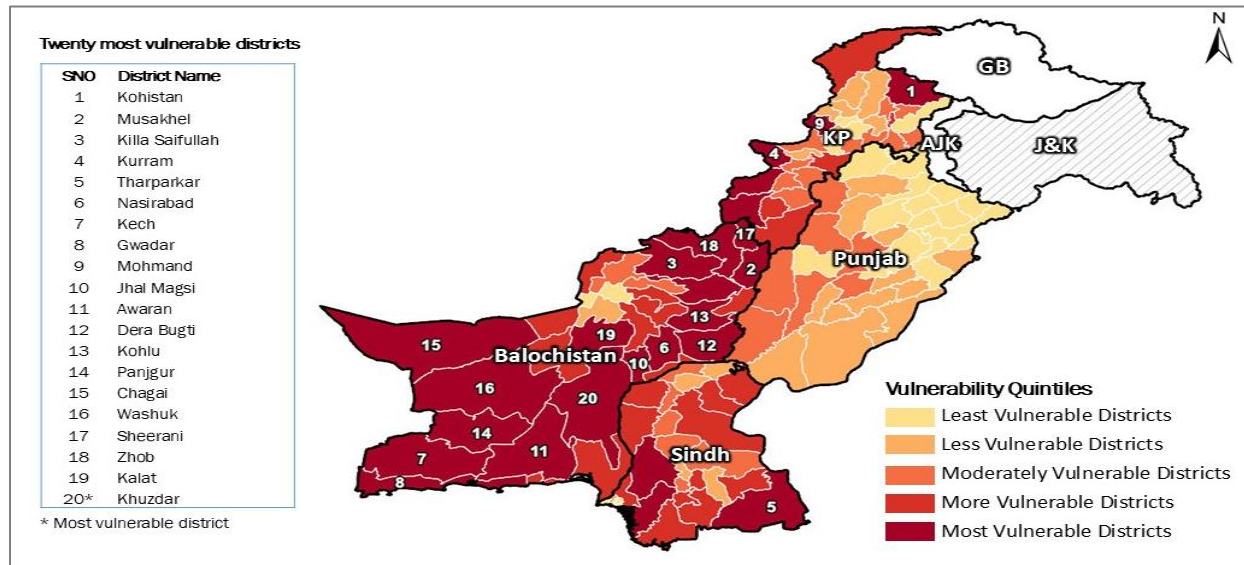


AJK=Azad Jammu and Kashmir, GB=Gilgit-Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

Communication and Transportation Domain

Most of the districts showing highest vulnerability in the communication and transportation domain are in Balochistan (Figure 3.8). While it is the largest province in terms of geographical area, Balochistan has the lowest population density and is regarded as economically and socially backward. Gaps in communication and transportation infrastructure severely limit capacities in the province to manage crises, such as epidemics and climate hazards, and were an important factor in the inadequacy of flood warning mechanisms during the 2022 floods and subsequent devastation.

Figure 3.8: Spatial Distribution of Vulnerability in the Communication and Transportation Domain across Districts of Pakistan, by Ranking Quintile

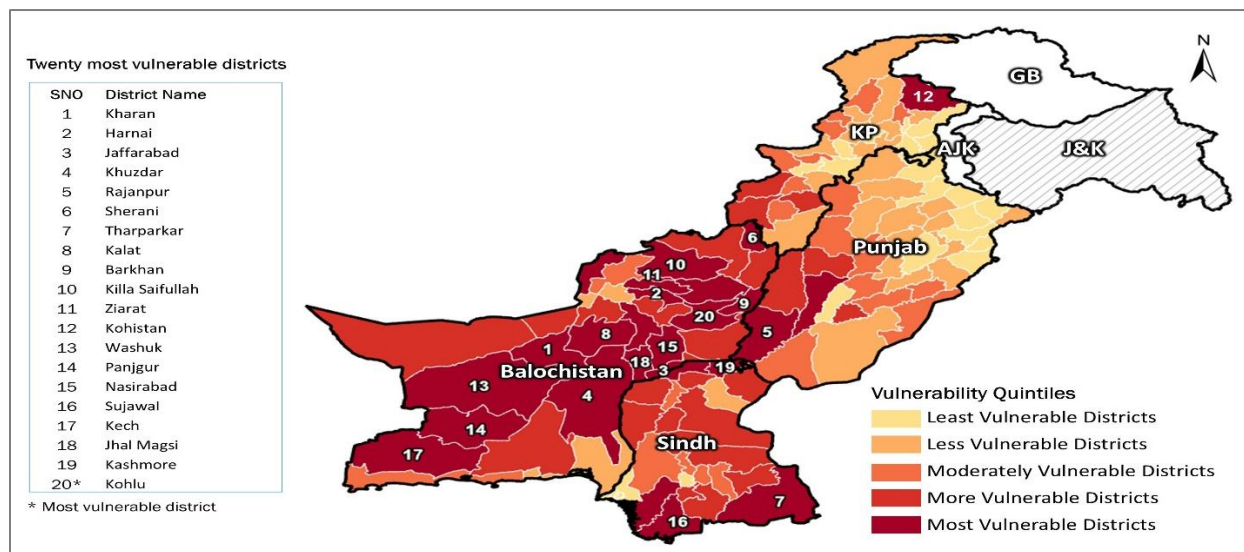


AJK=Azad Jammu and Kashmir, GB=Gilgit-Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

Livelihoods Domain

All four provinces are represented among the twenty most vulnerable districts in the livelihoods domain, but Balochistan again stands out with a disproportionately high share of fifteen districts (Figure 3.9). Kachhi district in the province holds the most vulnerable livelihoods position in the country. Additionally, three districts from Sindh (Kashmore, Sujawal and Tharparkar), one from KP (Kohistan) and one from Punjab (Rajanpur) fall into the category of the most vulnerable districts in this domain.

Figure 3.9: Spatial Distribution of Vulnerability in the Livelihoods Domain across Districts of Pakistan, by Ranking Quintile



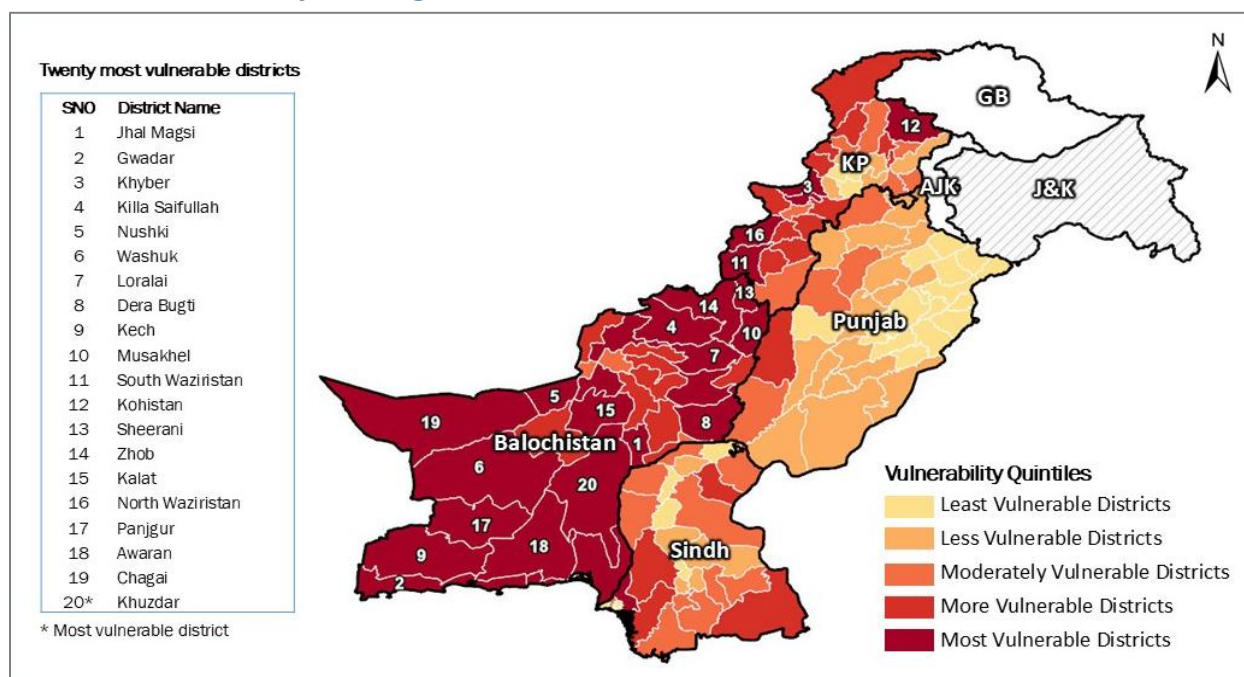
AJK=Azad Jammu and Kashmir, GB=Gilgit-Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

Access to Health Services Domain

Figure 3.10 shows the level of districts' vulnerability in terms of access to health services. Districts from Khyber Pakhtunkhwa and Balochistan have high vulnerability in this domain. It is worth noting that four of the highly vulnerable districts in Khyber Pakhtunkhwa are newly merged districts that were previously in the FATA region.

In Balochistan, Khuzdar is the most vulnerable in terms of access to health services. The average distance to the nearest health facility in the most vulnerable districts is more than 30 kilometers. The lack of nearby health services has serious implications for general health and, in particular, for maternal and child health.

Figure 3.10: Spatial Distribution of Vulnerability in the Access to Health Services Domain across Districts of Pakistan, by Ranking Quintile



AJK=Azad Jammu and Kashmir, GB=Gilgit-Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

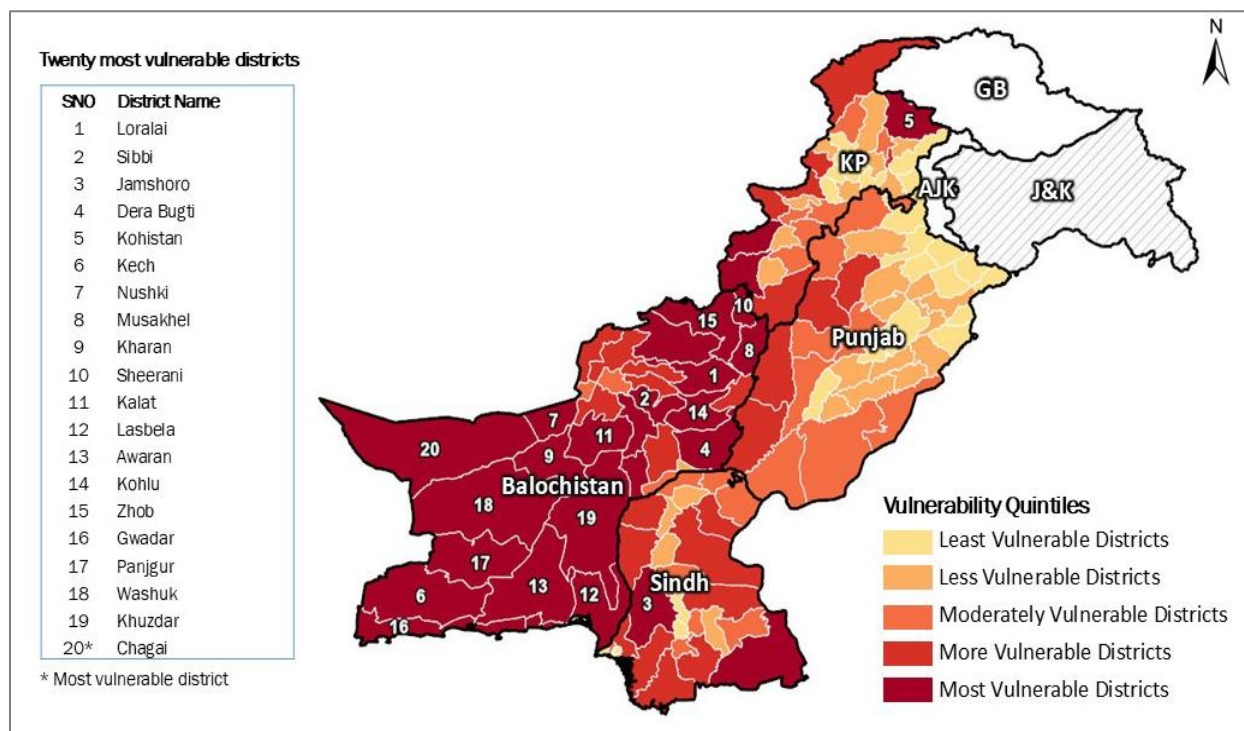
Access to Public Education Domain

As expected, districts with high education vulnerability rankings are also predominantly in Balochistan (Figure 3.11). All four indicators—average distance of mouza from high/higher secondary schools for boys; average distance of mouza from high/higher secondary schools for girls; number of primary schools per 10 square kilometers; and number of high schools per 10 square kilometers—contribute to the educational vulnerability of these districts.

The twenty most vulnerable districts have longer distances to schools and low density of primary and high schools. Differences in access to schools are very stark: for instance, Karachi Central, the least vulnerable district, has about 29 primary schools per 10 square kilometers, compared to 0.05 in Chaghi, the most vulnerable district. However, caution is needed in interpreting these results, as low

population density may play a role in Balochistan. School construction decisions are typically based on the number of inhabitants, and widely dispersed populations can suffer from not having schools placed nearby.

Figure 3.11: Spatial Distribution of Vulnerability in the Access to Public Education Domain across Districts of Pakistan, by Ranking Quintile



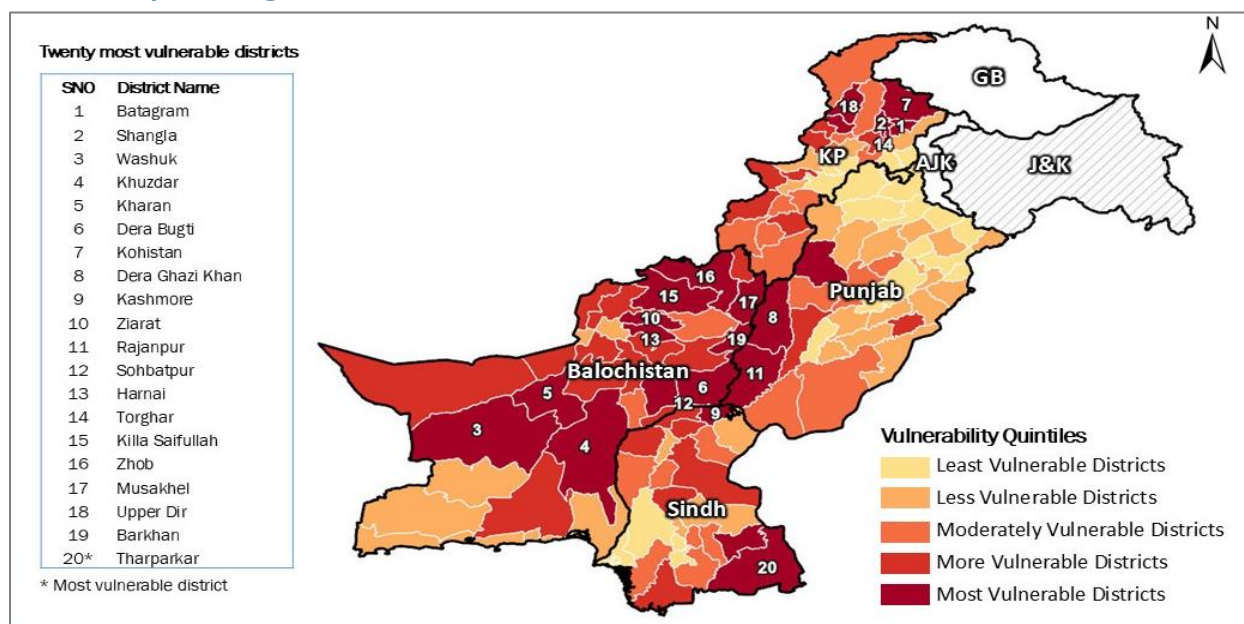
AJK=Azad Jammu and Kashmir, GB=Gilgit-Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

Demographics Domain

In terms of demographic vulnerability, Tharparkar from Sindh ranks the most vulnerable district, followed by Barkhan and Musakhel in Balochistan, and Upper Dir in Khyber Pakhtunkhwa (Figure 3.12). Many districts in Balochistan and Khyber Pakhtunkhwa score poorly on the demographic structure sub-index, indicating high dependency due to high fertility.

The indicator “children under 5 years of age” is a proxy measure for fertility and is a primary driver of vulnerability. Karachi South, which has lower fertility compared to other districts, has the lowest proportion of children under five (10.3 percent), whereas Zhob, one of the most demographically vulnerable districts, has the highest proportion of children under five (25.4 percent). Fourteen out of twenty vulnerable districts have a high share of children in their population (20 percent and above)—leading to a higher dependency ratio due to the high proportion of young children.

Figure 3.12: Spatial Distribution of Vulnerability in the Demographics Domain across Districts of Pakistan, by Ranking Quintile



AJK=Azad Jammu and Kashmir, GB=Gilgit–Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.

Overall Vulnerability Index

We obtained the composite, or overall, district-level vulnerability index by summing the six domain percentile ranks for each district. The results are presented in Table 3.1. It is worth reiterating that districts with high percentile scores (nearing one) have the highest relative vulnerability. Conversely, districts with low percentile scores (nearing zero) have low vulnerability relative to other districts. A low percentile score does not necessarily indicate low *absolute* vulnerability; instead, it signifies that the district has a better vulnerability score compared to other districts.

As the table shows, the twenty least vulnerable districts include four from Sindh—Karachi Central, Karachi Korangi, Karachi South, and Karachi East—which rank at the top; two from KP, namely Peshawar and Mardan; and the federal capital Islamabad, which ranks twelfth. These are all urban districts. The remaining thirteen least vulnerable districts are from Punjab, with Lahore ranking fifth nationally. Multan is the only district from South Punjab among these thirteen districts; the rest are from the central or northern regions of the province. Notably, not a single district from Balochistan ranks among the twenty least vulnerable districts in the country.

Table 3.1 also highlights the most vulnerable districts based on index percentiles across all six domains. Tharparkar in Sindh shows a high vulnerability score of 0.93 percentile, while Kohistan in Khyber Pakhtunkhwa is even more at risk with a score of 0.98 percentile. Most concerning are eight districts from Balochistan—Kalat, Killa Saifullah, Dera Bugti, Musakhel, Kohlu, Zhob, Khuzdar, and Washuk—all of which score between 0.94 and 1.00. These ten districts fall at the bottom of the index, reflecting deep and widespread challenges that need immediate focus and support.

Notably, the majority of the bottom twenty districts in the overall vulnerability index score poorly in most of the six domains.

Table 3.1: Overall and Domain-wise Vulnerability Index (Percentiles), by District

District	Province	Overall	Housing	Communication & Transportation	Livelihoods	Access to Health Services	Access to Public Education	Demographics
Karachi Central	SD	0.000	0.000	0.039	0.000	0.000	0.000	0.031
Karachi Korangi	SD	0.008	0.070	0.000	0.008	0.000	0.008	0.016
Karachi South	SD	0.016	0.039	0.008	0.023	0.000	0.023	0.031
Karachi East	SD	0.023	0.055	0.023	0.008	0.000	0.016	0.047
Lahore	PB	0.031	0.047	0.023	0.039	0.000	0.055	0.063
Gujrat	PB	0.039	0.023	0.047	0.078	0.039	0.094	0.125
Sialkot	PB	0.047	0.016	0.094	0.102	0.078	0.063	0.141
Rawalpindi	PB	0.055	0.086	0.063	0.055	0.250	0.148	0.086
Faisalabad	PB	0.063	0.156	0.125	0.109	0.141	0.164	0.055
Jhelum	PB	0.070	0.109	0.070	0.188	0.211	0.117	0.094
Gujranwala	PB	0.078	0.000	0.117	0.117	0.188	0.109	0.266
Islamabad	ICT	0.086	0.031	0.016	0.047	0.227	0.531	0.023
Peshawar	KP	0.094	0.242	0.109	0.125	0.328	0.047	0.070
Toba Tek Singh	PB	0.102	0.133	0.133	0.320	0.055	0.156	0.156
Sheikhupura	PB	0.109	0.078	0.195	0.156	0.133	0.273	0.164
Mardan	KP	0.117	0.188	0.164	0.172	0.070	0.031	0.398
Mandi Bahauddin	PB	0.125	0.125	0.094	0.305	0.063	0.188	0.266
Narowal	PB	0.133	0.055	0.164	0.391	0.117	0.086	0.250
Multan	PB	0.141	0.250	0.250	0.164	0.297	0.195	0.078
Kasur	PB	0.148	0.211	0.250	0.180	0.086	0.180	0.336
Nankana Sahib	PB	0.148	0.297	0.195	0.258	0.039	0.242	0.211
Hyderabad	SD	0.164	0.297	0.414	0.086	0.203	0.164	0.102
Charsada	KP	0.172	0.227	0.219	0.219	0.156	0.031	0.531
Sargodha	PB	0.180	0.352	0.141	0.234	0.227	0.203	0.234
Attock	PB	0.180	0.102	0.070	0.227	0.414	0.477	0.102
Hafizabad	PB	0.195	0.188	0.148	0.375	0.258	0.258	0.188
Mansehra	KP	0.203	0.398	0.188	0.148	0.281	0.141	0.266
Okara	PB	0.211	0.227	0.086	0.398	0.094	0.273	0.359
Abbottabad	KP	0.219	0.219	0.469	0.063	0.445	0.133	0.133
Chakwal	PB	0.227	0.094	0.273	0.234	0.352	0.352	0.195
Malakand	KP	0.234	0.281	0.055	0.289	0.375	0.070	0.508
Sahiwal	PB	0.242	0.148	0.328	0.398	0.109	0.211	0.398
Karachi West	SD	0.250	0.117	0.336	0.031	0.547	0.570	0.008
Nowshera	KP	0.258	0.344	0.547	0.211	0.164	0.234	0.117
Haripur	KP	0.266	0.133	0.453	0.094	0.516	0.367	0.141
Vehari	PB	0.273	0.203	0.242	0.469	0.289	0.250	0.305
Khanewal	PB	0.281	0.180	0.484	0.484	0.219	0.313	0.227
Larkana	SD	0.289	0.375	0.461	0.492	0.125	0.219	0.250
Swabi	KP	0.297	0.359	0.422	0.273	0.336	0.102	0.445
Matiari	SD	0.305	0.578	0.398	0.453	0.094	0.125	0.297
Quetta	BL	0.313	0.164	0.180	0.203	0.570	0.539	0.305
Layyah	PB	0.320	0.313	0.156	0.602	0.148	0.422	0.500
Pakpattan	PB	0.328	0.414	0.266	0.461	0.172	0.266	0.617
Chiniot	PB	0.336	0.406	0.297	0.281	0.398	0.398	0.430
Swat	KP	0.344	0.430	0.227	0.234	0.523	0.320	0.492
Khushab	PB	0.352	0.336	0.281	0.313	0.461	0.609	0.242
Mianwali	PB	0.359	0.320	0.492	0.430	0.313	0.508	0.219
Lodhran	PB	0.367	0.375	0.344	0.617	0.313	0.383	0.266
Lower Dir	KP	0.375	0.391	0.313	0.258	0.477	0.078	0.820
Hangu	KP	0.383	0.266	0.516	0.133	0.563	0.523	0.359
Bahawalpur	PB	0.391	0.359	0.352	0.398	0.227	0.578	0.461
Kohat	KP	0.398	0.289	0.609	0.195	0.742	0.414	0.164
Jhang	PB	0.398	0.273	0.406	0.469	0.305	0.492	0.469
Karachi Malir	SD	0.414	0.172	0.711	0.070	0.820	0.688	0.000
Rahim Yar Khan	PB	0.422	0.422	0.281	0.500	0.273	0.430	0.563
Buner	KP	0.430	0.508	0.320	0.367	0.352	0.297	0.664
Bahawalnagar	PB	0.438	0.461	0.367	0.516	0.398	0.469	0.344
Naushahro Feroze	SD	0.445	0.539	0.586	0.609	0.195	0.227	0.531
Karak	KP	0.453	0.258	0.578	0.344	0.648	0.453	0.516
Shikarpur	SD	0.461	0.500	0.383	0.742	0.344	0.328	0.781
Tando Allahyar	SD	0.469	0.711	0.727	0.438	0.383	0.406	0.422
Bannu	KP	0.477	0.531	0.516	0.578	0.672	0.289	0.516
Dera Ismail Khan	KP	0.484	0.453	0.648	0.352	0.594	0.625	0.445
Bhakkar	PB	0.492	0.328	0.430	0.500	0.430	0.609	0.844
Shaheed Benazirabad	SD	0.500	0.578	0.594	0.625	0.266	0.500	0.609

District	Province	Overall	Housing	Communication & Transportation	Livelihoods	Access to Health Services	Access to Public Education	Demographics
Mirpur Khas	SD	0.508	0.852	0.391	0.594	0.469	0.336	0.547
Orakzai	KP	0.516	0.516	0.234	0.523	0.836	0.359	0.742
Chitral	KP	0.523	0.438	0.727	0.328	0.617	0.711	0.430
Batagram	KP	0.531	0.641	0.594	0.352	0.500	0.375	0.852
Bajaur	KP	0.539	0.836	0.211	0.570	0.656	0.344	0.742
Sanghar	SD	0.547	0.797	0.570	0.648	0.367	0.656	0.359
Tando Muhammad Khan	SD	0.547	0.820	0.742	0.789	0.414	0.438	0.195
Sukkur	SD	0.563	0.516	0.797	0.289	0.609	0.664	0.547
Ghotki	SD	0.570	0.609	0.703	0.688	0.453	0.586	0.398
Lakki Marwat	KP	0.578	0.469	0.438	0.633	0.625	0.484	0.797
Muzaffargarh	PB	0.586	0.469	0.555	0.820	0.391	0.555	0.680
Tank	KP	0.594	0.664	0.664	0.555	0.633	0.391	0.594
Khyber	KP	0.602	0.719	0.531	0.328	0.867	0.766	0.359
Kashmore	SD	0.609	0.750	0.305	0.984	0.180	0.445	0.914
Shangla	KP	0.617	0.656	0.492	0.445	0.688	0.461	0.859
Dadu	SD	0.625	0.492	0.789	0.727	0.531	0.625	0.469
Khairpur	SD	0.633	0.602	0.688	0.656	0.484	0.672	0.633
Mastung	BL	0.641	0.484	0.359	0.672	0.828	0.773	0.664
Jamshoro	SD	0.648	0.633	0.820	0.531	0.781	0.867	0.164
Lasbela	BL	0.648	0.695	0.625	0.375	0.805	0.938	0.359
Jacobabad	SD	0.664	0.766	0.539	0.828	0.430	0.563	0.742
Upper Dir	KP	0.664	0.781	0.367	0.539	0.664	0.539	0.977
Pishin	BL	0.680	0.555	0.469	0.586	0.844	0.711	0.719
Kambar Shahdadkot	SD	0.688	0.672	0.641	0.734	0.508	0.641	0.695
Gwadar	BL	0.695	0.563	0.906	0.422	0.859	0.969	0.320
Badin	SD	0.703	0.867	0.672	0.781	0.555	0.602	0.586
Torghar	KP	0.711	0.906	0.711	0.141	0.750	0.648	0.953
Kurram	KP	0.719	0.570	0.875	0.547	0.727	0.727	0.711
Umerkot	SD	0.727	0.961	0.617	0.711	0.578	0.508	0.820
Rajanpur	PB	0.727	0.758	0.445	0.875	0.492	0.695	0.930
Killa Abdullah	BL	0.742	0.547	0.680	0.813	0.789	0.680	0.695
Dera Ghazi Khan	PB	0.750	0.594	0.555	0.766	0.680	0.742	0.906
Nushki	BL	0.758	0.445	0.750	0.641	0.883	0.891	0.656
Sohbatpur	BL	0.766	0.992	0.758	0.750	0.539	0.305	0.938
Mohmand	KP	0.773	0.648	0.914	0.555	0.750	0.727	0.734
Sibbi	BL	0.781	0.695	0.797	0.695	0.734	0.859	0.617
Thatta	SD	0.789	0.867	0.828	0.805	0.602	0.758	0.563
Jaffarabad	BL	0.789	0.914	0.625	0.859	0.633	0.594	0.797
South Waziristan	KP	0.805	0.789	0.813	0.703	0.930	0.820	0.469
Sujawal	SD	0.813	0.914	0.758	0.961	0.586	0.750	0.680
Ziarat	BL	0.820	0.938	0.492	0.922	0.703	0.695	0.922
Kachhi	BL	0.828	0.828	0.688	1.000	0.711	0.805	0.719
Loralai	BL	0.836	0.766	0.844	0.828	0.898	0.852	0.594
Panigur	BL	0.844	0.609	0.953	0.945	0.977	0.977	0.344
Kech	BL	0.844	0.813	0.898	0.969	0.914	0.891	0.320
North Waziristan	KP	0.859	0.844	0.836	0.719	0.969	0.828	0.633
Kharan	BL	0.867	0.680	0.781	0.844	0.789	0.906	0.883
Awaran	BL	0.875	0.742	0.930	0.664	0.984	0.945	0.633
Harnai	BL	0.883	0.883	0.773	0.844	0.719	0.781	0.945
Barkhan	BL	0.891	0.977	0.656	0.898	0.750	0.789	0.992
Chagai	BL	0.891	0.688	0.961	0.680	0.992	1.000	0.742
Nasirabad	BL	0.906	0.969	0.883	0.945	0.695	0.797	0.820
Jhal Magsi	BL	0.914	1.000	0.914	0.977	0.852	0.813	0.563
Sheerani	BL	0.922	0.609	0.977	0.883	0.945	0.922	0.797
Tharparkar	SD	0.930	0.898	0.883	0.891	0.773	0.844	1.000
Kalat	BL	0.938	0.734	0.992	0.898	0.961	0.930	0.781
Killa Saifullah	BL	0.945	0.859	0.867	0.914	0.867	0.836	0.961
Dera Bugti	BL	0.953	0.984	0.938	0.750	0.906	0.875	0.891
Musakhel	BL	0.961	0.945	0.859	0.766	0.922	0.906	0.977
Kohlu	BL	0.969	0.953	0.945	0.984	0.805	0.953	0.742
Zhob	BL	0.969	0.719	0.984	0.797	0.953	0.961	0.969
Kohistan	KP	0.984	0.930	0.852	0.922	0.938	0.883	0.898
Khuzdar	BL	0.992	0.797	1.000	0.859	1.000	0.984	0.875
Washuk	BL	1.000	0.891	0.961	0.938	0.883	0.984	0.867

BL=Balochistan, KP=Khyber Pakhtunkhwa, PB=Punjab, SD=Sindh.

Note: A higher percentile rank denotes greater relative vulnerability, 1 being the most vulnerable and 0 being the least vulnerable.

Table 3.2 presents the ranking of districts based on overall vulnerability scores within provinces; the national ranking is also shown for comparison. Notably, the top-ranked district in Balochistan, Quetta, ranks 41st in the national ranking, while the bottom-ranking district in Punjab stands no lower than 97th in the national ranking.

Table 3.2: National and Provincial Rankings of Districts by Overall Vulnerability

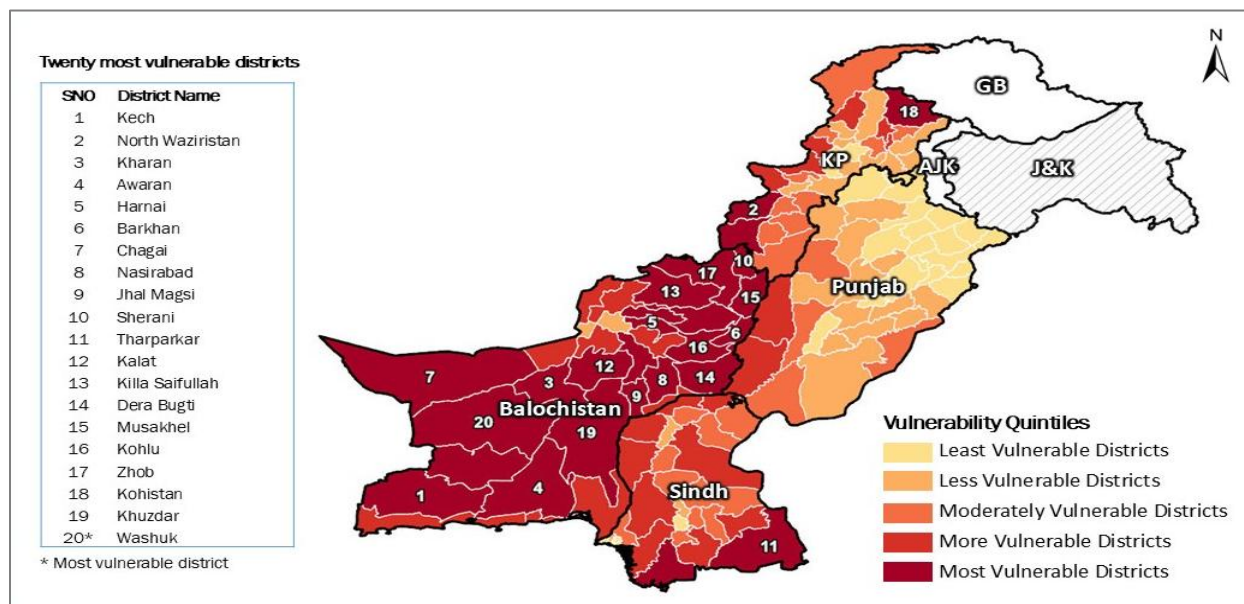
Khyber Pakhtunkhwa			Punjab			Sindh			Balochistan		
PR	District	NR	PR	District	NR	PR	District	NR	PR	District	NR
1	Peshawar	13	1	Lahore	5	1	Khi.Central	1	1	Quetta	41
2	Mardan	16	2	Gujrat	6	2	Khi.Korangi	2	2	Mastung	83
3	Charsadda	23	3	Sialkot	7	3	Khi.South	3	3	Lasbela	84
4	Mansehra	27	4	Rawalpindi	8	4	Khi.East	4	4	Pishin	88
5	Abbottabad	29	5	Faisalabad	9	5	Hyderabad	22	5	Gwadar	90
6	Malakand	31	6	Jhelum	10	6	Khi.West	33	6	K Abdullah	96
7	Nowshera	34	7	Gujranwala	11	7	Larkana	38	7	Nushki	98
8	Haripur	35	8	Toba Tek Singh	14	8	Matiari	40	8	Sohbatpur	99
9	Swabi	39	9	Sheikhupura	15	9	Khi.Malir	54	9	Sibbi	101
10	Swat	45	10	M Bahauddin	17	10	Naushero Feroze	58	10	Jaffarabad	102
11	Lower Dir	49	11	Narowal	18	11	Shikarpur	60	11	Ziarat	106
12	Hangou	50	12	Multan	19	12	Tando Allah Yar	61	12	Kachhi	107
13	Kohat	52	13	Kasur	20	13	Sh. Benazirabad	65	13	Loralai	108
14	Buner	56	14	Nankana Sahib	20	14	Mirpur Khas	66	14	Panjgur	109
15	Karak	59	15	Attock	24	15	Sanghar	71	15	Kech	109
16	Bannu	62	16	Sargodha	24	16	TM Khan	71	16	Kharan	112
17	DI Khan	63	17	Hafizabad	26	17	Sukkur	73	17	Awaran	113
18	Orakzai	67	18	Okara	28	18	Ghotki	74	18	Harnai	114
19	Chitral	68	19	Chakwal	30	19	Kashmore	79	19	Chagai	115
20	Batagram	69	20	Sahiwal	32	20	Dadu	81	20	Barkhan	115
21	Bajaur	70	21	Vehari	36	21	Khairpur	82	21	Nasirabad	117
22	Lakki Marwat	75	22	Khanewal	37	22	Jamshoro	84	22	Jhal Magsi	118
23	Tank	77	23	Layyah	42	23	Jacobabad	86	23	Sheerani	119
24	Khyber	78	24	Pakpattan	43	24	Kr. Shahdadkot	89	24	Kalat	121
25	Shangla	80	25	Chiniot	44	25	Badin	91	25	K Saifullah	122
26	Upper Dir	86	26	Khushab	46	26	Umerkot	94	26	Dera Bugti	123
27	Torghar	92	27	Mianwali	47	27	Thatta	102	27	Musakhel	124
28	Kurram	93	28	Lodhran	48	28	Sujawal	105	28	Zhob	125
29	Mohmand	100	29	Bahawalpur	51	29	Tharparkar	120	29	Kohlu	125
30	S Waziristan	104	30	Jhang	52				30	Khuzdar	128
31	N Waziristan	111	31	Rahim Yar Khan	55				31	Washuk	129
32	Kohistan	127	32	Bahawalnagar	57						
			33	Bhakkar	64						
			34	Muzaffargarh	76						
			35	Rajanpur	94						
			36	DG Khan	97						

DG Khan=Dera Ghazi Khan, DI Khan=Dera Ismail Khan, K Abdullah/Saifullah=Killa Abdullah/Saifullah, Kr. Shahdadkot=Kambar Shahdadkot, M Bahauddin=Mandi Bahauddin, NR=National Ranking, N Waziristan=North Waziristan, PR=Provincial Ranking, Sh. Benazirabad=Shaheed Benazirabad, S Waziristan=South Waziristan, TM Khan=Tando Muhammad Khan.

Note: Districts with the lowest vulnerability scores in each province are shaded green; those with the highest scores are shaded gray.

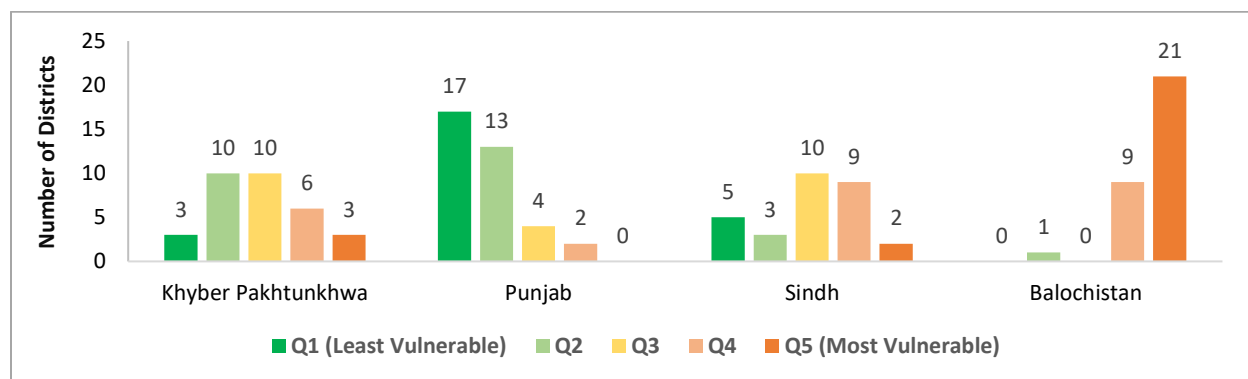
The map in Figure 3.13 provides a spatial view of differences in vulnerability across the districts of Pakistan. High vulnerability is mainly concentrated in Balochistan, where seventeen of the twenty most vulnerable districts are situated. Two of the bottom-ranked twenty districts—Kohistan and North Waziristan—are in KP; only one, Tharparkar, is in Sindh; and no district from Punjab falls in this range. It must be underscored that the two most vulnerable districts from KP were formerly part of the FATA region, a poorly developed area that was recently merged with KP. One of these, Kohistan, was split into three districts by the local government prior to the 2023 Census.

Figure 3.13: Spatial Distribution of Overall Vulnerability across Districts of Pakistan, by Ranking Quintile



Finally, Figure 3.14 shows the number of districts in each vulnerability category across provinces. Balochistan is clearly identified as the most vulnerable province in Pakistan, with twenty-one of its districts classified in the most vulnerable quintile. In contrast, Punjab has the largest number of districts—seventeen—categorized as the least vulnerable.

Figure 3.14: Number of Districts in Each National Vulnerability Quintile (Q), by Province



Islamabad (ICT) not shown in figure, which is in Q1 (Least Vulnerable)

The findings presented in this section have demonstrated the ability of the DVIP to provide a data-based, comparative assessment of population vulnerability across districts, based on six key domains: housing, transportation and communication, livelihoods, access to health services, access to public education, and demographics. Essentially, it serves as a well-integrated tool for assessing the relative capacity of district populations to cope with current and potential external threats. It also enables a more informed approach to identifying the characteristics that contribute to local vulnerability or resilience in the face of external stresses. In the following section, we demonstrate how the utility of the index may be further extended when it is used in conjunction with hazard assessments to inform policy and action.

4. Pairing the DVIP with Climate Risk Assessments

The framework of the DVIP is intentionally designed to be flexible. This enables policymakers, and other stakeholders, such as program implementers and activists, to use it in a wide range of applications—from routine development planning to responses to additional shocks such as economic shocks, climate-related disasters, or public health crises. When combined with hazard assessments, the DVIP can generate critical insights into the number of people at risk and how existing vulnerabilities may influence the impact of these hazards across districts. This perspective can pave the way for more targeted, data-informed policymaking and supports proactive—rather than reactive—interventions in spheres like disaster risk reduction, resilience building, preparedness planning, emergency response, and climate adaptation. The Population Council used a similar approach during the 2022 floods in Pakistan to map flooded areas and estimate the size and characteristics of the most affected population (Sadiq and Khalil 2022).

This section demonstrates how the DVIP can be extended through pairing with climate risk data to identify high-risk populations and to prioritize interventions. While climate change adaptation is a key application, the approach is equally relevant to other shocks—such as epidemics or economic disruptions—where hazard data are available. Our aim is to present a method for overlaying the DVIP’s vulnerability indicators with external threat data to better understand multiple, interacting layers of risk and vulnerability. Assessment of Climate Risks at the District Level

Pakistan is experiencing disproportionately severe impacts of global climate change, which is widely recognized as a threat multiplier—one that intensifies existing risks and vulnerabilities (UNDP 2020). The country faces a diverse array of climate-related stresses and hazards, including rising temperatures, unpredictable rainfall, flooding, drought, tropical cyclones and associated hazards, tidal intrusion, and glacial melting (Lohano 2024, Chaudhry 2017). The prevalence and intensity of these stresses varies considerably across the country.

To demonstrate how the DVIP can be used in conjunction with climate risk assessments, we needed to develop a scoring system to measure degrees of climate risks at the district level. The first difficulty lay in the considerable diversity of climate-related hazards and events across districts. Climatic stresses are influenced by factors such as a district’s location, topography, elevation, and proximity to features like the sea, riverbeds, or mountains. Not all climate hazards apply uniformly across districts, even within a single province. A second challenge was the inconsistent availability of robust data about different climate hazards across the country.

With these considerations in mind, we included four specific climate hazards in our framework that are both widespread and supported by quality data at the district level: **floods (including riverine and flash floods), drought, temperature change, and rainfall change.**

We assigned each district an individual climate risk score for each of the four climate risks, as well as a fifth combined climate risk score reflecting the cumulative burden. While the combined score is not comprehensive—as it excludes important hazards such as sea incursion and glacial lake outburst floods (GLOFs)—it serves as an indicator of the overall climate stress burden at the district level.

Data Sources

We adapted and utilized flood and drought hazard scores from the Integrated Context Analysis conducted by the National Disaster Management Authority and World Food Programme (2017). In this source, the flood hazard index was calculated using data on the number and severity of recorded flood events from 1950 to 2015, classifying districts on a three-point hazard scale (1=low, 2=medium, 3=high). Similarly, the drought hazard index was based on soil moisture and precipitation data from 1951 to 2010, with districts classified on the same three-point hazard scale.

We utilized the World Bank's (2019) Climate Change Knowledge Portal to obtain historical monthly average temperature and rainfall data. The portal provides climate data based on the Climatic Research Unit gridded Time Series (CRU TS) version 4.05—a widely used dataset derived from observations collected at numerous weather stations across the globe. This source offers several methods for downloading data across different administrative and spatial boundaries. One option allows users to input GPS coordinates to extract historical climate data for specific locations from 1901 to 2016.

As a first step, we collected the GPS coordinates for the centroids of all districts in Pakistan using Google Earth. We then downloaded climate data corresponding to these coordinates.¹⁴ In total, we downloaded over 500 individual files representing all districts across a 116-year timeframe and consolidated them into a single comprehensive dataset. This final dataset contains monthly average temperature and rainfall values for each district for every year from 1901 to 2016. Once spatially linked to the administrative boundaries of each district, this structured dataset served as the foundation for further analysis of climate trends and changes at the district level.

To calculate temperature change we compared the average annual temperature between 1970–1980 and 2006–2016, the most recent period for which data was available. In earlier work, we found that a sharp rise in temperature occurred in Pakistan mostly after 1990, and the time period was selected to capture that trend (Faisal and Riaz 2019). Similarly, rainfall change was calculated as the difference in average annual rainfall between 1970–1980 and 2006–2016.

District-level Climate Risk Scoring

Using the data obtained, we scored each district for four individual climate risks using the following criteria:

- **Temperature change:** A score of 0 was assigned if the temperature change was less than 0.6°C, and 1 if the change exceeded 0.6°C.¹⁵
- **Rainfall change:** A score of 0 was assigned if the change in rainfall was equal to or greater than 10 millimeters, and 1 if it was less than 10 millimeters.

¹⁴ Notably, the data was accessed and downloaded from the portal in 2019. The methodology for data access on the portal has since changed, and the option to download data using GPS coordinates is no longer available.

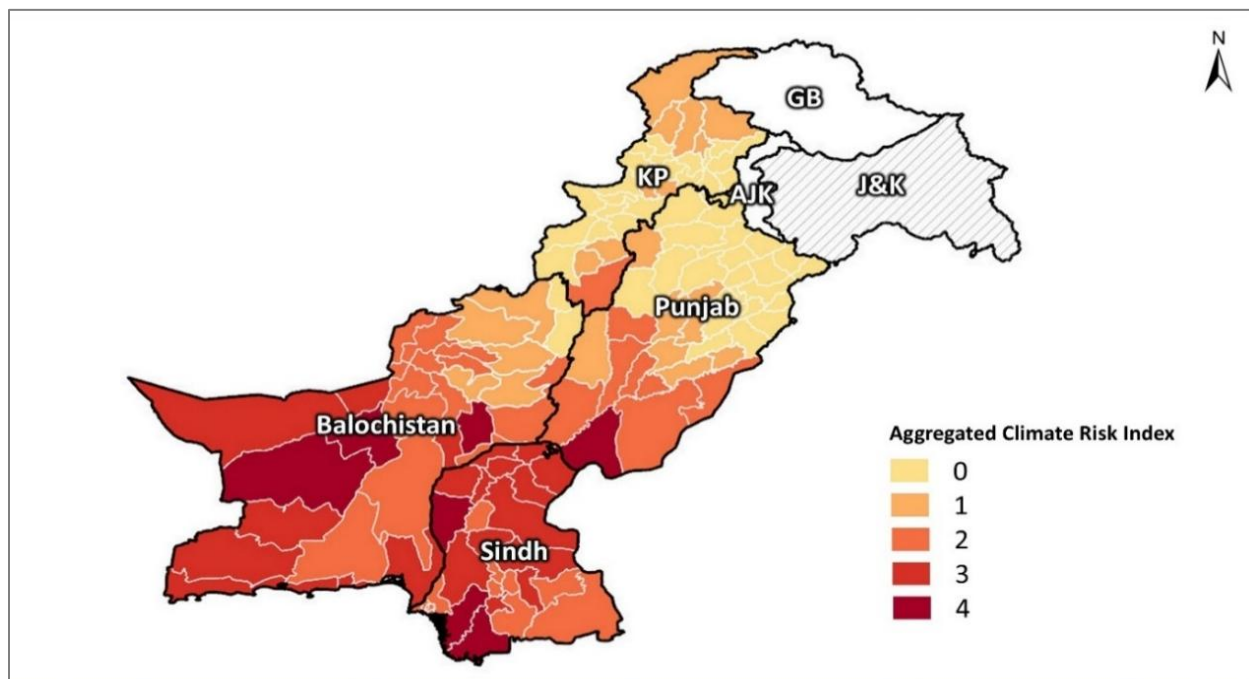
¹⁵ The thresholds used in scoring for change in temperature (0.6°C) and change in rainfall (10 millimeters) were selected on the basis of data distribution.

- **Flood hazard:** A score of 0 was assigned if the district's flood hazard rating was 1 or 2 (low or medium), and 1 if it was 3 (high).
- **Drought hazard:** A score of 0 was assigned if the drought hazard score was 1 or 2 (low or medium), and 1 if it was 3 (high).

We then calculated a combined climate risk score for each district by summing the individual scores from the four indicators. This yielded a climate risk index ranging from 0–4, where 0 indicates no stress and 4 indicates maximum stress. For example, a district experiencing a temperature change above 0.6°C, rainfall change below 10 millimeters, and flood and drought hazard scores of 3 would receive a combined score of 4. Conversely, a district meeting none of these criteria would score 0. Districts scoring of 3 or 4 are considered to be at the highest risk based on the selected climate indicators.

Figure 4.1 shows the gradation of districts by the aggregated climate score. Districts with the lowest aggregate climate risk score of 0 include Lahore, Gujrat, Sialkot, Rawalpindi, and Faisalabad in Punjab, and Mansehra, Abbottabad, Malakand, Haripur, and Swabi in KP.

Figure 4.1: Spatial Distribution of Combined Climate Risks across Districts of Pakistan



AJK=Azad Jammu and Kashmir, GB=Gilgit–Baltistan, J&K=Jammu and Kashmir, KP=Khyber Pakhtunkhwa.
 Note: Climate risks considered include changes in temperature and rainfall, drought hazard, and riverine and flash flood hazard.

Source: Authors' calculations based on data from World Bank 2019 and National Disaster Management Authority and World Food Programme 2017.

Seven districts fall into the highest climate risk category, with a combined score of 4. These include Rahim Yar Khan in Punjab; Dadu, Thatta, and Sujawal in Sindh; and Kharan, Nasirabad, and Washuk in Balochistan. In addition, twenty districts have a high combined climate risk score of 3. These most-affected twenty-seven districts are shown in Figure 4.2. Altogether, they represent 14.2 percent of

Pakistan’s population and over a third (35.6 percent) of the country’s land area (Table 4.1). The affected population shows several demographic vulnerabilities. A significant 70.8 percent lives in rural areas, while 22.0 percent are women of reproductive age (15–49), and 17.3 percent are children under five. The elderly (aged 65+) constitute 2.8 percent of the population. Notably, the dependency ratio is extremely high at 92.3 percent, indicating a large proportion of non-working dependents relative to the working-age population. Furthermore, the literacy rate among individuals aged 10 and above is only 45.3 percent, reflecting limited educational attainment and access in these areas.

Figure 4.2: Location of Districts with High Aggregate Climate Risk Scores (3 or 4)

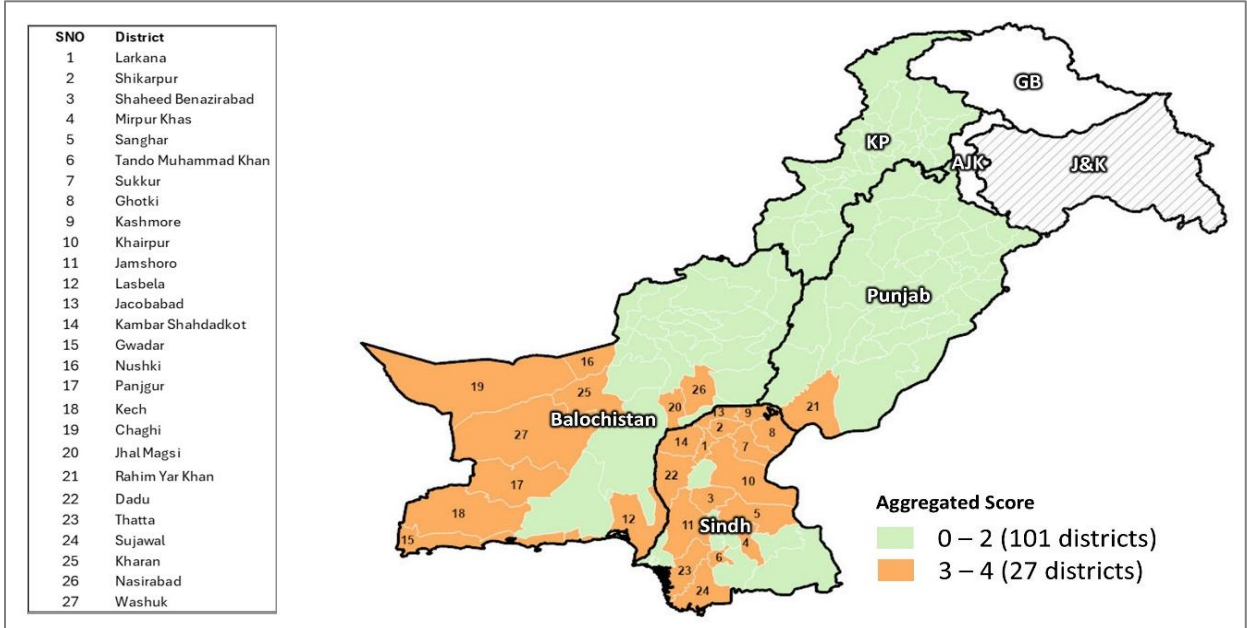


Table 4.1: Population Statistics of Districts with High Aggregate Climate Risk Scores (3 or 4)

Characteristics	%
Area (% of Pakistan)	35.6
Population (% of Pakistan)	14.2
Rural Population	70.8
Women of Reproductive Age (15-49)	22.0
Children under 5	17.3
Elderly (aged 65+)	2.8
Dependency Ratio	92.3
Literacy (among those aged 10+)	45.3

Correlation of District Vulnerability and Climate Risks

We tested the associations between the four components of the climate score and the DVIP to examine the direction and statistical significance of these relationships.¹⁶ Using Pearson’s correlation coefficient, we found a strong positive association between rising temperatures and higher drought risk, which is to be expected. Similarly, there is a negative association between changes in heat and rainfall changes. Flood risk does not show strong associations with either temperature or drought but is negatively associated, though weakly, with increases in rainfall (Table 4.2).

Importantly, when examining the association between the DVIP and the four climate indicators, we found a statistically significant positive association between vulnerability and both temperature change and the drought hazard index: districts experiencing higher temperature increase and greater drought risk are also more vulnerable. The association with increased rainfall is negative, and there is no significant association with the flood hazard score. Flood risk is also weakly associated with district-level vulnerability. This may be because flood risks operate through more independent pathways, such as proximity to riverbanks or areas of the Indus basin, exposure to GLOF-prone zones, likelihood of heavy rainfall, and topographical features like flat terrain.

Table 4.2: Pearson’s Correlation Coefficient between the DVIP and Climate Indicators

	DVIP	Change in temperature	Change in Rainfall	Drought Risk	Flood Risk
DVIP	1	0.5509*	-0.2657*	0.3086*	0.0293
Change in temperature	0.5509*	1	-0.7254*	0.4893*	0.0717
Change in Rainfall	-0.2657*	-0.7254*	1	-0.447*	-0.201*
Drought Risk	0.3086*	0.4893*	-0.447*	1	-0.0534
Flood Risk	0.0293	0.0717	-0.201*	-0.0534	1

*p≤0.05.

We look next at the association between the aggregate climate risk score and the DVIP rankings of districts. Table 4.3 shows the average aggregate climate score for each vulnerability quintile according to the DVIP. A positive association is evident: districts in the two more vulnerable quintiles have an average climate score of 2 or more, while those in the least vulnerable quintile average below 1. This suggests the strong probability that the most vulnerable districts are also more likely to be exposed to significant climate stressors, including temperature and rainfall changes, flooding, and drought.

¹⁶ Coefficients are statistically significant at 5% level of significance, i.e., p≤0.05.

Table 4.3: Specific and Aggregated Climate Risks by DVIP Ranking Quintiles

DVIP Ranking Quintiles	Average Temperature Change, 1970–80 to 2006–16	Average Rainfall Change, 1970–80 to 2006–16	Flood Risk Score	Drought Risk Score	Aggregated Climate Risk Score (0-4)
First	0.39	54.28	1.65	1.52	0.57
Second	0.44	71.36	1.80	2.08	0.85
Third	0.55	54.42	2.00	2.20	1.57
Fourth	0.79	26.10	2.13	2.26	2.00
Fifth	0.88	14.75	1.54	2.33	2.04

Source: Authors' calculations.

In the last part of our analysis, we juxtapose the climate risk indicators with the overall vulnerability rankings of districts from highest to lowest. As shown in Table 4.4, urban districts generally rank at the top, with their low vulnerability largely attributed to urban settings. However, climate risk scores remain high in several highly urbanized districts—such as Peshawar and Toba Tek Singh—and moderately high in districts like Karachi, Multan, and Sahiwal.

It is important to point out that high vulnerability does not always align with high climate risk—and vice versa. Likewise, different climate risks may trend in opposite directions within the same district. Crucially, however, low vulnerability can help offset the impact of external shocks, especially those related to climate events such as floods or sea incursion.

Table 4.4: DVIP Ranking, Climate Risk Indicators, and Aggregated Climate Risk Scores, by District

DISTRICT	Overall Vulnerability Rank	CHANGE IN TEMPERATURE RE °C	CHANGE IN RAINFALL (mm)	FLOOD RISK	DROUGHT RISK	CLIMATE SCORE	DISTRICT	Overall Vulnerability Rank	CHANGE IN TEMPERATURE RE °C	CHANGE IN RAINFALL (mm)	FLOOD RISK	DROUGHT RISK	CLIMATE SCORE
Karachi Central	1	0.92	-39.5	2	2	2	Mirpur Khas	66	0.89	8.0	1	3	3
Karachi Korangi	2	0.92	-39.5	2	2	2	Orakzai	67	0.23	243.3	1	1	0
Karachi South	3	0.92	-39.5	2	2	2	Chitral	68	0.44	8.9	2	2	1
Karachi East	4	0.92	-39.5	2	2	2	Batagram	69	0.33	71.8	2	2	0
Lahore	5	0.39	41.2	1	2	0	Bajaur	70	0.30	121.2	1	2	0
Gujrat	6	0.33	33.4	2	1	0	Sanghar	71	0.89	1.9	2	3	3
Sialkot	7	0.33	49.9	2	1	0	TM Khan	71	0.85	12.6	3	3	3
Rawalpindi	8	0.33	86.2	2	1	0	Sukkur	73	0.91	-7.7	3	1	3
Faisalabad	9	0.39	36.7	1	2	0	Ghotki	74	0.73	2.1	3	1	3
Jhelum	10	0.31	24.3	1	1	0	Lakki Marwat	75	0.26	115.1	1	3	1
Gujranwala	11	0.32	37.6	2	1	0	Muzaffargarh	76	0.38	15.6	3	3	2
Islamabad	12	0.33	86.2	1	1	0	Tank	77	0.35	75.0	3	2	1
Peshawar	13	0.27	120.2	3	1	1	Khyber	78	0.25	156.1	1	1	0
Toba Tek Singh	14	0.38	31.3	1	3	1	Kashmore	79	0.74	0.1	3	1	3
Sheikhupura	15	0.32	40.9	2	2	0	Shangla	80	0.28	91.8	3	1	1
Mardan	16	0.28	117.2	2	2	0	Dadu	81	0.98	-16.7	3	3	4
Mandi Bahauddin	17	0.30	72.4	1	1	0	Khairpur	82	0.86	-2.4	3	2	3
Narowal	18	0.33	49.9	2	1	0	Mastung	83	1.23	30.1	1	3	2
Multan	19	0.38	15.6	3	3	2	Jamshoro	84	0.90	-5.6	3	2	3
Kasur	20	0.43	42.3	1	2	0	Lasbela	84	1.08	-48.0	2	3	3
Nankana Sahib	20	0.43	39.0	1	2	0	Jacobabad	86	0.91	-3.4	3	1	3
Hyderabad	22	0.90	-5.6	2	2	2	Upper Dir	86	0.34	51.5	3	2	1
Charsadda	23	0.27	120.2	3	1	1	Pishin	88	1.01	26.3	1	3	2
Sargodha	24	0.29	70.6	1	1	0	Kr. Shahdadkot	89	0.96	-6.2	3	2	3
Attock	24	0.29	141.2	1	1	0	Gwadar	90	0.84	-37.8	2	3	3
Hafizabad	26	0.31	37.1	1	1	0	Badin	91	0.85	17.2	2	3	2
Mansehra	27	0.30	109.9	2	2	0	Torghar	92	<i>Historical Climate Data Not Available</i>				
Okara	28	0.46	26.7	1	2	0	Kurram	93	0.22	256.7	1	1	0
Abbottabad	29	0.30	109.9	2	2	0	Umerkot	94	0.78	24.8	1	3	2
Chakwal	30	0.29	105.2	1	2	0	Rajanpur	94	0.67	13.0	3	2	2
Malakand	31	0.30	121.2	2	2	0	Killa Abdullah	96	1.10	16.7	1	3	2
Sahiwal	32	0.46	26.7	1	2	0	Dera Ghazi Khan	97	0.52	16.6	3	2	1
Karachi West	33	0.92	-39.5	2	2	2	Nushki	98	1.34	-7.6	1	3	3
Nowshera	34	0.27	120.2	3	1	1	Sohbatpur	99	0.91	-3.4			
Haripur	35	0.32	125.6	2	2	0	Mohmand	100	0.28	144.9	1	2	0
Vehari	36	0.47	18.3	1	3	1	Sibi	101	0.94	13.4	2	2	1
Khanewal	37	0.43	15.9	1	3	1	Thatta	102	0.91	-21.7	3	3	4
Larkana	38	0.96	-8.0	3	1	3	Jaffarabad	102	0.91	-3.4			0
Swabi	39	0.28	117.2	2	1	0	South Waziristan	104	0.40	75.9	1	2	0
Matari	40	0.94	-3.1	2	2	2	Sujawal	105	0.91	-21.7	3	3	4
Quetta	41	1.23	13.5	1	3	2	Ziarat	106	0.96	27.7	1	3	2
Layyah	42	0.45	27.3	3	3	2	Kachhi	107	1.00	8.6	2	2	2
Pakpattan	43	0.51	15.9	1	3	1	Loralai	108	0.78	26.6	1	1	1
Chiniot	44	0.29	50.7	3	2	1	Panjgur	109	1.03	-36.9	1	3	3
Swat	45	0.27	89.3	3	2	1	Kech	109	0.97	-32.7	2	3	3
Khushab	46	0.29	82.3	2	2	0	North Waziristan	111	0.34	123.6	1	1	0
Mianwali	47	0.29	109.4	3	2	1	Kharan	112	1.38	-13.8	3	3	4
Lodhran	48	0.55	8.8	1	3	2	Awaran	113	1.06	-57.7	1	2	2
Lower Dir	49	0.30	121.2	2	1	0	Harnai	114	0.96	27.7	2	3	2
Hangu	50	0.27	187.8	1	1	0	Barkhan	115	0.62	33.1	1	3	2
Bahawalpur	51	0.59	4.4	1	3	2	Chaghi	115	1.40	-23.5	1	3	3
Kohat	52	0.27	187.8	1	2	0	Nasirabad	117	0.88	1.9	3	3	4
Jhang	52	0.34	46.6	3	2	1	Jhal Magsi	118	1.04	17.7	3	3	3
Karachi Malir	54	0.92	-39.5	2	2	2	Sherani	119	0.43	41.3	1	2	0
Rahim Yar Khan	55	0.74	-4.4	3	3	4	Tharparkar	120	0.76	23.7	1	3	2
Buner	56	0.27	89.3	2	2	0	Kalat	121	1.19	45.5	1	3	2
Bahawalnagar	57	0.55	9.5	1	3	2	Killa Saifullah	122	0.87	22.1	1	1	1
Naushero Feroze	58	0.94	-7.8	2	2	2	Dera Bugti	123	0.77	31.1	1	3	2
Karak	59	0.26	156.5	1	2	0	Musakhel	124	0.56	27.8	1	2	0
Shikarpur	60	0.91	-7.7	3	1	3	Kohlu	125	0.70	34.0	1	2	1
Tando Allahyar	61	0.85	12.6	1	3	2	Zhob	125	0.62	19.2	1	1	1
Bannu	62	0.26	115.1	1	2	0	Kohistan	127	0.38	28.8	3	1	1
Dera Ismail Khan	63	0.35	60.2	3	3	2	Khuzdar	128	1.08	8.1	1	2	2
Bhakkar	64	0.32	72.3	2	2	0	Washuk	129	1.25	-30.0	3	3	4
Sh. Benazirabad	65	1.00	-5.8	2	3	3							

Kr. Shahdadkot=Kambar Shahdadkot, Sh. Benazirabad=Shaheed Benazirabad, TM Khan=Tando Muhammad Khan.

Notes: Change in temperature was computed as difference in average annual temperature between 1970-80 and 2006-16. Change in rainfall was computed as difference in average annual rainfall over the same period. For flood and drought risks, the scores 1, 2, and 3 indicate low, medium, and extreme risk, respectively.

Sources: Flood and drought risk scores are from National Disaster Management Authority and World Food Programme (2017). Temperature and rainfall data are from the World Bank (2019) Climate Change Knowledge Portal.

The analysis presented in this section indicates the DVIP's potential as a tool for multi-hazard planning, ensuring preparedness is grounded in both structural vulnerabilities and potential risks. While we focused on climate hazards here as a demonstration, the same principles apply equally to other domains, offering a blueprint for evidence-based policy across Pakistan's complex risk landscape.

It is important to acknowledge the limitations of our approach to climate risk assessment. Ideally, such assessments should be carried out at a much more granular level and include all the key stresses of relevance—even those that may not affect most districts but are critically important to the communities where they do occur, such as sea incursion and GLOFs. While data constraints prevented us from adopting a deeper and more comprehensive approach in this study, we hope the approach demonstrated here nonetheless provides a model for using the DVIP and leveraging available data to explore the intersection of any disaster risk with vulnerability at the district level in Pakistan.

5. Way Forward

The District Vulnerability Index for Pakistan (DVIP) is distinguished by its architecture, its conceptual framework, and extensive data mining, serving as a tailored instrument for assessing vulnerability across the country. Drawing on robust national statistical systems, it utilizes the most recent data sources, such as the Housing and Population Census 2023, to construct a multidimensional district-level profile. Its twenty-one indicators capture critical aspects of vulnerability most relevant to the Pakistani population. The results presented in this study enable comparisons of relative vulnerability across the districts of Pakistan, in specific domains as well as overall, based on the latest available data.

The District Vulnerability Landscape

Our analysis reveals stark disparities in vulnerability across provinces. **Among the twenty least vulnerable districts, thirteen are from Punjab, four from Sindh, two from Khyber Pakhtunkhwa, and none are from Balochistan.** When we look at the **most vulnerable districts**, the provincial distribution flips: this category includes **two former FATA districts from KP, only one district from Sindh, no district from Punjab, and an alarming seventeen districts from Balochistan.**

The five least vulnerable districts in the country are the four urban districts of Karachi in Sindh, followed by Lahore from Punjab. Conversely, the **five most vulnerable districts include four from Balochistan**—Washuk, Khuzdar, Kohlu, and Zhob—and Kohistan from KP. As expected, specific domain scores generally follow the pattern of overall vulnerability, with the majority of the most vulnerable districts in Balochistan.

Domain-level rankings based on the DVIP paint a more detailed picture of challenges. In the twenty lowest ranking districts in the **housing** domain, **over 65 percent of households reside in temporary or makeshift structures; half lack toilet facilities; and 40 percent have no access to improved water facilities.** Very high proportions of households—for example, 75 percent in Sohbatpur, Balochistan—reside in one-room homes. Housing conditions reach critical levels in Jhal Magsi (Balochistan), where 97 percent of households reside in *kacha* or *semi-pakka* homes.

Most of the districts with the **greatest vulnerability in the communication and transportation domains are also in Balochistan.** Mapping this domain presents an alarming picture of disconnection in the province, with many contiguous districts severely lacking access to roads, transport facilities, or telephones within reachable distances. This has serious implications for crisis response, relief delivery, as well as for building resilience—whether at household, community, or district government levels. In clear contrast, most districts in Punjab, especially in the northern and central regions, benefit from better communication and transportation infrastructure.

In the livelihoods domain, again, fifteen of the twenty worst-ranking districts are from Balochistan.

District populations in KP and Balochistan have the highest unemployment rates and the highest proportions of people working as unpaid family helpers, signifying more fragile livelihoods. These two provinces also stand out as more vulnerable in the health domain, with lower accessibility of health facilities and doorstep community health services, as well as greater internal disparities between districts within the province.

In the most vulnerable districts in the **health** domain, the **average distance to the nearest health facility can exceed 30 kilometers**. Where coupled with high vulnerability in the transportation and communication domain, this translates into severe challenges in meeting basic health needs, especially for maternal and child healthcare.

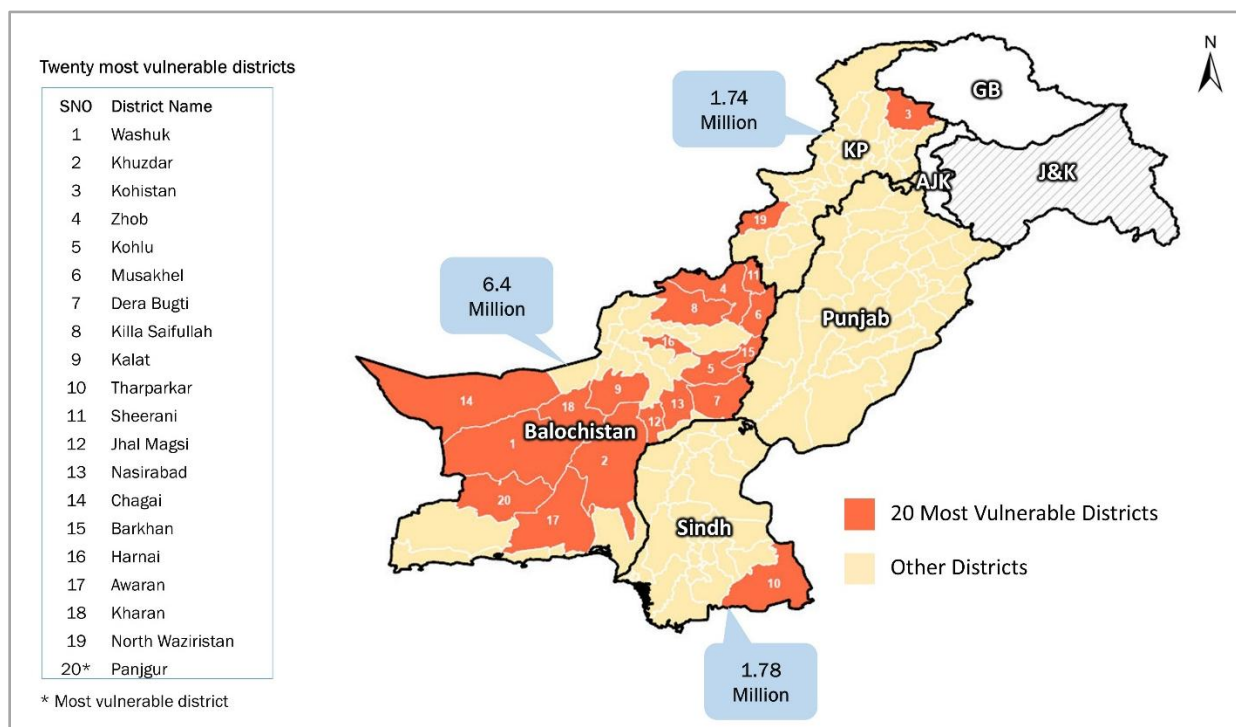
In terms of **access to public education** facilities, Karachi stands out with the highest density of primary and high/higher secondary schools, though this is likely due to its population density. The **most vulnerable districts are again concentrated in Balochistan**, where low school density and long travel distances are likely exacerbated by weaknesses in the transportation domain. Notably, in all provinces except Punjab, girls tend to face greater distances to high/higher secondary schools than boys.

Many districts in **Balochistan and Khyber Pakhtunkhwa also score poorly** in the **demographics** domain, although **Tharparkar in Sindh ranks as the most vulnerable**. High fertility—measured by the proportion of children under 5 years of age—drives vulnerability in this domain. While high fertility rates are prevalent across Pakistan, some districts lag significantly in the fertility transition and have unusually large families. This is likely linked to other domains such as access to health services, transportation infrastructure, and livelihoods.

Using population data from the 2023 Pakistan Housing and Population Census, we estimate that **nearly 10 million Pakistanis live in the twenty districts with highest vulnerability—about 2 million of them are women of reproductive age, and a similar number are children under 5** (Figure 5.1). A disproportionate number of these individuals—6.4 million—reside in Balochistan, representing 43 percent of the province’s total population. Tharparkar is the most populous of the vulnerable districts in Sindh, with a population of 1.78 million. Kohistan and North Waziristan districts are the most vulnerable in KP, with a combined population of 1.74 million.¹⁷

¹⁷ As mentioned earlier, the Housing and Population Census 2023 divides the district of Kohistan into three districts. However, we have treated it as a single district for alignment with other data sources used in the index.

Figure 5.1: Twenty Most Affected Districts and Their Population



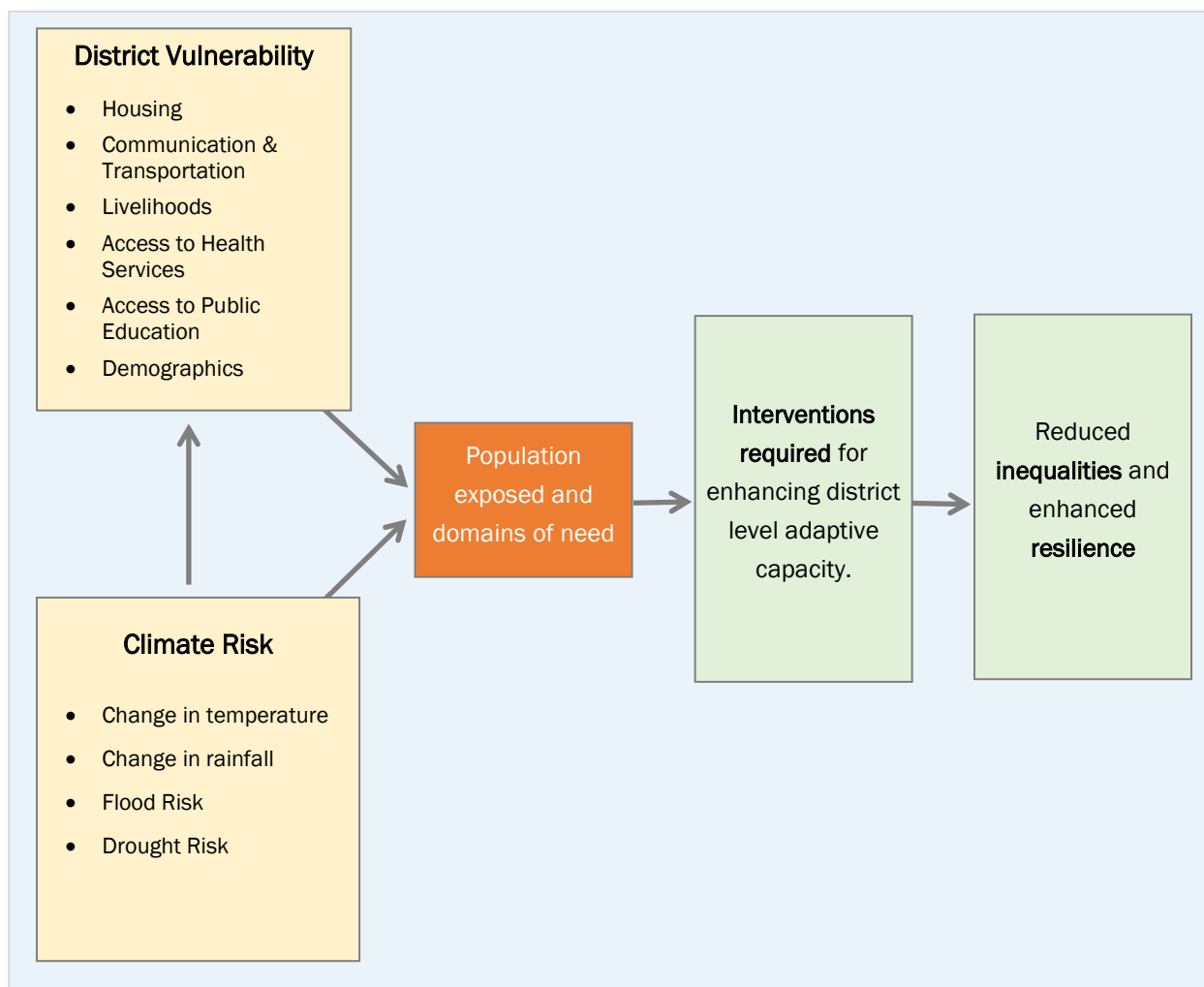
Source: Developed by the authors.

The findings of this study provide a more detailed and nuanced understanding of population vulnerabilities at both the provincial and district levels. Pakistan faces many external hazards and shocks that can have a detrimental impact on people’s wellbeing. District-level analysis reinforces the conclusion that we cannot design effective development or disaster response policies solely at the national level. Instead, policies and remedial programs must be tailored to the specific vulnerabilities and intersecting hazards faced by local populations at the district—or even sub-district—level.

Factoring in Climate Risk

Climate risks—measured by the four elements selected for this study (floods, drought, heat rise, and rainfall changes)—add an additional layer of risk atop the underlying vulnerability measured by the DVIP. The framework we propose for analyzing and addressing how climate stress and population vulnerability interact at the district level is summarized diagrammatically in Figure 5.2. The framework combines the six DVIP domains with additional data on climate threat exposures to assess their joint influence on district populations. It considers the relative vulnerability of districts—ranging from high to low—based on both individual domain scores and overall DVIP rankings. The approach allows us to compute the population and characteristics of people at highest risk of facing a range of shocks across Pakistan. It also enables stakeholders to tackle multiple risks of district vulnerability and climate by prioritizing key themes (such as housing, communications, education, health, demographics, and livelihoods) and the specific districts that require the greatest attention. Basically, the approach informs the design of targeted interventions at the district level which would lead to reduced inequalities and enhanced resilience at the national level.

Figure 5.2: Addressing Climate Stress and Population Vulnerabilities at the District Level

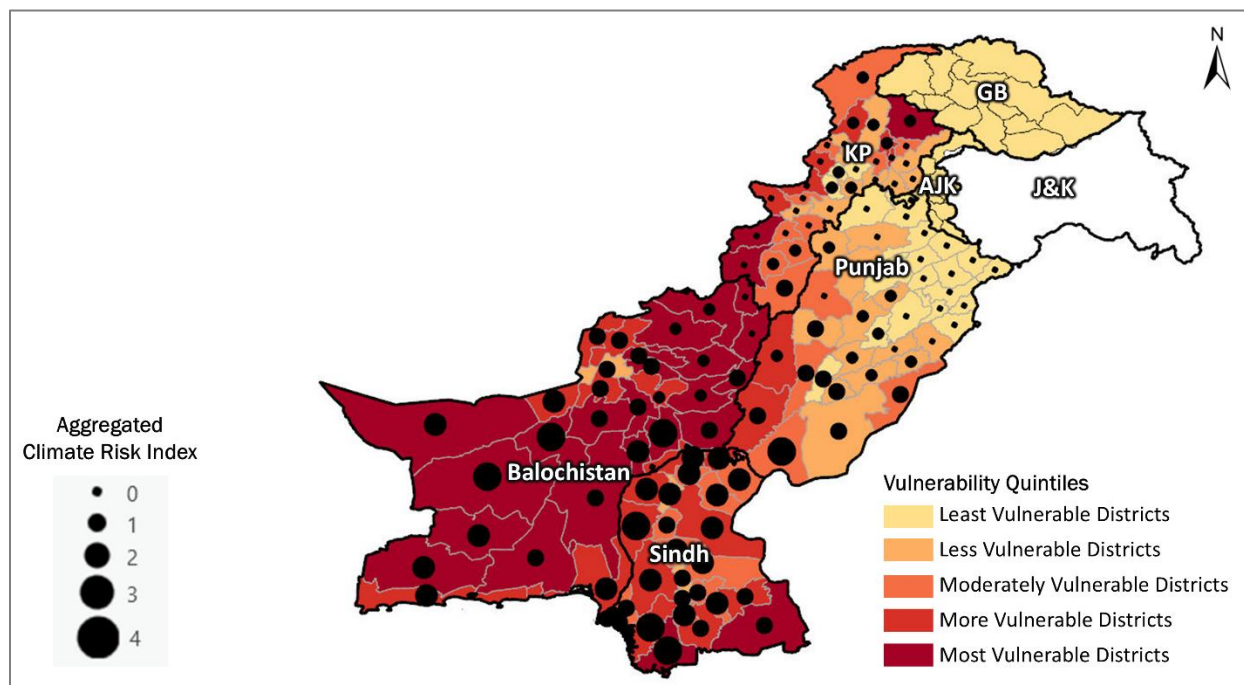


Source: Developed by the authors.

By exploring the association of climate risk scores and DVIP results, we identified areas of overlap to highlight districts facing the double burden of climate stress and structural vulnerability. We also traced some of the pathways through which climate change interacts with existing vulnerabilities. For example, districts highly dependent on agriculture for livelihoods, with limited access to basic services and significant geographic isolation, are at greater risk of damage and destruction when faced with climate risk.

A spatial perspective on the relationship between vulnerability and climate risk is presented in Figure 5.3. The map reveals that the majority of districts scoring 3 or 4 on the climate index are also among the most highly vulnerable districts in Pakistan.

Figure 5.3: Spatial Distribution of Overall Vulnerability, by Ranking Quintile, in Combination with Climate Risk Exposure



The double-burden districts where the greatest vulnerability overlaps with the highest exposure to climate risks must be prioritized for focused attention in disaster management and adaptation strategies. Our analysis identifies eighteen districts that rank in the two highest quintiles of vulnerability and at the same time have a high combined climate risk score of 3 or 4. These include Washuk, Jhal Magsi, Nasirabad, Chagai, Kharan, Panjgur, Kech, Nushki, Gwadar, and Lasbela in Balochistan, and Sujawal, Thatta, Kambar Shahdadkot, Jacobabad, Jamshoro, Khairpur, Dadu, and Kashmore in Sindh. The combined population of these districts is 15.67 million.

The DVIP enables a rapid identification of priority adaptation measures for districts where climate change impacts intersect with existing vulnerability. Reducing the compound risks of environmental, social, and economic shocks in doubly stressed districts requires investment in climate-resilient infrastructure, such as flood barriers, drought-resistant crops, and energy-efficient public services. But in addition, based on domain-specific evidence from the DVIP, efforts should also be directed at strengthening basic services, housing, communication networks, demographic resilience, and health systems. A two-pronged approach—addressing both structural risks and climate risks—is a sounder adaptation strategy for preparing already highly vulnerable districts against climate-related shocks. The response has to be to improve the communities’ housing, communications, and also to build their capacities through improved access to education and health facilities, diversification of livelihood opportunities, and to move to less dependency in their demographic structures. These improvements, in combination, will build resilience against a broader range of future challenges and crises.

The analysis in this report demonstrates that the DVIP can serve as a cornerstone for data-driven policymaking and intervention design, enabling stakeholders to **prioritize districts with high levels of existing socioeconomic vulnerability** when designing and implementing developmental interventions, thereby ensuring that resources are directed towards the communities and population

groups most in need and at the greatest risk of being left behind. Within districts, the index helps **identify gaps in critical service delivery** (e.g., health, education, infrastructure, and employment), highlighting areas where public investments and reforms are urgently needed to enhance local resilience. These insights will help decision-makers to **allocate resources equitably** by grounding investment decisions in robust, district-level data, thereby contributing to fairer distribution of public goods and more inclusive development outcomes.

6. Conclusions

The District Vulnerability Index for Pakistan offers a foundation for designing integrated policies that concurrently address intersecting vulnerabilities—including, but not limited to social, economic, and service-related factors, such as access to education, healthcare, family planning, and livelihood opportunities. Cross-sectoral strategies rooted in the index will help create synergistic interventions that address these interconnected vulnerabilities holistically.

As an evidence-based assessment tool, the DVIP highlights the wide heterogeneity of Pakistan's regions, and has the potential to guide prioritization, resource allocation, and the customization of development strategies and programs in alignment with district-level vulnerability profiles.

The DVIP's district-level granularity is a key strength. Future iterations could incorporate sub-district data to further refine targeting. Climate data could be combined with the DVIP to form a regularly updated and live tool, providing a basis for dynamic monitoring of exposure and vulnerability trends. This would allow for timely adjustments to policies and programs in response to emerging risks and changing circumstances.

This study also demonstrates that the DVIP can be used in conjunction with assessments of external threats to inform better-targeted responses. By combining the DVIP with indicators of climate risks at the district level, we illustrated an approach for assessing and prioritizing district-level needs to build climate resilience and reduce inequalities in coping capacities across Pakistan.

This pairing required several steps to extract and process quality data on major climate hazards across districts. While not all potential climate-related risks—such as GLOFs and sea level incursion—were included, the approach is flexible enough to incorporate such hazards as relevant data become available. Notably, the DVIP's intentionally adaptable design allows it to be paired with assessments of multiple other hazards, such as epidemics like COVID-19, economic crises, or natural disasters like the 2022 floods.

In the current study, we have indicated some of the statistical and geospatial analysis possible with the DVIP, but deeper probes are also possible—for example, examining the associations of specific domains with overall vulnerability or particular hazard risks. The DVIP's data architecture can also be extended by incorporating data from government systems such as education and health systems statistics. Long-term sustainability requires political attention to addressing the root causes of vulnerability. This is essential for achieving inclusive growth.

The large disparities in vulnerability across and within provinces show that this task exceeds the scope of development interventions alone. It will require deliberate targeted efforts and prioritization to tackle poverty, improve access to education and healthcare (including family planning), and ensure equal economic opportunities for marginalized populations. By addressing these foundational issues, Pakistan can break the cycle of vulnerability—enabling communities to adapt more effectively to existing and emerging threats, including climate risks—and align more closely with the UN Sustainable Development Goals (SDGs).

The DVIP is expected to serve as a valuable tool along this journey, harnessing publicly available data to enable the crafting and implementation of sound strategies that target the right populations with

the most-needed interventions. This will enable the government and development partners to focus efforts where the potential for impact is highest. The index's ability to integrate with external hazard assessments—including, but not limited to, climate change—also makes it ideal for identifying the districts most at risk from external stresses, and for guiding the risk management, adaptation, and resilience-building measures required to negotiate these challenges.

References

- Acharya, R., and A. Porwal. 2020. "A Vulnerability Index for the Management of and Response to the COVID-19 Epidemic in India: An Ecological Study." *Lancet Global Health* 8 (9): e1142-e1151. Available from: [https://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X\(20\)30300-4.pdf](https://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X(20)30300-4.pdf).
- Ali, S. M., & Kiani, M. F. K. (2003). Ageing and poverty in Pakistan (No. 2003: 18). Pakistan Institute of Development Economics.
- Arab Water Council and World Food Programme. 2022. *Climate Change and Social Vulnerability: Using Multi-Sectoral Indicators to Assess Compound Drought Risk and Social Vulnerability in Jordan*. Cairo: SDG Climate Facility. Available from: <https://gis.jor.wfp.org/portal/apps/storymaps/stories/c11d2ebd25434f67b1ce65b59234dd08>.
- Alam, H., & Hussain, B. (2020). Analysis Of Economic Vulnerability Among Elderly Widows In Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Gender Studies*, 20(2), 41-58. <https://doi.org/10.46568/pjgs.v20i2.516>.
- Baig, S. U., M. U. Rehman, and N. N. Janjua. 2021. "District-Level Disaster Risk and Vulnerability in the Northern Mountains of Pakistan." *Geomatics, Natural Hazards and Risk* 12 (1): 2002–2022. <https://doi.org/10.1080/19475705.2021.1944331d>
- Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the national academy of sciences*, 117(30), 17656-17666. Available from: <https://www.pnas.org/doi/pdf/10.1073/pnas.2006991117>
- Bashir, S., Kishwar, S., Nasir, M., & Ali, S. (2024). Socioeconomic Inequalities in Out-of-Pocket and Catastrophic Health Expenditures in Pakistan. *International Journal of Public Health*, 69, 1607313. <https://doi.org/10.3389/ijph.2024.1607313>
- Birkmann, J., Liwenga, E., Pandey, R., Boyd, E., Djalante, R., Gemenne, F., ... & Wrathall, D. (2022). Poverty, livelihoods and sustainable development. *Climate Change 2022 – Impacts, Adaptation and Vulnerability Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, pp. 1171 – 1284. Cambridge University Press. DOI: <https://doi.org/10.1017/9781009325844.010>.
- Bloorani, A. D., Shorabeh, S. N., Samany, N. N., Mousivand, A., Kazemi, Y., Jaafarzadeh, N., ... & Rabiei, J. (2021). Vulnerability mapping and risk analysis of sand and dust storms in Ahvaz, IRAN. *Environmental Pollution*, 279, 116859. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0269749121004413>.
- Biswas, S., & Nautiyal, S. (2023). A review of socio-economic vulnerability: The emergence of its theoretical concepts, models and methodologies. *Natural Hazards Research*, 3(3), 563-571. <https://doi.org/10.1016/j.nhres.2023.05.005>.
- Brooks, N. (2003). Vulnerability, risk and adaptation: A conceptual framework. Tyndall Centre for climate change research working paper, 38(38), 1-16. Available at: https://www.researchgate.net/profile/Nick-Brooks-3/publication/200032746_Vulnerability_Risk_and_Adaptation_A_Conceptual_Framework/links/0fcfd50ac169e15865000000/Vulnerability-Risk-and-Adaptation-A-Conceptual-Framework.pdf
- Cardona, O. 2004. "The Need for Rethinking the Concepts of Vulnerability and Risk from a Holistic Perspective: A Necessary Review and Criticism for Effective Risk Management." In *Mapping Vulnerability*, edited by G. Bankoff, G. Frerks, and D. Hilhorst, 37–51. London: Routledge. <https://doi.org/10.4324/9781849771924>.

CDC (2022). Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index (2022) Database [State]. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed on July 14, 2025

Cutter, S. L., B. J. Boruff, and W. L. Shirley. 2003. "Social Vulnerability to Environmental Hazards." In *Hazards Vulnerability and Environmental Justice. Social Science Quarterly* 84 (2). Available from: <http://ece.uprm.edu/~pol/pdf/cutter1.pdf>

Cutter, S. L., & Finch, C. (2008). Temporal and spatial changes in social vulnerability to natural hazards. *Proceedings of the national academy of sciences*, 105(7), 2301-2306. Available from: <https://www.pnas.org/doi/pdf/10.1073/pnas.0710375105>

Cutter, S., & Blackwood, L. (2023). Using the Social Vulnerability Index (Sovi) to validate targeting of post-disaster recovery resources. Available at SSRN 4207748.

del Ninno, C., Vecchi, G., & Hussain, N. (2006). Poverty, Risk and vulnerability in Pakistan. Washington, DC, World Bank. Available from: https://www.researchgate.net/profile/Carlo-Del-Ninno/publication/228382329_Poverty_Risk_and_Vulnerability_in_Pakistan/links/00b7d53a1980d12c3b000000/Poverty-Risk-and-Vulnerability-in-Pakistan.pdf

Dodman, D., J. Ayers, and S. Huq. 2009. "Building Resilience." In *State of the World 2009: Into a Warming World*, 151–168. New York: World Watch Institute. ISBN 978-0-393-33418-0. Available from: <https://webstatic.niwa.co.nz/library/stateworld2009.pdf>

Dwivedi, L. K., K. Banerjee, N. Jain, M. Ranjan, and P. Dixit. 2018. "Child Health and Unhealthy Sanitary Practices in India: Evidence from Recent Round of National Family Health Survey–IV." *SSM–Population Health*. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC6597875/>

Faisal, N., and M. Riaz. 2019. "Climate Change in Pakistan. Chapter 1, *Climate, Population, and Vulnerability in Pakistan: Exploring Evidence of Linkages for Adaptation*, edited by Zeba A. Sathar and Kiren Khan. Islamabad: Population Council. Available at: https://knowledgecommons.popcouncil.org/departments_sbsr-pgy/733/

Feng, Y., Lagakos, D., & Rauch, J. E. (2024). Unemployment and development. *The Economic Journal*, 134(658), 614-647. Available from: https://www.nber.org/system/files/working_papers/w25171/w25171.pdf

Flanagan, B. E., Gregory, E. W., Hallisey, E. J., Heitgerd, J. L., & Lewis, B. (2011). A social vulnerability index for disaster management. *Journal of homeland security and emergency management*, 8(1). <https://doi.org/10.2202/1547-7355.1792>

Frank, N., and M. Apollonia. 2015. *The Role of Social Inequalities for the Vulnerability to Climate-Related Extreme Weather Events*. Luxembourg: Publications Office of the European Union. <https://doi.org/10.2788/267540>.

Freeman, M. C., Garn, J. V., Sclar, G. D., Boisson, S., Medicott, K., Alexander, K. T., ... & Clasen, T. F. (2017). The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis. *International journal of hygiene and environmental health*, 220(6), 928-949.

Füssel, H. M., & Klein, R. J. (2006). Climate change vulnerability assessments: an evolution of conceptual thinking. *Climatic change*, 75(3), 301-329. Available from: <https://link.springer.com/article/10.1007/s10584-006-0329-3>

Gera, T., Shah, D., & Sachdev, H. S. (2018). Impact of water, sanitation and hygiene interventions on growth, non-diarrheal morbidity and mortality in children residing in low-and middle-income countries: a systematic review. *Indian pediatrics*, 55(5), 381-393. Available from: <https://www.indianpediatrics.net/may2018/381.pdf>

Gunaratne, M. S., Firdaus, R. R., & Sosai, A. U. G. U. S. T. I. N. E. (2023). The importance of multidimensional vulnerability analysis in sustainable development. *Journal of Sustainability Science and Management*, 18(9), 38-57. <https://doi.org/10.46754/jssm.2023.09.004>

Islam Jitu, M. H., & Masud, M. S. (2025). Demographic, socioeconomic and regional disparities in the coverage of water, sanitation and hygiene facilities in four South Asian Countries. *PloS one*, 20(3), e0319754. Available from: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0319754&type=printable>

Hamidi, A. R., Jing, L., Shahab, M., Azam, K., Atiq Ur Rehman Tariq, M., & Ng, A. W. (2022). Flood exposure and social vulnerability analysis in rural areas of developing countries: an empirical study of Charsadda District, Pakistan. *Water*, 14(7), 1176.

Hoffmann, R., and D. Blecha. 2020. "Education and Disaster Vulnerability in Southeast Asia: Evidence and Policy Implications." *Sustainability* 12 (4): 1401. Available from: <https://www.mdpi.com/2071-1050/12/4/1401/pdf>

Jamal, H. (2016). Spatial disparities in socioeconomic development: the case of Pakistan. *The Pakistan Development Review*, 421-435.

Kamau, N., & Njiru, H. (2018). Water, sanitation and hygiene situation in Kenya's urban slums. *Journal of health care for the poor and underserved*, 29(1), 321-336.

Kaiser, N., & Barstow, C. K. (2022). Rural transportation infrastructure in low-and middle-income countries: a review of impacts, implications, and interventions. *Sustainability*, 14(4), 2149.

Kayser, G. L., Chokhandre, P., Rao, N., Singh, A., McDougal, L., & Raj, A. (2021). Household sanitation access and risk for non-marital sexual violence among a nationally representative sample of women in India, 2015-16. *SSM-Population Health*, 13, 100738. Available from: <https://www.sciencedirect.com/science/article/pii/S2352827321000136>

Khalid, S., Hafeez, M., & Aqib, S. (2024). Who is more water insecure? Gendered evidence from urban Pakistan. *Frontiers in Water*, 6, 1423237. <https://www.frontiersin.org/journals/water/articles/10.3389/frwa.2024.1423237/pdf>

Khalid, Z., Meng, X., Rana, I. A., ur Rehman, M., & Su, X. (2021). Holistic multidimensional vulnerability assessment: an empirical investigation on rural communities of the Hindu Kush Himalayan region, Northern Pakistan. *International Journal of Disaster Risk Reduction*, 62, 102413.

El Khayat, M., Halwani, D. A., Hneiny, L., Alameddine, I., Haidar, M. A., & Habib, R. R. (2022). Impacts of climate change and heat stress on farmworkers' health: A scoping review. *Frontiers in public health*, 10, 782811. Available from: <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2022.782811/full?ref=ambrook>

Li, A., Toll, M., & Bentley, R. (2023). Mapping social vulnerability indicators to understand the health impacts of climate change: a scoping review. *The Lancet Planetary Health*, 7(11), e925-e937. Available from: [https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196\(23\)00216-4.pdf](https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196(23)00216-4.pdf)

Madajewicz, M. (2020). Who is vulnerable and who is resilient to coastal flooding? Lessons from Hurricane Sandy in New York City. *Climatic Change*, 163(4), 2029-2053. Available from: <https://link.springer.com/article/10.1007/s10584-020-02896-y>

Mengal, K., Kor, G., Kozák, P., & Niksirat, H. (2023). Heat shock proteins adaptive responses to environmental stressors and implications in health management of decapods. *Aquaculture Reports*, 30, 101564. Available from: <https://www.sciencedirect.com/science/article/pii/S2352513423001035>

Miller, F., Osbahr, H., Boyd, E., Thomalla, F., Bharwani, S., Ziervogel, G., ... & Nelson, D. (2010). Resilience and vulnerability: complementary or conflicting concepts?. *Ecology and Society*, 15(3). <https://doi.org/10.5751/es-03378-150311>

Muttarak, R., & Lutz, W. (2014). Is education a key to reducing vulnerability to natural disasters and hence unavoidable climate change?. *Ecology and society*, 19(1). Available from: <https://pure.iiasa.ac.at/id/eprint/10964/1/ES-2013-6476.pdf>

National Disaster Management Authority and World Food Programme. 2017. *Integrated Context Analysis (ICA) on Vulnerability to Food Insecurity and Natural Hazards Pakistan*. Islamabad: Government of Pakistan. Available from: [https://www.pdma.gov.pk/sub/uploads/Integrated%20Context%20Analysis%20\(ICA\)%20On%20Vulnerability%20to%20Food%20Insecurity%20and%20Natural%20Hazards%20Pakistan,%202017.pdf](https://www.pdma.gov.pk/sub/uploads/Integrated%20Context%20Analysis%20(ICA)%20On%20Vulnerability%20to%20Food%20Insecurity%20and%20Natural%20Hazards%20Pakistan,%202017.pdf)

Neher, F., & Miola, A. (2015). The role of social inequalities for the vulnerability to climate related extreme weather events. Joint Research Centre, Publications Office of the European Union, Luxembourg. <https://doi.org/10.2788/267540>

Ngepah, N., Makgalemele, T., & Saba, C. S. (2023). The relationship between education and vulnerability to poverty in South Africa. *Economic Change and Restructuring*, 56(1), 633-656. Available from: <https://link.springer.com/content/pdf/10.1007/s10644-022-09439-8.pdf>

Pakistan Bureau of Statistics. 2020. *Pakistan Social and Living Standards Measurement Survey, District Level Report 2019–20*. Islamabad: Government of Pakistan. Available from: <https://www.pbs.gov.pk/content/all-reports-and-publications>.

Pakistan Bureau of Statistics. 2020. *Pakistan Mouza Census Report*. Agriculture Wing, Government of Pakistan, Islamabad. Available from: <https://www.pbs.gov.pk/content/mouza-census-2020>

Pakistan Bureau of Statistics. 2023. *Pakistan Population and Housing Census 2023*. Government of Pakistan, Islamabad. Available from: <https://www.pbs.gov.pk/digital-census/detailed-results>.

Pakistan Bureau of Statistics. 2020. *Pakistan Social and Living Standards Measurement Survey 2019-20*. Government of Pakistan, Islamabad. Available from: <https://www.pbs.gov.pk/digital-census/detailed-results>.

Pakistan Institute for Education. 2021. *School Directory*. Ministry of Federal Education & Professional Training, Government of Pakistan, Islamabad.

Permanyer, I., & Boertien, D. (2019). A century of change in global education variability and gender differences in education. *PloS one*, 14(2), e0212692.

Preston, S. H., & Stokes, A. (2012). Sources of population aging in more and less developed countries. *Population and Development Review*, 38(2), 221-236. Proag, V. (2014). The concept of vulnerability and resilience. *Procedia Economics and Finance*, 18, 369-376. [https://doi.org/10.1016/s2212-5671\(14\)00952-6](https://doi.org/10.1016/s2212-5671(14)00952-6)

Qasim, S., Qasim, M., Shrestha, R. P., Khan, A. N., Tun, K., & Ashraf, M. (2016). Community resilience to flood hazards in Khyber Pukhthunkhwa province of Pakistan. *International Journal of Disaster Risk Reduction*, 18, 100-106.

- Rafiq, L., & Blaschke, T. (2012). Disaster risk and vulnerability in Pakistan at a district level. *Geomatics, Natural Hazards and Risk*, 3(4), 324-341. Available from: <https://www.tandfonline.com/doi/pdf/10.1080/19475705.2011.626083>
- Rahman, A., & Salman, A. (2013). A district level climate change vulnerability index of Pakistan. Centre for Environmental Economics and Climate Change (CEECC) Working Paper, 5. <https://ideas.repec.org/p/pid/ceeccp/201305.html>
- Rana, I. A., & Routray, J. K. (2018). Multidimensional model for vulnerability assessment of urban flooding: An empirical study in Pakistan. *International Journal of disaster risk Science*, 9(3), 359-375. Available from: <https://link.springer.com/content/pdf/10.1007/s13753-018-0179-4.pdf>
- Sadiq, M., & Khalil, M. (2022). *2022 Pakistan floods: Population estimates and vulnerabilities of people affected by floods in Pakistan*. Islamabad: Population Council. <https://doi.org/10.31899/sbsr2022.1023>
- Schellnhuber, H. J., Serdeczny, O. M., Adams, S., Köhler, C., Magdalena Otto, I., & Schleussner, C. F. (2016). The Challenge of a 4 C World by 2100. In *Handbook on sustainability transition and sustainable peace* (pp. 267-283). Cham: Springer International Publishing.
- Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., ... & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. *Wiley interdisciplinary reviews: Climate change*, 10(2), e565. Available from: <https://wires.onlinelibrary.wiley.com/doi/pdfdirect/10.1002/wcc.565>
- United Nations Development Programme (UNDP). 2024. *National Human Development Report 2023/2024 on Digital Transformation in Pakistan*. Islamabad: UNDP. <https://undppknhdr2024.com/wp-content/uploads/2024/05/NATIONAL-HUMAN-DEVELOPMENT-REPORT-2024.pdf>
- Wang, Q., Zhang, Y., Ban, J., Zhu, H., Xu, H., & Li, T. (2021). The relationship between population heat vulnerability and urbanization levels: A county-level modeling study across China. *Environment International*, 156, 106742. Available from: <https://www.sciencedirect.com/science/article/pii/S0160412021003676>
- Williams, D. S., Máñez Costa, M., Sutherland, C., Celliers, L., & Scheffran, J. (2019). Vulnerability of informal settlements in the context of rapid urbanization and climate change. *Environment and urbanization*, 31(1), 157-176. Available at: <https://journals.sagepub.com/doi/pdf/10.1177/0956247818819694>
- Wisner, B. (2016). Vulnerability as concept, model, metric, and tool. In *Oxford research encyclopedia of natural hazard science*. <https://doi.org/10.1093/acrefore/9780199389407.013.25>
- World Bank. 2019. *Climate Change Knowledge Portal*. <https://climateknowledgeportal.worldbank.org/>

Appendix A: District Vulnerability Index for Pakistan (DVIP): Indicator Values by Domain and District

		HOUSING				COMMUNICATION & TRANSPORTATION			LIVELIHOODS			ACCESS TO HEALTH SERVICES				ACCESS TO PUBLIC EDUCATION				DEMOGRAPHICS		
		Kacha and semi-pakka houses	With no Toilet	With unimproved drinking water sources	With only 1 room	Distance to metalled road	Distance to transport facility	Households with no phone	Engaged in agriculture	Unpaid family helpers	Unemployment to population ratio	Distance to BHU	Distance to private doctor	Distance to MNCH	HH not visited by LHW in last 30 days	Distance to boys high/ higher sec. school	Distance to girls high/ higher sec. school	Density of primary schools	Density of high/ higher secondary schools	Population aged <5	Population aged >69	Age dependency ratio
PROVINCE DISTRICT		% of households				km	km	%	% of population aged 15-60		Ratio	km	km	km	%	km	km	No. of schools/10km ²	%	%	Ratio	
ICT	Islamabad	2.7	1.0	3.4	8.1	2	5	0.6	1.9	2.6	8.4	5	8	9	66.1	12	17	2.09	1.13	10.4	2.8	57.7
KP	Abbottabad	18.1	5.0	17.6	16.7	7	18	3.0	2.3	4.3	9.4	9	18	14	31.4	7	9	6.75	0.79	11.9	3.3	67.2
KP	Bajaur	85.0	20.4	31.3	41.7	4	10	1.9	7.4	13.6	19.9	11	13	16	97.5	7	13	4.21	0.40	18.5	1.5	110.5
KP	Bannu	47.6	21.1	7.5	30.7	8	14	3.7	4.4	14.9	25.3	13	18	15	77.0	10	15	12.55	1.37	16.8	1.8	93.6
KP	Batagram	43.8	21.4	27.6	34.4	10	13	5.2	4.8	12.7	16.4	7	19	13	60.9	7	17	5.36	0.40	15.6	2.7	96.9
KP	Buner	42.4	22.9	11.7	25.2	5	9	4.1	6.8	11.8	14.5	7	10	11	56.8	8	10	3.49	0.64	15.4	2.5	89.7
KP	Charsadda	33.4	3.7	2.3	28.3	5	6	4.8	6.9	8.1	12.0	5	6	8	53.6	5	5	9.46	1.48	15.3	2.4	84.5
KP	Chitral	80.0	5.9	21.0	16.0	29	26	3.4	1.8	10.6	22.3	12	21	15	59.5	9	13	0.41	0.04	13.9	3.8	70.4
KP	Dera Ismail Khan	53.6	0.5	16.2	39.7	8	11	11.5	6.0	11.7	15.5	15	19	16	39.7	11	14	1.86	0.24	15.2	2.1	87.2
KP	Hangu	36.7	6.6	10.3	17.6	5	21	5.2	2.3	6.2	14.4	11	13	14	70.7	12	15	2.83	0.45	14.2	2.3	85.2
KP	Haripur	13.7	3.9	9.0	13.9	7	11	4.9	4.2	4.4	10.7	12	19	20	17.3	9	15	5.27	0.90	12.1	3.5	68.0
KP	Karak	39.3	0.3	18.6	20.6	6	10	11.4	3.2	8.2	24.4	14	13	15	82.7	9	9	2.34	0.31	15.5	2.3	82.6
KP	Khyber	76.1	10.1	29.4	47.3	9	23	1.5	6.2	10.1	16.3	40	39	40	72.6	41	52	2.27	0.21	17.1	1.2	103.8
KP	Kohat	27.8	5.7	10.6	22.2	10	15	4.6	4.7	6.7	14.0	13	18	18	97.8	9	13	3.18	0.49	13.6	2.4	76.3
KP	Kohistan	87.5	37.0	67.4	40.3	27	30	5.8	8.9	20.9	26.9	23	46	72	92.7	28	72	1.05	0.05	24.5	1.0	147.0
KP	Kurram	76.9	14.2	35.6	21.5	11	22	17.4	5.3	14.1	22.1	18	21	19	68.2	17	19	1.53	0.23	18.5	1.7	103.3
KP	Laki Marwat	56.2	12.1	10.2	24.1	7	11	4.7	7.3	14.7	21.3	11	15	16	78.6	9	14	3.08	0.34	17.8	2.1	94.8
KP	Lower Dir	38.1	7.1	27.2	19.4	8	9	1.6	2.8	8.7	17.0	8	12	11	81.3	5	8	7.75	1.17	17.3	2.3	97.0
KP	Malakand	30.3	8.7	9.3	18.9	2	4	2.8	3.6	10.8	17.1	11	13	10	30.5	5	4	5.80	0.95	15.5	2.3	84.3
KP	Mansehra	23.0	8.6	21.0	24.5	5	7	2.9	3.9	7.5	12.8	7	12	11	32.7	6	7	4.25	0.44	13.3	2.9	77.0
KP	Mardan	27.1	4.7	2.6	25.8	5	6	3.9	4.9	6.7	13.2	5	7	7	40.2	4	6	8.74	1.54	14.9	2.3	81.2
KP	Mohmand	85.3	22.0	25.0	22.4	14	18	20.0	9.0	13.4	16.4	14	28	21	78.2	19	35	2.24	0.20	17.3	1.9	106.1
KP	North Waziristan	81.1	26.0	31.3	39.9	23	109	4.0	3.9	26.4	29.5	66	56	71	84.2	36	43	1.71	0.11	19.5	1.2	108.0
KP	Nowshera	37.6	5.4	5.6	30.3	8	11	5.5	5.2	8.6	13.9	7	9	8	37.3	11	7	4.43	0.89	14.0	2.0	76.6
KP	Orakzai	95.7	0.0	40.6	22.0	8	6	3.0	6.9	12.7	17.8	17	39	33	81.3	5	11	2.92	0.27	19.2	1.5	107.9
KP	Peshawar	33.1	4.0	3.0	26.5	3	6	3.7	4.6	5.6	12.0	6	11	11	48.3	5	7	9.51	1.68	14.5	1.6	78.9
KP	Shangla	53.8	25.3	32.0	27.8	13	15	0.8	6.7	11.4	18.0	11	17	20	81.6	9	15	3.80	0.42	17.2	2.1	104.3
KP	South Waziristan	97.2	18.8	53.5	21.9	9	15	16.7	4.2	21.9	29.5	52	25	53	95.9	15	29	0.99	0.06	17.1	1.5	96.8
KP	Swabi	22.7	8.9	5.8	29.9	7	13	3.1	5.7	9.0	14.9	8	12	10	40.6	7	7	6.57	1.11	14.0	2.8	78.9
KP	Swat	32.7	9.2	20.2	22.9	7	8	1.5	5.5	7.8	15.0	9	11	13	86.5	6	9	2.51	0.32	14.9	2.1	88.4
KP	Tank	73.3	11.4	23.0	42.3	16	10	7.0	5.4	15.2	20.5	12	15	14	83.1	8	11	3.34	0.33	17.4	1.6	102.9
KP	Torghar	89.3	52.5	31.8	39.2	11	16	6.5	3.1	7.1	13.2	20	33	32	48.5	16	38	4.56	0.26	16.7	2.9	103.4
KP	Upper Dir	67.2	15.3	51.9	36.4	10	9	2.1	4.7	15.5	20.9	9	17	17	90.7	7	16	2.20	0.25	18.9	2.2	112.8
PB	Attock	15.0	4.9	5.6	10.4	4	6	2.7	7.7	8.2	11.4	9	13	12	36.8	8	9	1.24	0.38	11.4	3.7	62.7
PB	Bahawalnagar	31.2	17.5	7.1	29.6	3	9	8.8	11.8	13.7	10.4	8	13	11	44.4	8	9	1.95	0.28	13.9	2.7	79.2
PB	Bahawalpur	25.5	13.5	3.0	29.9	3	8	9.7	10.3	11.9	10.5	7	10	9	42.7	8	8	0.60	0.09	15.2	2.4	80.3
PB	Bhakar	28.0	17.0	1.0	31.3	5	10	7.2	10.9	13.3	11.7	10	14	13	28.2	10	11	1.23	0.18	17.9	2.5	82.7
PB	Chakwal	11.6	5.9	4.6	7.7	5	10	2.8	8.0	8.5	11.1	8	11	10	47.5	6	7	1.11	0.48	12.9	4.5	65.6
PB	Chiniot	22.1	29.0	1.7	30.9	3	6	12.6	10.5	10.6	8.9	7	12	11	58.9	7	9	2.06	0.32	13.8	3.1	76.0
PB	Dera Ghazi Khan	46.9	26.1	8.8	36.5	11	10	5.0	11.5	18.2	16.1	15	23	25	42.2	13	18	1.17	0.14	18.4	2.2	100.3
PB	Faisalabad	10.5	5.3	7.0	20.6	2	6	4.7	6.9	5.3	7.7	6	8	7	47.1	6	7	2.20	1.02	12.9	2.5	64.7

PROVINCE DISTRICT		HOUSING				COMMUNICATION & INFRASTRUCTURE			LIVELIHOOD			ACCESS TO HEALTH SERVICES				ACCESS TO PUBLIC EDUCATION				DEMOGRAPHICS		
		Kacha and semi-pakka houses	With no Toilet	With unimproved drinking water sources	With only 1 room	Distance to metalled road	Distance to transport facility	Households with no phone	Engaged in agriculture	Unpaid family helpers	Unemployment to population ratio	Distance to BHU	Distance to private doctor	Distance to MNCH	HH not visited by LHW in last 30 days	Distance to boys high school	Distance to girls high school	Density of primary schools	Density of high/ higher secondary schools	Population aged <5	Population aged >69	Age dependency ratio
		% of households				km	km	%	% of population aged 15-60		Ratio	km	km	km	%	km	km	No. of schools/10km ²	%	%	Ratio	
PB	Gujranwala	12.6	1.5	0.9	12.1	4	5	3.4	6.6	5.9	8.8	5	7	7	61.1	5	5	3.00	0.89	15.5	2.3	72.3
PB	Gujrat	12.3	2.9	1.0	9.7	3	4	2.0	5.3	4.5	6.8	4	6	6	37.6	4	4	2.99	1.08	11.8	3.7	63.3
PB	Hafizabad	22.3	8.6	5.3	17.1	5	6	3.6	12.0	8.5	10.6	7	9	8	59.8	7	7	2.57	0.36	13.5	3.0	70.0
PB	Jhang	19.2	20.8	1.2	26.7	5	8	8.5	11.6	12.4	11.1	7	11	10	46.1	7	9	0.88	0.32	14.1	2.8	77.3
PB	Jhelum	17.9	5.5	4.4	10.0	4	6	2.7	6.7	7.1	11.0	6	9	8	48.9	5	5	3.56	0.61	10.8	3.9	58.9
PB	Kasur	16.3	5.1	2.1	34.7	4	6	7.0	7.7	7.6	9.2	7	8	8	32.2	6	7	2.63	0.62	15.5	2.3	76.5
PB	Khanewal	20.0	9.9	1.5	25.3	5	7	18.3	10.9	13.2	11.4	7	9	10	42.0	6	8	1.64	0.61	14.1	2.5	74.4
PB	Khushab	29.1	15.6	5.2	21.4	4	8	5.2	8.1	11.6	11.6	10	16	14	34.5	10	12	1.13	0.25	13.8	3.5	68.1
PB	Lahore	3.7	1.8	2.0	19.0	0	0	3.0	1.8	2.0	7.1	0	0	0	0.0	0	0	3.42	2.33	14.1	2.1	64.7
PB	Layyah	21.7	11.9	1.4	37.2	5	8	1.7	10.9	15.0	13.6	8	9	9	10.0	7	9	1.90	0.31	15.7	2.3	79.8
PB	Lodhran	23.9	12.0	3.5	33.4	4	6	12.8	13.7	14.0	12.7	7	9	9	72.2	8	8	2.07	0.45	14.5	2.3	78.3
PB	Mandi Bahauddin	21.1	10.8	1.8	16.4	4	4	3.1	11.7	8.8	8.4	5	8	8	36.9	5	5	2.04	0.72	13.6	3.4	70.7
PB	Mianwali	27.6	8.8	6.1	23.3	5	10	9.8	8.1	10.9	14.9	9	11	12	17.1	8	11	1.68	0.29	13.7	3.0	69.4
PB	Multan	22.6	8.3	2.1	31.2	3	6	8.5	6.1	6.4	11.8	6	9	10	60.7	6	8	2.72	0.65	13.7	2.1	70.8
PB	Muzaffargarh	39.3	21.1	1.0	46.5	6	8	15.9	12.9	15.7	17.2	8	10	10	62.7	9	10	2.08	0.24	17.4	2.0	93.5
PB	Nankana Sahib	25.1	8.1	7.6	23.2	4	6	5.3	10.9	6.7	9.0	6	8	8	24.4	7	8	2.71	0.52	13.8	2.7	72.8
PB	Narowal	17.2	4.4	1.2	13.4	3	3	7.0	10.3	9.6	12.3	5	8	7	47.9	4	4	4.01	0.87	13.6	3.1	71.8
PB	Okara	17.4	9.1	1.9	29.8	3	6	3.5	11.7	10.1	10.4	6	10	8	17.4	7	9	2.47	0.59	14.6	2.7	75.8
PB	Pakpattan	20.7	12.1	4.0	36.0	3	7	6.2	14.1	10.7	10.1	6	11	9	18.1	7	8	2.38	0.48	15.9	2.7	80.3
PB	Rahim Yar Khan	32.6	14.2	2.7	34.0	3	7	7.0	10.4	14.0	11.5	7	10	9	48.1	7	9	2.01	0.28	15.9	2.2	84.8
PB	Rajanpur	60.1	37.6	10.2	56.4	8	11	3.9	14.8	19.7	15.5	11	14	15	37.5	12	14	0.80	0.08	18.6	2.0	105.0
PB	Rawalpindi	4.4	2.4	7.3	8.3	4	6	2.4	2.3	3.6	10.1	7	9	10	46.3	6	6	2.26	0.95	11.9	3.0	61.2
PB	Sahiwal	11.7	9.2	1.9	22.5	5	7	5.8	11.7	11.6	9.1	6	10	8	20.2	6	8	2.19	0.92	14.7	2.8	73.3
PB	Sargodha	31.9	13.5	3.4	25.4	3	5	5.3	7.5	7.7	12.2	8	9	10	36.9	6	7	2.20	0.74	13.7	3.1	69.7
PB	Sheikhpura	13.5	2.3	2.7	19.2	5	6	4.5	8.1	5.0	9.3	7	9	9	29.4	8	8	2.71	0.50	14.9	2.1	71.9
PB	Sialkot	10.0	2.5	1.0	12.6	3	3	4.1	6.2	5.8	8.6	4	5	5	47.5	4	4	4.57	1.13	13.6	2.8	68.8
PB	Toba Tek Singh	14.2	7.5	3.6	18.8	2	6	5.2	10.7	10.4	9.5	5	8	6	37.5	5	6	2.16	0.83	12.8	3.0	68.3
PB	Vehari	15.2	9.5	2.7	23.9	3	6	8.0	12.0	12.6	10.3	8	10	9	45.0	7	8	2.34	0.55	14.8	2.5	75.2
SD	Badin	78.1	50.1	10.7	85.0	6	11	26.5	13.5	15.6	16.4	10	13	18	59.1	12	16	3.48	0.10	16.0	2.0	88.8
SD	Dadu	69.3	1.0	7.0	67.3	8	13	28.0	10.8	15.7	19.0	13	13	17	42.1	11	12	2.00	0.11	15.7	2.0	87.3
SD	Ghotki	57.0	33.6	2.3	74.9	11	10	11.3	8.9	16.6	19.9	10	10	11	62.4	11	11	2.56	0.07	15.9	1.7	88.5
SD	Hyderabad	16.4	4.0	3.8	44.3	2	11	9.4	3.4	4.3	11.2	5	5	7	68.6	8	9	7.22	0.85	15.6	1.9	68.8
SD	Jacobabad	71.9	29.2	5.7	66.9	6	9	10.0	17.8	16.2	15.2	9	15	16	15.6	11	14	4.33	0.18	20.7	1.3	114.8
SD	Jamshoro	44.0	18.3	12.0	62.3	13	14	10.4	6.3	14.0	17.6	19	19	21	83.5	22	23	0.58	0.04	15.2	1.8	80.3
SD	Kr. Shahdadkot	69.8	18.4	7.7	62.0	9	11	7.6	16.8	14.5	16.0	12	12	12	53.9	13	13	2.42	0.10	18.2	1.8	100.1
SD	Karachi Central	3.5	0.5	1.7	16.5	0	0	3.3	1.3	0.9	5.7	0	0	0	0.0	0	0	29.86	16.38	12.7	2.5	62.3
SD	Karachi East	6.5	1.8	2.8	16.3	0	0	3.0	1.5	0.8	6.6	0	0	0	0.0	0	0	6.76	4.82	12.7	2.6	64.4
SD	Karachi Korangi	3.6	0.6	2.1	22.3	0	0	1.3	1.1	1.7	6.2	0	0	0	0.0	0	0	11.85	7.50	13.9	1.9	70.3
SD	Karachi Malir	8.7	3.7	3.1	32.8	13	44	3.5	2.6	4.7	9.3	34	31	31	64.5	31	30	2.21	0.29	12.8	1.7	67.4
SD	Karachi South	2.6	0.6	1.8	21.7	0	0	1.5	1.6	1.0	6.2	0	0	0	0.0	0	0	5.16	4.59	10.3	2.9	57.0
SD	Karachi West	8.8	1.2	4.0	24.4	6	13	1.7	1.3	1.7	7.6	15	18	16	35.2	13	13	1.51	0.68	13.0	1.7	68.0
SD	Kashmore	74.9	31.3	3.6	69.0	6	8	3.6	16.2	21.5	19.5	8	8	9	33.4	9	10	4.67	0.20	21.0	1.5	120.0

PROVINCE DISTRICT		HOUSING				COMMUNICATION & INFRASTRUCTURE			LIVELIHOOD			ACCESS TO HEALTH SERVICES				ACCESS TO PUBLIC EDUCATION				DEMOGRAPHICS		
		Kacha and semi-pukka houses	With no Toilet	With unimproved drinking water sources	With only 1 room	Distance to metaled road	Distance to transport facility	Households with no phone	Engaged in agriculture	Unpaid family helpers	Unemployment to population ratio	Distance to BHU	Distance to private doctor	Distance to MNCH	HH not visited by LHW in last 30 days	Distance to boys high/ higher sec. school	Distance to girls high/ higher sec. school	Density of primary schools	Density of high/ higher secondary schools	Population aged <5	Population aged >69	Age dependency ratio
		% of households				km	km	%	% of population aged 15-60		Ratio	km	km	km	%	km	km	No. of schools/10km ²	%	%	Ratio	
SD	Khairpur	63.8	28.4	2.8	65.4	8	11	14.9	9.3	15.4	19.6	12	13	14	39.0	13	14	1.73	0.09	18.2	1.8	94.5
SD	Larkana	53.2	6.7	1.1	48.1	7	9	6.7	10.0	10.6	15.3	7	8	9	33.4	8	8	5.13	0.43	16.8	1.6	86.9
SD	Matiari	52.3	25.2	2.5	75.5	4	6	20.8	8.8	12.4	14.2	5	5	6	48.1	5	6	5.68	0.32	16.7	1.7	84.2
SD	Mirpur Khas	66.6	40.2	19.9	69.4	4	7	11.0	15.3	14.6	10.9	9	11	13	61.1	8	11	6.14	0.32	17.0	1.9	88.5
SD	Naushero Feroze	60.8	15.2	2.6	64.2	7	9	13.2	10.7	13.9	16.2	9	8	9	29.8	7	8	6.56	0.25	17.5	1.8	88.0
SD	Sanghar	63.3	38.4	8.3	67.6	6	9	13.0	14.7	14.3	13.6	10	12	11	29.0	10	16	2.27	0.08	16.4	1.7	88.1
SD	Sh. Benazirabad	59.9	26.6	2.3	67.2	6	9	17.9	12.6	13.7	14.1	9	10	11	13.1	12	13	4.98	0.23	17.6	1.8	89.9
SD	Shikarpur	70.6	17.6	0.9	62.9	5	6	12.7	16.9	16.5	13.4	8	9	11	49.9	8	8	4.15	0.27	19.8	1.4	111.1
SD	Sujawal	84.3	50.0	20.0	86.0	8	14	17.8	12.4	17.7	22.7	12	14	14	64.2	13	14	1.40	0.03	17.3	2.0	97.4
SD	SuKur	46.7	14.8	3.6	58.4	13	15	8.9	7.2	9.4	13.6	14	14	16	61.8	14	14	1.81	0.15	17.7	1.6	91.7
SD	Tando Allahyar	60.7	33.0	3.3	76.3	12	8	22.6	5.8	14.7	15.1	8	10	11	54.5	8	10	4.14	0.24	17.3	1.6	88.2
SD	TM Khan	71.2	51.1	3.9	85.2	7	13	22.5	12.2	15.6	17.3	11	11	11	41.7	10	13	6.26	0.28	14.9	1.9	82.5
SD	Tharparkar	80.9	58.8	44.9	39.2	19	38	7.7	15.8	18.4	16.3	26	25	27	55.5	28	30	1.73	0.02	21.5	2.4	123.4
SD	Thatta	65.3	48.3	21.9	80.6	10	16	13.3	12.8	15.0	19.3	14	15	17	54.2	15	16	1.18	0.05	15.8	2.0	89.7
SD	Umerkot	73.3	58.0	32.2	69.7	7	11	9.8	16.0	16.3	12.8	11	12	12	84.3	10	11	3.41	0.13	18.3	1.9	102.7
BL	Awaran	87.4	20.9	25.7	28.7	54	39	7.4	10.2	13.2	23.7	41	57	85	99.8	28	35	0.10	0.01	17.6	1.6	107.3
BL	Barkhan	94.3	55.1	30.0	49.9	10	17	5.5	7.8	26.6	25.9	28	27	30	48.8	19	31	1.67	0.08	20.8	1.9	134.9
BL	Chagai	91.2	24.7	11.4	26.7	59	28	24.9	6.3	17.7	23.8	56	64	64	100	65	61	0.06	0.01	19.4	1.3	118.1
BL	Dera Bugti	84.8	57.7	46.9	59.4	15	27	14.7	10.5	15.3	21.5	18	35	51	98.3	22	30	0.31	0.04	23.0	1.1	136.0
BL	Gwadar	48.6	12.2	12.2	44.7	40	61	6.8	3.6	11.6	21.0	47	59	51	55.2	45	47	0.18	0.03	15.2	2.0	84.7
BL	Harnai	83.6	46.8	47.1	33.6	18	21	5.5	12.4	14.4	24.0	14	18	17	94.2	14	16	0.64	0.08	24.7	1.3	142.7
BL	Jaffarabad	78.9	34.0	51.6	65.7	7	9	17.8	14.2	17.3	17.0	14	22	24	37.5	12	18	3.18	0.21	20.0	1.4	115.3
BL	Jhal Magsi	96.8	37.7	60.7	57.6	12	17	49.5	17.2	17.8	20.2	22	23	22	100	19	19	0.73	0.07	17.7	1.3	110.1
BL	Kachhi	91.1	14.0	72.7	33.6	8	16	7.8	14.1	22.6	23.6	12	28	20	75.8	13	25	0.72	0.07	18.9	1.2	127.8
BL	Kalat	96.1	20.3	32.9	20.7	46	49	26.9	10.2	19.2	24.3	32	55	60	98.7	33	43	0.36	0.05	21.2	1.1	122.1
BL	Kech	82.1	18.2	28.8	42.4	53	56	6.5	9.1	22.2	30.3	43	75	69	62.3	23	33	0.24	0.04	18.2	1.5	80.5
BL	Kharan	95.8	15.7	18.2	26.1	15	34	5.1	10.1	16.7	25.2	22	30	28	80.8	23	22	0.13	0.02	22.9	1.0	136.8
BL	Khuzdar	90.5	29.1	31.7	25.4	45	56	29.1	9.7	17.5	25.7	47	86	93	98.9	50	62	0.19	0.02	20.3	1.4	116.9
BL	Killa Abdullah	92.2	7.9	21.0	23.0	15	18	4.0	6.7	20.8	27.6	15	32	20	96.5	12	11	0.66	0.06	20.6	1.2	116.2
BL	Killa Saifullah	95.2	51.6	38.0	24.9	32	47	6.0	11.6	15.7	25.1	28	30	29	93.4	24	25	0.84	0.06	22.3	1.5	126.8
BL	Kohlu	94.2	67.4	69.5	27.9	62	92	7.6	10.1	25.8	33.7	67	90	89	30.8	71	81	0.56	0.04	18.9	1.4	116.0
BL	Lasbela	51.8	21.0	17.4	62.0	12	30	2.7	9.8	10.4	12.7	24	34	26	72.7	27	40	0.37	0.03	15.5	1.9	87.9
BL	Loralai	93.3	28.7	22.7	24.3	19	31	5.6	9.1	17.3	24.4	31	39	43	86.1	19	28	0.90	0.03	18.9	1.4	102.7
BL	Mastung	91.6	7.5	22.8	13.0	7	8	4.6	11.1	12.7	21.0	22	34	34	74.9	18	22	0.96	0.11	18.7	1.4	104.2
BL	Musakhel	90.6	53.4	59.0	34.0	23	49	5.4	6.0	21.1	27.0	28	41	47	93.7	31	35	0.50	0.04	22.0	1.6	135.0
BL	Nasirabad	87.3	40.3	48.0	54.6	10	22	23.6	20.8	18.5	16.8	19	21	22	43.2	30	28	1.58	0.11	20.2	1.3	119.2
BL	Nushki	81.3	9.3	6.1	19.8	46	80	1.7	5.3	15.9	25.0	35	41	42	82.2	35	34	0.32	0.07	19.4	1.4	102.3
BL	Panjgur	92.9	20.0	26.7	20.4	54	81	9.4	7.9	26.8	35.9	55	88	77	91.5	44	62	0.20	0.02	18.7	1.6	77.2
BL	Pishin	92.5	8.6	15.5	27.8	12	14	1.1	9.2	13.3	17.3	15	52	21	96.5	12	22	1.36	0.11	21.4	1.2	113.1
BL	Quetta	41.0	1.3	5.6	13.3	4	9	2.8	4.9	6.8	15.2	9	19	10	89.4	8	13	1.30	0.37	16.9	1.4	89.1
BL	Sherani	83.1	27.5	46.6	11.4	40	38	39.4	8.6	19.5	27.7	24	55	52	99.3	25	34	0.44	0.02	21.7	1.0	123.9

PROVINCE DISTRICT	HOUSING				COMMUNICATION & INFRASTRUCTURE			LIVELIHOOD			ACCESS TO HEALTH SERVICES				ACCESS TO PUBLIC EDUCATION				DEMOGRAPHICS			
	<i>Kacha and semi-pakka houses^a</i>	<i>With no Toilet</i>	<i>With unimproved drinking water sources</i>	<i>With only 1 room</i>	<i>Distance to metalled road</i>	<i>Distance to transport facility</i>	<i>Households with no phone</i>	<i>Engaged in agriculture</i>	<i>Unpaid family helpers</i>	<i>Unemployment to population ratio</i>	<i>Distance to BHU</i>	<i>Distance to private doctor</i>	<i>Distance to MNCH</i>	<i>HH not visited by LHW in last 30 days</i>	<i>Distance to boys high/ higher sec. school</i>	<i>Distance to girls high/ higher sec. school</i>	<i>Density of primary schools</i>	<i>Density of high/ higher secondary schools</i>	<i>Population aged <5</i>	<i>Population aged >69</i>	<i>Age dependency ratio</i>	
	% of households				Km	Km	%	% of population aged 15-60	Ratio	km	km	km	%	km	km	No. of schools/10km ²	%	%	Ratio			
BL	Sibbi	76.5	11.5	32.8	35.4	12	22	7.4	9.7	16.0	20.1	16	70	48	36.0	17	20	0.30	0.05	19.4	1.4	102.7
BL	Sohbatpur	84.0	50.1	46.1	76.0	11	21	7.1	26.3	17.1	12.5	13	19	18	28.0	7	13	4.89	0.41	24.0	1.3	140.9
BL	Washuk	96.9	42.8	26.4	37.2	62	55	15.5	8.7	21.1	31.7	38	55	57	66.8	37	55	0.05	0.01	21.4	1.2	130.9
BL	Zhob	80.9	36.7	35.4	20.8	20	60	32.1	7.0	19.0	25.6	37	48	47	99.9	39	44	0.21	0.02	25.4	1.3	156.7
BL	Ziarat	93.6	40.6	45.5	38.0	12	15	1.6	12.1	17.0	21.2	12	16	16	93.9	12	14	0.71	0.09	22.9	1.3	135.8

Agri.=Agriculture, BHU=basic health unit, BL=Balochistan, HH=households, ICT=Islamabad Capital Territory, km=kilometers, KP=Khyber Pakhtunkhwa Province, Kr. Shahdadkot=Kambar Shahdadkot, LHW=Lady Health Worker, MNCH=Maternal, Neonatal and Child Health facility, PB=Punjab, SD=Sindh, Sec.=Secondary, Sh. Benazirabad=Shaheed Benazirabad, TM Khan=Tando Mohammad Khan.

^a The term “*kacha*” refers to homes built with temporary or flimsy materials, such as adobe or bamboo, while “*semi-pakka*” refers to homes built with some solid (*pakka*) and some *kacha* materials.

Note: In all distance-based indicators, the distance is measured from the mouza (small administrative unit) to the nearest facility.

Appendix B: National Ranking of Districts in Each Domain of the District Vulnerability Index for Pakistan (DVIP)

HOUSING			COMMUNICATION AND TRANSPORTATION			LIVELIHOODS			ACCESS TO HEALTH SERVICES			ACCESS TO PUBLIC EDUCATION			DEMOGRAPHICS		
R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P
1	KHI. CENTRAL	SD	1	KHI. KORANGI	SD	1	KHI. CENTRAL	SD	1	KHI. KORANGI	SD	1	KHI. CENTRAL	SD	1	KHI. MALIR	SD
1	GUJRANWALA	PB	2	KHI. SOUTH	SD	2	KORANGI	SD	1	LAHORE	PB	2	KHI. KORANGI	SD	2	KHI. WEST	SD
3	SIALKOT	PB	3	ISLAMABAD	ICT	2	KHI. EAST	SD	1	KHI. SOUTH	SD	3	KHI. EAST	SD	3	KORANGI	SD
4	GUJRAT	PB	4	LAHORE	PB	4	KHI. SOUTH	SD	1	KHI. CENTRAL	SD	4	KHI. SOUTH	SD	4	ISLAMABAD	PB
5	ISLAMABAD	PB	4	KHI. EAST	SD	5	KHI. WEST	SD	1	KHI. EAST	SD	5	CHARSADA	KP	5	KHI. CENTRAL	SD
6	KHI. SOUTH	SD	6	KHI. CENTRAL	SD	6	LAHORE	PB	6	GUJRAT	PB	5	MARDAN	KP	5	KHI. SOUTH	SD
7	LAHORE	PB	7	GUJRAT	PB	7	ISLAMABAD	ICT	6	NANKANA SAHIB	PB	7	PESHAWAR	KP	7	KHI. EAST	SD
8	KHI. EAST	SD	8	MALAKAND	KP	8	RAWALPINDI	PB	8	TOBA TEK SINGH	PB	8	LAHORE	PB	8	FAISALABAD	PB
8	NAROWAL	PB	9	RAWALPINDI	PB	9	ABBOTTABAD	KP	9	MANDI BAHAUDDIN	PB	9	SIALKOT	PB	9	LAHORE	PB
10	KORANGI	SD	10	ATTOCK	PB	10	KHI. MALIR	SD	10	MARDAN	KP	10	MALAKAND	KP	10	PESHAWAR	KP
11	SHEIKHUPURA	PB	10	JHELUM	PB	11	GUJRAT	PB	11	SIALKOT	PB	11	LOWER DIR	KP	11	MULTAN	PB
12	RAWALPINDI	PB	12	OKARA	PB	12	HYDERABAD	SD	12	KASUR	PB	12	NAROWAL	PB	12	RAWALPINDI	PB
13	CHAKWAL	PB	13	SIALKOT	PB	13	HARIPUR	KP	13	OKARA	PB	13	GUJRAT	PB	13	JHELUM	PB
14	ATTOCK	PB	13	MANDI BAHAUDDIN	PB	14	SIALKOT	PB	13	MATIARI	SD	14	SWABI	KP	14	ATTOCK	PB
15	JHELUM	PB	15	PESHAWAR	KP	15	FAISALABAD	PB	15	SAHIWAL	PB	15	GUJRANWALA	PB	14	HYDERABAD	SD
16	KHI. WEST	SD	16	GUJRANWALA	PB	16	GUJRANWALA	PB	16	NAROWAL	PB	16	JHELUM	PB	16	NOWSHERA	KP
17	MANDI BAHAUDDIN	PB	17	FAISALABAD	PB	17	PESHAWAR	KP	17	LARKANA	SD	17	MATIARI	SD	17	GUJRAT	PB
18	HARIPUR	KP	18	TOBA TEK SINGH	PB	18	HANGU	KP	18	SHEIKHUPURA	PB	18	ABBOTTABAD	KP	18	ABBOTTABAD	KP
18	TOBA TEK SINGH	PB	19	SARGODHA	PB	19	TORGHAR	KP	19	FAISALABAD	PB	19	MANSEHRA	KP	19	SIALKOT	PB
20	SAHIWAL	PB	20	HAFIZABAD	PB	20	MANSEHRA	KP	20	LAYYAH	PB	20	RAWALPINDI	PB	19	HARIPUR	KP
21	FAISALABAD	PB	21	LAYYAH	PB	21	SHEIKHUPURA	PB	21	CHARSADA	KP	21	TOBA TEK SINGH	PB	21	TOBA TEK SINGH	PB
22	QUETTA	BL	22	MARDAN	KP	22	MULTAN	PB	22	NOWSHERA	KP	22	HYDERABAD	SD	22	SHEIKHUPURA	PB
23	KHI. MALIR	SD	22	NAROWAL	PB	23	MARDAN	KP	23	PAKPATTAN	PB	22	FAISALABAD	PB	22	KOHAT	KP
24	KHANEWAL	PB	24	QUETTA	BL	24	KASUR	PB	24	KASHMORE	SD	24	KASUR	PB	22	JAMSHORO	SD
25	HAFIZABAD	PB	25	MANSEHRA	KP	25	JHELUM	PB	25	GUJRANWALA	PB	25	MANDI BAHAUDDIN	PB	25	HAFIZABAD	PB
25	MARDAN	KP	26	NANKANA SAHIB	PB	26	KOHAT	KP	26	NAUSHERO FEROZE	SD	26	MULTAN	PB	26	CHAKWAL	PB
27	VEHARI	PB	26	SHEIKHUPURA	PB	27	QUETTA	BL	27	HYDERABAD	SD	27	SARGODHA	PB	26	TM KHAN	SD
28	KASUR	PB	28	BAJAUR	KP	28	NOWSHERA	KP	28	JHELUM	PB	28	SARGODHA	PB	28	NANKANA SAHIB	PB
29	ABBOTTABAD	KP	29	CHARSADA	KP	29	CHARSADDA	KP	29	KHANEWAL	PB	29	LARKANA	SD	29	MIANWALI	PB
30	OKARA	PB	30	SWAT	KP	30	ATTOCK	PB	30	BAHAWALPUR	PB	30	NAUSHERO FEROZE	SD	30	KHANEWAL	PB
30	CHARSADDA	KP	31	ORAKZAI	KP	31	SWAT	KP	30	ISLAMABAD	ICT	31	NOWSHERA	KP	31	SARGODHA	PB
32	PESHAWAR	KP	32	VEHARI	PB	31	CHAKWAL	PB	30	SARGODHA	PB	32	NANKANA SAHIB	PB	32	KHUSHAB	PB
33	MULTAN	PB	33	KASUR	PB	31	SARGODHA	PB	33	RAWALPINDI	PB	33	VEHARI	PB	33	LARKANA	SD
34	KARAK	KP	33	MULTAN	PB	34	LOWER DIR	KP	34	HAFIZABAD	PB	34	HAFIZABAD	PB	33	NAROWAL	PB
35	HANGU	KP	35	PAKPATTAN	PB	34	NANKANA SAHIB	PB	35	SH. BENAZIRABAD	SD	35	PAKPATTAN	PB	35	MANDI BAHAUDDIN	PB
36	JHANG	PB	36	CHAKWAL	PB	36	SWABI	KP	36	RAHIM YAR KHAN	PB	36	OKARA	PB	35	MANSEHRA	KP
37	MALAKAND	KP	37	RAHIM YAR KHAN	PB	37	CHINIOT	PB	37	MANSEHRA	KP	36	SHEIKHUPURA	PB	35	GUJRANWALA	PB
38	KOHAT	KP	37	KHUSHAB	PB	38	MALAKAND	KP	38	VEHARI	PB	38	BANNU	KP	35	LODHRAN	PB
39	HYDERABAD	SD	39	CHINIOT	PB	38	SUKKUR	SD	39	MULTAN	PB	39	BUNER	KP	39	MATIARI	SD
39	NANKANA SAHIB	PB	40	KASHMORE	SD	40	MANDI BAHAUDDIN	PB	40	JHANG	PB	40	SOHBATPUR	BL	40	VEHARI	PB
41	LAYYAH	PB	41	LOWER DIR	KP	41	KHUSHAB	PB	41	LODHRAN	PB	41	KHANEWAL	PB	40	QUETTA	BL
42	MIANWALI	PB	42	BUNER	KP	42	TOBA TEK SINGH	PB	41	MIANWALI	PB	42	SWAT	KP	42	KECH	BL
43	BHAKKAR	PB	43	SAHIWAL	PB	43	KHYBER	KP	43	PESHAWAR	KP	43	SHIKARPUR	SD	42	GWADAR	BL
44	KHUSHAB	PB	44	KHI. WEST	SD	43	CHITRAL	KP	44	SWABI	KP	44	MIRPUR KHAS	SD	44	KASUR	PB
45	NOWSHERA	KP	45	LODHRAN	PB	45	KARAK	KP	45	SHIKARPUR	SD	45	BAJAUR	KP	45	BAHAWALNAGAR	PB
46	SARGODHA	PB	46	BAHAWALPUR	PB	46	DERA ISMAIL KHAN	KP	46	BUNER	KP	46	CHAKWAL	PB	45	PANJGUR	BL
47	SWABI	KP	47	MASTUNG	BL	46	BATAGRAM	KP	46	CHAKWAL	PB	47	ORAKZAI	KP	47	LASBELA	BL
47	BAHAWALPUR	PB	48	UPPER DIR	KP	48	BUNER	KP	48	SANGHAR	SD	48	HARIPUR	KP	47	KHYBER	KP
49	LODHRAN	PB	48	BAHAWALNAGAR	PB	49	LASBELA	BL	49	MALAKAND	KP	49	BATAGRAM	KP	47	SANGHAR	SD
49	LARKANA	SD	50	SHIKARPUR	SD	49	HAFIZABAD	PB	50	TANDO ALLAHYAR	SD	50	LODHRAN	PB	47	HANGU	KP
51	LOWER DIR	KP	51	MIRPUR KHAS	SD	51	NAROWAL	PB	51	MUZAFFARGARH	PB	51	TANK	KP	47	OKARA	PB
52	MANSEHRA	KP	52	MATIARI	SD	52	SAHIWAL	PB	52	BAHAWALNAGAR	PB	52	CHINIOT	PB	52	SAHIWAL	PB

HOUSING			COMMUNICATION AND TRANSPORTATION			LIVELIHOODS			ACCESS TO HEALTH SERVICES			ACCESS TO PUBLIC EDUCATION			DEMOGRAPHICS		
R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P
53	CHINIOT	PB	53	JHANG	PB	52	OKARA	PB	52	CHINIOT	PB	53	TANDO ALLAHYAR	SD	52	GHOTKI	SD
54	PAKPATTAN	PB	54	HYDERABAD	SD	52	BAHAWALPUR	PB	54	TM KHAN	SD	54	KOHAT	KP	52	MARDAN	KP
55	RAHIM YAR KHAN	PB	55	SWABI	KP	55	GWADAR	BL	54	ATTOCK	PB	55	LAYYAH	PB	55	TANDO ALLAHYAR	SD
56	SWAT	KP	56	BHAKKAR	PB	56	MIANWALI	PB	56	BHAKKAR	PB	56	RAHIM YAR KHAN	PB	56	CHITRAL	KP
57	CHITRAL	KP	57	LAKKI MARWAT	KP	57	TANDO ALLAHYAR	SD	56	JACOBABAD	SD	57	TM KHAN	SD	56	CHINIOT	PB
58	NUSHKI	BL	58	RAJANPUR	PB	58	SHANGLA	KP	58	ABBOTTABAD	KP	58	KASHMORE	SD	58	SWABI	KP
59	DI KHAN	KP	59	HARIPUR	KP	59	MATIARI	SD	59	GHOTKI	SD	59	KARAK	KP	58	DI KHAN	KP
60	BAHAWALNAGAR	PB	60	LARKANA	SD	60	PAKPATTAN	PB	60	KHUSHAB	PB	60	SHANGLA	KP	60	BAHAWALPUR	PB
61	MUZAFFARGARH	PB	61	ABBOTTABAD	KP	61	VEHARI	PB	61	MIRPUR KHAS	SD	61	BAHAWALNAGAR	PB	61	DADU	SD
61	LAKKI MARWAT	KP	61	PISHIN	BL	61	JHANG	PB	62	LOWER DIR	KP	62	ATTOCK	PB	61	SOUTH WAZIRISTAN	KP
63	MASTUNG	BL	63	KHANEWAL	PB	63	KHANEWAL	PB	63	KHAIRPUR	SD	63	LAKKI MARWAT	KP	61	JHANG	PB
64	DADU	SD	64	ZIARAT	BL	64	LARKANA	SD	64	RAJANPUR	PB	64	JHANG	PB	64	SWAT	KP
	SHIKARPUR	SD	64	SHANGLA	KP	65	RAHIM YAR KHAN	PB	65	BATAGRAM	KP	65	SH. BENAZIRABAD	SD	65	LAYYAH	PB
66	BUNER	KP	64	MIANWALI	PB	65	BHAKKAR	PB	66	KAMBAR SHAHDADKOT	SD	66	UMERKOT	SD	66	MALAKAND	KP
67	SUKKUR	SD	67	BANNU	KP	67	BAHAWALNAGAR	PB	67	HARIPUR	KP	66	MIANWALI	PB	67	KARAK	KP
67	ORAKZAI	KP	67	HANGU	KP	68	ORAKZAI	KP	68	SWAT	KP	68	HANGU	KP	67	BANNU	KP
69	BANNU	KP	69	KHYBER	KP	69	JAMSHORO	SD	69	DADU	SD	69	ISLAMABAD	PB	69	CHARSADDA	KP
70	NAUSHERO FEROZE	SD	70	JACOBABAD	SD	70	UPPER DIR	KP	70	SOHBATPUR	BL	70	UPPER DIR	KP	69	NAUSHERO FEROZE	SD
71	KILLA ABDULLAH	BL	71	NOWSHERA	KP	71	KURRAM	KP	71	KHI. WEST	SD	70	QUETTA	BL	71	MIRPUR KHAS	SD
72	PISHIN	BL	72	DG KHAN	PB	72	MOHMAND	KP	72	BADIN	SD	72	MUZAFFARGARH	PB	71	SUKKUR	SD
73	GWADAR	BL	72	MUZAFFARGARH	PB	72	TANK	KP	73	HANGU	KP	73	JACOBABAD	SD	73	RAHIM YAR KHAN	PB
74	KURRAM	KP	74	SANGHAR	SD	74	BAJAUR	KP	74	QUETTA	BL	74	KHI. WEST	SD	73	JHAL MAGSI	BL
75	MATIARI	SD	75	KARAK	KP	75	BANNU	KP	75	UMERKOT	SD	75	BAHAWALPUR	PB	73	THATTA	SD
75	SHAHEED BENAZIRABAD	SD	76	NAUSHERO FEROZE	SD	76	PISHIN	BL	76	SUJAWAL	SD	76	GHOTKI	SD	76	BADIN	SD
77	DG KHAN	PB	77	BATAGRAM	KP	77	MIRPUR KHAS	SD	77	DI KHAN	KP	77	JAFFARABAD	BL	77	LORALAI	BL
78	KHAIRPUR	SD	77	SH. BENAZIRABAD	SD	78	LAYYAH	PB	78	THATTA	SD	78	BADIN	SD	77	TANK	KP
79	GHOTKI	SD	79	KOHAT	KP	79	NAUSHERO FEROZE	SD	79	SUKKUR	SD	79	BHAKKAR	PB	79	SH. BENAZIRABAD	SD
79	SHERANI	BL	80	UMERKOT	SD	80	LODHAN	PB	80	CHITRAL	KP	79	KHUSHAB	PB	80	PAKPATTAN	PB
79	PANJGUR	BL	81	JAFFARABAD	BL	81	SH. BENAZIRABAD	SD	81	LAKKI MARWAT	KP	81	DADU	SD	80	SIBI	BL
82	JAMSHORO	SD	81	LASBELA	BL	82	LAKKI MARWAT	KP	82	JAFFARABAD	BL	81	DI KHAN	KP	82	NORTH WAZIRISTAN	KP
83	BATAGRAM	KP	83	KAMBAR SHAHDADKOT	SD	83	NUSHKI	BL	82	TANK	KP	83	KAMBAR SHAHDADKOT	SD	82	KHAIRPUR	SD
84	MOHMAND	KP	84	DI KHAN	KP	84	SANGHAR	SD	84	KARAK	KP	84	TORGHAR	KP	82	AWARAN	BL
85	SHANGLA	KP	85	BARKHAN	BL	85	KHAIRPUR	SD	85	BAJAUR	KP	85	SANGHAR	SD	85	NUSHKI	BL
86	TANK	KP	86	TANK	KP	86	AWARAN	BL	86	UPPER DIR	KP	86	SUKKUR	SD	86	MASTUNG	BL
87	KAMBAR SHAHDADKOT	SD	87	BADIN	SD	87	MASTUNG	BL	87	BANNU	KP	87	KHAIRPUR	SD	86	BUNER	KP
88	KHARAN	BL	88	KILLA ABDULLAH	BL	88	CHAGAI	BL	88	DG KHAN	PB	88	KILLA ABDULLAH	BL	88	MUZAFFARGARH	PB
89	CHAGAI	BL	89	KACHHI	BL	89	GHOTKI	SD	89	SHANGLA	KP	89	KHI. MALIR	SD	88	SUJAWAL	SD
90	LASBELA	BL	89	KHAIRPUR	SD	90	SIBI	BL	90	NASIRABAD	BL	90	ZIARAT	BL	90	KILLA ABDULLAH	BL
90	SIBI	BL	91	GHOTKI	SD	91	SOUTH WAZIRISTAN	KP	91	ZIARAT	BL	90	RAJANPUR	PB	90	KAMBAR SHAHDADKOT	SD
92	TANDO ALLAHYAR	SD	92	TORGHAR	KP	92	UMERKOT	SD	92	KACHHI	BL	92	PISHIN	BL	92	KURRAM	KP
93	KHYBER	KP	92	KHI. MALIR	SD	93	NORTH WAZIRISTAN	KP	93	HARNAI	BL	92	CHITRAL	KP	93	PISHIN	BL
93	ZHOB	BL	94	CHITRAL	KP	94	DADU	SD	94	KURRAM	KP	94	MOHMAND	KP	93	KACHHI	BL
95	KALAT	BL	94	TANDO ALLAHYAR	SD	95	KAMBAR SHAHDADKOT	SD	95	SIBBI	BL	94	KURRAM	KP	95	MOHMAND	KP
96	AWARAN	BL	96	TM KHAN	SD	96	SHIKARPUR	SD	96	KOHAT	KP	96	DG KHAN	PB	96	JACOBABAD	SD
97	KASHMORE	SD	97	NUSHKI	BL	97	SOHBATPUR	BL	97	TORGHAR	KP	97	SUJAWAL	SD	96	BAJAUR	KP
98	RAJANPUR	PB	98	SOHBATPUR	BL	97	DERA BUGTI	BL	97	BARKHAN	BL	98	THATTA	SD	96	KOHLU	BL
99	JACOBABAD	SD	98	SUJAWAL	SD	99	MUSAKHEL	BL	97	MOHMAND	KP	99	KHYBER	KP	96	ORAKZAI	KP
99	LORALAI	BL	100	HARNAI	BL	99	DG KHAN	PB	100	THARPARKAR	SD	100	MASTUNG	BL	96	CHAGAI	BL
101	UPPER DIR	KP	101	KHARAN	BL	101	BADIN	SD	101	JAMSHORO	SD	101	HARNAI	BL	101	SHIKARPUR	SD
102	SOUTH WAZIRISTAN	KP	102	DADU	SD	102	TM KHAN	SD	102	KILLA ABDULLAH	BL	102	BARKHAN	BL	101	KALAT	BL
103	SANGHAR	SD	103	SUKKUR	SD	103	ZHOB	BL	102	KHARAN	BL	103	NASIRABAD	BL	103	JAFFARABAD	BL
103	KHUZDAR	BL	103	SIBBI	BL	104	THATTA	SD	104	KOHLU	BL	104	KACHHI	BL	103	SHERANI	BL
105	KECH	BL	105	SOUTH WAZIRISTAN	KP	105	KILLA ABDULLAH	BL	104	LASBELA	BL	105	JHAL MAGSI	BL	103	LAKKI MARWAT	KP
106	TM KHAN	SD	106	JAMSHORO	SD	106	MUZAFFARGARH	PB	106	KHI. MALIR	SD	106	SOUTH WAZIRISTAN	KP	106	UMERKOT	SD
107	KACHHI	BL	107	THATTA	SD	107	LORALAI	BL	107	MASTUNG	BL	107	NORTH WAZIRISTAN	KP	106	LOWER DIR	KP

HOUSING			COMMUNICATION AND TRANSPORTATION			LIVELIHOODS			ACCESS TO HEALTH SERVICES			ACCESS TO PUBLIC EDUCATION			DEMOGRAPHICS		
R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P	R	DISTRICTS	P
108	BAJAUR	KP	108	NORTH WAZIRISTAN	KP	107	JACOBABAD	SD	108	ORAKZAI	KP	108	KILLA SAIFULLAH	BL	106	NASIRABAD	BL
109	NORTH WAZIRISTAN	KP	109	LORALAI	BL	109	HARNAI	BL	109	PISHIN	BL	109	THARPARKAR	SD	109	BHAKKAR	PB
110	MIRPUR KHAS	SD	110	KOHISTAN	KP	109	KHARAN	BL	110	JHAL MAGSI	BL	110	LORALAI	BL	110	BATAGRAM	KP
111	KILLA SAIFULLAH	BL	111	MUSAKHEL	BL	111	JAFFARABAD	BL	111	GWADAR	BL	111	SIBBI	BL	111	SHANGLA	KP
112	THATTA	SD	112	KILLA SAIFULLAH	BL	111	KHUZDAR	BL	112	KHYBER	KP	112	JAMSHORO	SD	112	WASHUK	BL
112	BADIN	SD	113	KURRAM	KP	113	RAJANPUR	PB	112	KILLA SAIFULLAH	BL	113	DERA BUGTI	BL	113	KHUZDAR	BL
114	HARNAI	BL	114	THARPARKAR	SD	114	SHERANI	BL	114	NUSHKI	BL	114	KOHISTAN	KP	114	KHARAN	BL
115	WASHUK	BL	114	NASIRABAD	BL	115	THARPARKAR	SD	114	WASHUK	BL	115	KECH	BL	115	DERA BUGTI	BL
116	THARPARKAR	SD	116	KECH	BL	116	KALAT	BL	116	LORALAI	BL	115	NUSHKI	BL	116	KOHISTAN	KP
117	TORGHAR	KP	117	GWADAR	BL	116	BARKHAN	BL	117	DERA BUGTI	BL	117	MUSAKHEL	BL	117	DG KHAN	PB
118	JAFFARABAD	BL	118	MOHMAND	KP	118	KILLA SAIFULLAH	BL	118	KECH	BL	117	KHARAN	BL	118	KASHMORE	SD
118	SUJAWAL	SD	118	JHAL MAGSI	BL	119	ZIARAT	BL	119	MUSAKHEL	BL	119	SHEERANI	BL	119	ZIARAT	BL
120	KOHISTAN	KP	120	AWARAN	BL	119	KOHISTAN	KP	120	SOUTH WAZIRISTAN	KP	120	KALAT	BL	120	RAJANPUR	PB
121	ZIARAT	BL	121	DERA BUGTI	BL	121	WASHUK	BL	121	KOHISTAN	KP	121	LASBELA	BL	121	SOHBATPUR	BL
122	MUSAKHEL	BL	122	KOHLU	BL	122	NASIRABAD	BL	122	SHEERANI	BL	122	AWARAN	BL	122	HARNAI	BL
123	KOHLU	BL	123	PANJGUR	BL	122	PANJGUR	BL	123	ZHOB	BL	123	KOHLU	BL	123	TORGHAR	KP
124	UMERKOT	SD	124	CHAGAI	BL	124	SUJAWAL	SD	124	KALAT	BL	124	ZHOB	BL	124	KILLA SAIFULLAH	BL
125	NASIRABAD	BL	124	WASHUK	BL	125	KECH	BL	125	NORTH WAZIRISTAN	KP	125	GWADAR	BL	125	ZHOB	BL
126	BARKHAN	BL	126	SHEERANI	BL	126	JHAL MAGSI	BL	126	PANJGUR	BL	126	PANJGUR	BL	126	MUSAKHEL	BL
127	DERA BUGTI	BL	127	ZHOB	BL	127	KOHLU	BL	127	AWARAN	BL	127	WASHUK	BL	126	UPPER DIR	KP
128	SOHBATPUR	BL	128	KALAT	BL	127	KASHMORE	SD	128	CHAGAI	BL	127	KHUZDAR	BL	128	BARKHAN	BL
129	JHAL MAGSI	BL	129	KHUZDAR	BL	129	KACHHI	BL	129	KHUZDAR	BL	129	CHAGAI	BL	129	THARPARKAR	SD

Abbreviations: DG Khan=Dera Ghazi Khan, DI Khan=Dera Ismail Khan, ICT=Islamabad Capital Territory, Khi.=Karachi, KP=Khyber Pakhtunkhwa, P=Name of the Province, PB=Punjab, R=National Ranking, Sh. Benazirabad=Shaheed Benazirabad (Nawabshah), SD=Sindh, TM Khan=Tando Muhammad Khan.

Note: Districts with the lowest vulnerability scores in each province are shaded green; those with the highest scores are shaded grey.

