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How the rural poor cope with a climate catastrophe: Evidence from Pakistan's 2022 floods

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- This brief explores initial findings from a survey of rural households in Sindh, Pakistan, seeking to understand how they were impacted by the 2022 floods.
- The results show that flooding was severe and incredibly prolonged, disrupting lives long after the monsoon was over.
- Despite near-universal exposure of the sample to some degree of flooding, evacuation was far from universal.
- Very few households in the study have permanently migrated since the floods, raising important questions about the drivers of migration decisions after natural disasters, including the influence of place-based reconstruction programmes.

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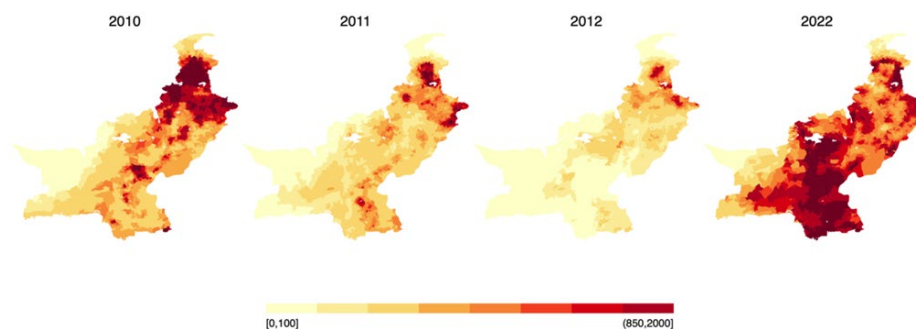


Introduction

On 27 July 2022, the Pakistan Meteorological Department (PMD) signalled the end of the monsoon season in Sindh, one of five provinces in Pakistan located in the south-east of the country. Their forecast predicted a weakening of the ongoing monsoon spell by month-end, and a shift northward to Sindh (“Monsoon System Weakening in Sindh: PMD,” 2022). In just two weeks following this announcement, the province was hit by unprecedented rains, 531% above Sindh's 20-year historical average. These rains resulted in widespread inundation, surpassing even the worst floods in Pakistan's history. There was nearly twice as much rainfall in Sindh as there was in the 2010 floods, previously the nation's most severe (see Figure 1). Satellite imagery from August 2022 shows that one-fifth of the province was submerged underwater.

FIGURE 1: Floods in 2022 compared to the biggest floods in Pakistan's history

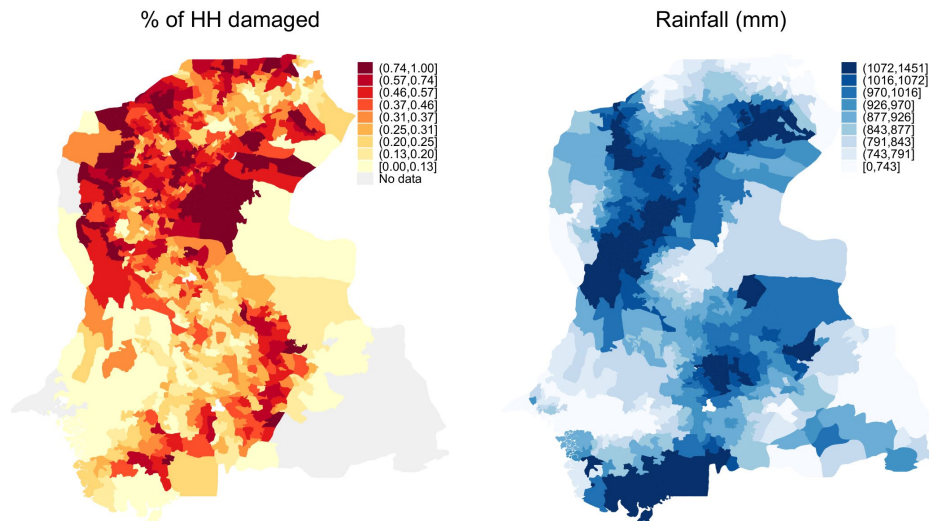
Source: NASA GPM



These floods disrupted the lives of millions and caused severe damage to agriculture, housing, and infrastructure. A Post-Disaster Needs Assessment – jointly authored by the Government of Pakistan (GoP) and multilateral donor organisations – valued total economic damages at USD 14.9 billion (“Pakistan Floods 2022: Post-Disaster Needs Assessment (PDNA),” 2022). Of these damages, 70% were estimated to have occurred in Sindh.

According to a post-floods census by the Government of Sindh (GoS), 1.4 million houses, 14% of all dwellings in Sindh, were fully destroyed by the floods. Using microdata from this census and satellite data on rainfall, **Figure 2** shows how the spatial pattern of rain tracks the spread of damages across the province.

FIGURE 2: Percentage of households damaged versus the spatial pattern of rainfall.



The widespread devastation caused by the floods spurred a large response from the GoP and multilateral donors. In the immediate aftermath, GoP disbursed a one-time flood relief cash transfer of PKR 25,000 (USD 87) to all poor, flood-affected households. In December 2022, the Government of Sindh and the World Bank committed USD 1.7 billion in financing for a suite of major reconstruction programs (“Pakistan: World Bank Approves \$1.692 Billion for 5 Projects to Support the People of Sindh in the Flood-Affected Areas,” 2022). The extent of damages and the scale of reconstruction efforts underscore the magnitude of the calamity.

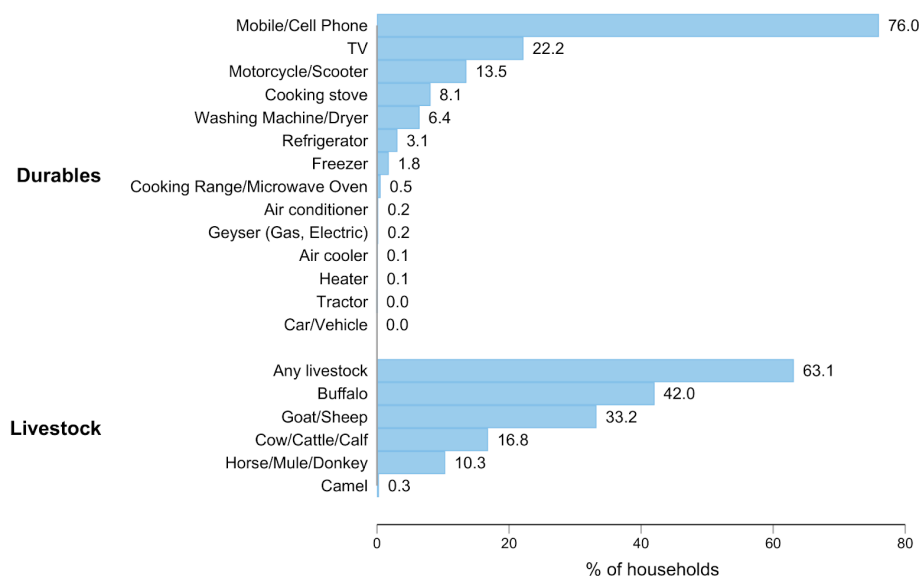
Overview of the research

Extreme weather events like the 2022 floods are increasingly common as a result of climate change. Poor households in developing countries are disproportionately impacted due to their location, occupational choices, and resource constraints. To design relief programmes and build resilience, we need more evidence on how the rural poor are affected by unforeseen natural disasters, the actions they take to cope, and the barriers they face in doing so.

This research sheds light on these questions by studying the impacts of the 2022 floods in Pakistan. Data was collected from a random sample of 5,100 rural poor households in six districts of Sindh, where links with local NGOs facilitated the research. A household was classified as poor if, in 2017, they had assets that put them in approximately the bottom fifth of the wealth distribution in Pakistan. This includes households on both sides of the eligibility criteria of the Benazir Income Support Programme (BISP). As a result, 50% of households in the sample

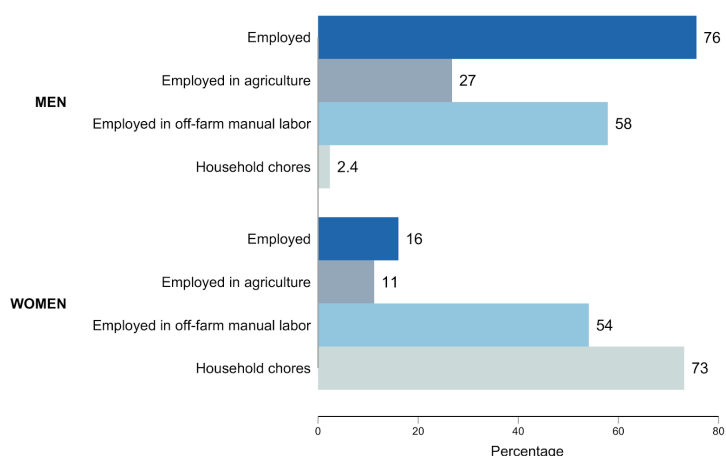
regularly received BISP, while 52% received at least one social protection programme prior to the floods.

FIGURE 3: Baseline Assets



It follows from these sampling decisions that respondents to the survey were largely low-income and had low levels of wealth. Median household income before the floods was Rs. 15,000 (approx. USD 54) in this sample, and the median household had ~7 members. As shown in **Figure 3**, the majority of households owned a mobile phone (76%) and some form of livestock (63%), but other types of transport or domestic assets were less common. Levels of human capital were also low – 74% of household heads in the sample and 63% of all working-age adults were illiterate. Of the working-age men in the study, 76% were gainfully employed – of those out of the labour force, almost half were enrolled in educational institutions. About 27% of working men worked in agriculture, while most of the rest did off-farm manual labour. By contrast, most women (84%) were not engaged in paid work (see **Figure 4**). Village census data from 2020 reveals that most of the sample lived in areas with limited access to various amenities: 75% of villages had mostly dirt roads, 58% had a girls' primary school, 8% had a market within the village, and only 5% had any industrial activity.

FIGURE 4: Baseline occupations for working-age individuals



Key findings

This section uses data from a survey carried out one year after the floods to document some descriptive facts about the study sample of rural, low-income households. Subsequent memos will investigate the causal effect of floods.

Flooding was not only severe but also prolonged.

Floods continued to disrupt lives long after the monsoon was over. Water depth at the peak of the floods was 2.9 feet but was reported to be as high as seven feet in some areas. Since Sindh is largely low-lying and flat, these flood waters were slow to drain. As a result, on average, the floods lasted 74 days, leading to 24 days of displacement. However, some regions experienced up to seven months of inundation and displacement. Trade partners remained inaccessible by road for an average of one month and up to three months. Unsurprisingly, the consequences were devastating: 95% of households reported *some* damage to their residential properties, while about half reported that their homes were fully washed away. In addition, 89% reported that at least one household member fell sick due to the floods. Mosquito-borne diseases like malaria and dengue, digestive illnesses, and skin infections were the most common.

Despite severe, near-universal flooding in the sample, evacuation was limited.

Despite 91% of households in the sample experiencing some degree of flooding, evacuation was far from universal. Only 41% of households evacuated and went to places that were, on average, only six km from their residence. Respondents also estimated that while most households in their village (61%) were flooded,

only 31% evacuated. Amongst those who did not evacuate, 56% reported that they preferred to stay to ensure the security of their house or land, underscoring the high levels of land insecurity in the region (76% of households in the sample do not own a formal deed for their house). Another 26% reported having nowhere to go, highlighting the widespread inundation around them, as well as the spatial concentration of their social networks.

No evidence of widespread adaptation through permanent migration

Though the floods caused immense destruction and sizable displacement, permanent migration was not a major response to this shock. We found 88% of households in or around their pre-flood location, and only 1% of our sampled households were known to have migrated after the floods; locals thought that other non-found households were temporarily absent or had migrated in the five years before the floods, or otherwise, were data entry errors in administrative records.

The low rates of permanent migration raise important questions about how these decisions may have been influenced by the state's launch of large, place-based reconstruction programs in response to the floods. We study the relationship between private adaptation and publicly funded place-based reconstruction in our follow-up work.

Policy implications

- These floods were severe and long-lasting, causing widespread property damage, sickness, and displacement. As a result, their impacts are likely to be persistent. Continuing to track these households and assessing how their needs evolve over time is crucial to designing effective relief and reconstruction efforts.
- Households report facing various barriers to evacuation. Land insecurity, high transportation costs and risks, and not having knowledge of safe and accessible evacuation destinations were commonly reported challenges. The inability to evacuate potentially exposed many of these households to waterborne diseases and other life-threatening risks. If these barriers exist, other interventions, such as early flood warnings and weather forecasts, may fail to move people out of harm's way. This suggests that assistance targeted specifically towards helping people safely evacuate could be critical.
- For the rural, poor in our study areas, there does not seem to have been a major migration response to the largest flood event in Pakistan's history. This raises important questions about whether these decisions

have been influenced by the Government of Sindh's large, place-based reconstruction programmes.

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