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Differential Flood Risk to Schools in Naseerabad Division, Balochistan:

**A Mixed-Methods Study of Hazard, Exposure, and Socioeconomic
Vulnerability**

Dissertation for Masters of Education Policies for Global Development (GLOBED)

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Abstract

The 2022 Pakistan floods disrupted the education of more than 3.5 million children, with Balochistan among the hardest-hit provinces. Educational disruption after floods is rarely temporary: damaged buildings, inaccessible roads, household income loss, child labour, and early marriage can turn short closures into long-term exclusion. Yet school-level disaster recovery is often limited by weak evidence on where educational risk concentrates and why some schools and students recover more slowly than others. Drawing on the IPCC understanding of risk as the interaction of hazard, exposure, and vulnerability, this mixed-methods study examines flood risk across all 1,836 government schools in Naseerabad Division¹, Balochistan. A spatial risk index built in QGIS combines 2022 flood exposure, school enrolment, and physical sensitivity indicators derived from EMIS data and qualitative interviews. Seven semi-structured interviews with education stakeholders are then used to examine institutional adaptive capacity and socioeconomic vulnerabilities not captured by the index. The analysis shows that 67.9% of schools were flooded, while high-risk schools represented 19% of flooded schools but enrolled 30% of children in flooded schools. Districts reached high risk through different pathways: the eastern corridor through large exposed school populations, Kachhi through structural fragility, and Nasirabad through the convergence of exposure, fragility, poverty, and low girls' literacy. The findings show that school-level risk assessment must be read alongside adaptive capacity and gendered socioeconomic vulnerability if recovery is to prioritise not only damaged infrastructure, but the children most likely to be permanently excluded.

Key words: flood risk, educational disruption, hazard-exposure-vulnerability framework.

¹ Naseerabad is the name of the division, Nasirabad is the name of the district within it

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Chapter 1: Introduction

Flooding is the most frequent and costly natural hazard worldwide (Field et al., 2012), affecting around a billion people living in flood-prone areas (Mukhtar et al., 2024). The educational impacts of these events are profound and operate through multiple, interacting channels, such as damaging school buildings, roads, and physical access (Lassa et al., 2023), and affecting children's health (Habiba et al., 2021). Furthermore, floods raise the opportunity cost of schooling in economically strained households, frequently pulling children into labour markets to support families (Bandara et al., 2015; Zhang et al., 2025) and constraining girls' education in particular (Gul et al., 2024). Yet educational needs are frequently subordinated to material and health needs during disaster response and recovery (Halman et al., 2018). This subordination is increasingly difficult to justify as Bromley and Andina (2010, p. 578) observe, "in a world moving toward viewing education as a human right, it is ever less legitimate to claim educational service provision...should be subordinated to other reconstruction efforts". This neglect may stem partly from a perception that hazards cannot be prevented. However, it is possible to reduce the adverse effects of a hazard by understanding that it alone does not constitute risk (IPCC, 2014). The Intergovernmental Panel on Climate Change (IPCC) holds that risk emerges from the interaction of hazard, exposure, and vulnerability (IPCC, 2014). Hence, the severity of educational disruption is determined not by flooding alone, but by where schools are located, who they serve, and the conditions that shape their capacity to respond and recover. Understanding flood risk to education, therefore, requires studying not the hazard in isolation, but its interaction with the exposure and vulnerability of the systems it affects.

Pakistan offers a stark case. It is among the countries most vulnerable to climate change, ranking 15th among the most affected by extreme weather events from 1995 to 2024 (GermanWatch, 2025). This reality was also made apparent by the 2022 monsoon floods, which affected 32 million people, leading to internal displacement of approximately 7.9 million people and 1,486 fatalities (Mukhtar et al., 2024; OCHA, 2023). Furthermore, the educational impact was extremely severe, disrupting the education of more than 3.5 million children nationwide (World Bank, 2023). Balochistan, the country's largest and most marginalised province, was among the hardest hit, with damages estimated at US\$ 1.625 billion and 2,850 educational institutions affected (GOB, 2022). Furthermore, the province already has a very fragile education system, with

the lowest literacy rates in the country and the highest out-of-school child rates in Pakistan (Coşkun, 2023). Hence, the 2022 floods struck an education system with almost no capacity to absorb further shocks.

Yet the research that should inform recovery and preparedness in such contexts remains remarkably thin. Existing work has approached flood risk to schools only partially. Some school-level assessments consider hazard and exposure but omit vulnerability (UNESCO-IIEP, 2024); others examine vulnerability in isolation, without situating it within the interaction among all three components (Ochola et al., 2010). A substantial body of flood-risk research models hazard through hydrological and multi-criteria approaches but stops at physical flood mapping rather than its consequences for education (Latif & He, 2024; Mukhtar et al., 2024). Furthermore, international frameworks such as the Sendai Framework and the Comprehensive School Safety Framework (CSSF) specifically emphasise that the physical safety of schools is inseparable from disaster risk governance (GADRRRES, 2022; Sakurai & Sato, 2016). Yet in Balochistan, where institutional capacity is severely constrained and literacy rates are the lowest in Pakistan, the extent to which these frameworks reach individual schools remains poorly understood (Ortega et al., 2024). Furthermore, no study has brought hazard, exposure, and vulnerability together in a school-level risk assessment in Pakistan, nor paired such an assessment with qualitative fieldwork.

This study, therefore, addresses the gap by combining a spatial risk assessment of schools in Naseerabad Division with qualitative fieldwork to examine not only where flood risk is concentrated but what deepens its impact on education. The main research question guiding this study is: *How do flood hazard, exposure, and physical sensitivity intersect to produce differential educational risk across government schools in Naseerabad Division, Balochistan, and how do adaptive capacity and socioeconomic conditions shape the resulting disruption and recovery?*

Chapter 2: Background and Context

Balochistan, the country's largest and poorest province, has a literacy rate of 43.58%, lower than the national average of 58.92%, and a poverty rate of approximately 38.7%, nearly double the national average of 21.9% (Coşkun, 2023; Ortega et al., 2024). According to the Balochistan Education Sector Plan, the province has the lowest literacy rate, the widest gender gaps, and the weakest access indicators in the country (GOB, 2020). Infrastructure neglect is also evident: about 15% of primary schools are shelterless, lacking a physical building, while 56% of schools lack

access to toilets (GOB, 2023) (see Appendix E). Gender is a primary determinant of educational access in Balochistan. The male literacy rate stands at 54.15%, while the female rate is even lower at 31.89%, dropping to just 17% in rural areas (Coşkun, 2023). The province has the country's largest gender gap in education, shaped by restrictive gender norms, limited mobility, and broader socioeconomic constraints that create structural barriers for girls (Coşkun, 2023).

The province also ranks among Pakistan's most hazard-prone territories: 32 of its 36 districts are considered flood-vulnerable, with 17 classified as extremely vulnerable to flash and fluvial floods (GOB, 2022). Its arid climate and heavy reliance on agriculture render it acutely susceptible to the cascading effects of floods, water scarcity, and land degradation (Akhtar & Amjad, 2024). These impacts are further intensified by structural marginalisation and high poverty rates in the province (Akhtar & Amjad, 2024). Floods also heighten girls' vulnerability: after the 2022 floods, the Government of Balochistan reported that 640,000 adolescent girls faced increased risks of coercion, gender-based violence, and child marriage (GOB, 2022).

Naseerabad Division: The Agricultural Green Belt

Naseerabad Division is located in eastern Balochistan and consists of six districts: Jaffarabad, Usta Mohammad, Nasirabad, Sohbatpur, Kachhi, and Jhal Magsi. The division forms part of Balochistan's agricultural belt, characterised by low-lying, canal-irrigated terrain that makes it exceptionally flood-prone (Akhtar & Amjad, 2024). It repeatedly experienced catastrophic flooding between 2010 and 2022, and all six districts were among Balochistan's most affected districts in terms of completely damaged houses during the 2022 floods (OCHA, 2010; OCHA, 2022). Naseerabad is therefore a particularly relevant case for examining how flood exposure intersects with educational fragility and agrarian vulnerability.

Chapter 3: Literature Review

3.1 The mechanisms connecting floods to educational disruption

Economic Channel

A growing body of evidence documents the adverse effects of floods on education disruption across different channels. One primary channel through which floods impact education is the economic one. Floods reduce household income by destroying crops, livestock, and productive assets; since education functions as a normal good, demand for it falls as income declines (Nguyen & Pham, 2018). This effect deepens when disasters cause parental death, injury, or disability,

forcing children to compensate for lost income through wage work or additional household responsibilities (Zhang et al., 2025). This economic channel can be the decisive one. Cook and Beachy (2019), examining the effect of Hurricane Matthew on school attendance in a rural agricultural community in Haiti, found that neither illness nor injury was cited as a reason for children leaving school; withdrawal was driven primarily by financial pressure. In agrarian, low-income settings, then, the economic pathway may be the dominant route through which floods disrupt education. Furthermore, the increasing travel cost of going to school post-flood is also an issue highlighted by Chang et al. (2013), who conducted research in Sindh, Pakistan; after the 2010 floods, pupils had to pay substantially higher fares for transport each morning and evening due to road inaccessibility or the need to take a boat. The interconnectedness of child labour after floods is a pattern documented across Zimbabwe, Colombia, and Nicaragua, where flood and storm events produced sharp increases in child labour participation (Mudavanhu, 2014; Muñoz-Morales, 2025; Baez & Santos, 2007). In rural contexts, this dynamic is particularly pronounced. Muñoz-Morales (2025) finds that returns to education in agricultural economies are already low, meaning post-disaster poverty more readily pushes rural children into child labour. Since household income decreases after a disaster, “children are being forced into paid child labour to assist parents in getting food for the family” (Mudavanhu, 2014).

Impact on Health

Another channel through which flood impacts education disruption is through health. Flood damage to school infrastructure creates direct health hazards: Mudavanhu (2014) documents how collapsed school toilets in Muzarabani, Zimbabwe, forced children to use bush toilets, producing a cholera outbreak that drove absenteeism. Children exposed to floods in Ethiopia and Vietnam were 8% more likely to report health problems than unexposed peers (Nguyen & Pham, 2018). The contamination of drinking water in a school after a flood further poses a significant health threat to students (Chaudhary & Timsina, 2017). Furthermore, the psychological toll extends beyond physical illness: In a study focused on children aged 8 to 18 in northern Namibia following the 2011 floods, Taukeni et al. (2016) observed that trauma symptoms persisted two years after the event, for 55.2% of children aged 12 and under and 72.8% of those aged 13 and above. Gul et al. (2024) suggest that governments should provide health facilities in schools, such as first aid boxes, a female doctor, and a psychologist for counseling to address mental health issues among female students, including trauma, anxiety, skin allergies, vomiting, and temperature fluctuations

during and after floods. This support will help female students cope with the physical and psychological impacts of floods.

Infrastructure and Education

The physical vulnerability of school buildings is a further channel through which floods disrupt education. In terms of construction type, mud-based schools are the most vulnerable during floods and are prone to total collapse (Ochola et al., 2010). However, the literature suggests that even cement and brick-made schools suffer during flood disasters; in Muzarabani district, Zimbabwe, “schools were built with bricks and cement...20% had roofs blown off”. (Mudavanhu, 2014, p. 4). While floods directly impact education by destroying facilities, an indirect effect is that this physical vulnerability translates into psychological distress, which affects the learning environment for children. Students have reported that visible cracks in walls and roofs caused them to be “in fear and feel insecure,” effectively paralysing the learning environment even when the building remained standing (Chaudhary & Timsina, 2017, p. 22). This pattern of widespread structural vulnerability is frequently rooted in systemic failures during construction. Research indicates that schools, particularly in rural areas, often have poor infrastructure, as they are built by local contractors without adherence to established building codes (Mudavanhu, 2014), rendering the structures inherently “below standard” and susceptible to damage (Chaudhary & Timsina, 2017, p. 22). Furthermore, floods frequently destroy facilities such as books, furniture, and computers, which are essential pedagogical items vital for a good learning environment (Lassa et al., 2023). Infrastructure damage outside the school gates often prevents attendance by making the journey to school hazardous. According to Lassa et al. (2023), the main reason for the disruption to school education, especially the closure of schools, was a lack of accessibility: teachers and students could not even reach school. Evidence from Nepal: 85.9% of students reported they could not reach school because roads were impassable due to flooding. (Chaudhary & Timsina, 2017).

3.2 Gender, education and disasters

Beyond immediate physical harm, floods produce gendered educational consequences through several pathways. Women face disproportionately high mortality and injury rates during floods due to limited mobility and a lack of survival skills such as swimming (Samiullah & Shaw, 2014). Fordham (2013) adds that gendered social roles and patterns of inequality further compound this vulnerability. Within education specifically, Gul et al. (2024) analysed the impacts of the 2022

floods on girls' education in District Nowshera, KPK. They found that 21% of respondents reported dropouts, driven by forced migration, the loss of male heads of household, which compelled girls to earn money or take over domestic duties, and a lack of basic supplies such as uniforms and stationery. The study also found that parents were more protective and less willing to send their daughters back to damaged or unsafe school buildings. A further gendered consequence is the risk of early marriage. Following a disaster, as household income decreases, parents force young daughters into marriage as a survival strategy (Mudavanhu, 2014). Gul et al. (2024) found a similar pattern, with 35% of respondents reporting a “significant” and 32% a “slight” increase in the risk of child marriage following the 2022 flood.

3.3 Long-term impact of school closure

The disruption caused by floods is rarely confined to the period of closure itself. A growing body of evidence documents that disasters depress school attendance and learning outcomes for years afterwards, with poorer children bearing the heaviest and most persistent burden (Muñoz-Morales, 2025). After the 2013–2016 Ebola outbreak closed schools in Guinea and Sierra Leone for seven to nine months, Smith (2021, p.1) found that “an additional 17,400 of the poorest secondary age youth were out of school” than would have been expected based on the pre-outbreak dropout rate. Lower achievement is also more common among students who have experienced natural disasters. In Pakistan specifically, Andrabi et al. (2020) found that four years after the 2005 earthquake, household living standards had fully recovered, but children whose schools closed for an average of 80 days remained 1.5 to 2 years behind their peers. Comparing test scores of students in Thailand who were affected and not affected by flooding, Thamtanajit (2020) reported a 0.03 to 0.11 standard deviation decline, depending on grade and subject. The economic stakes of a one standard deviation increase in cognitive test scores are associated with a 10 to 20 per cent increase in adult wages (Pinto & Jones, 2020), meaning the learning lost to a single flood season can compound into a measurable lifetime earnings penalty. The consequences extend beyond earnings to “higher crime rates, poorer health and mortality outcomes, and reduced participation in political and social institutions” (Pinto & Jones, 2020, p.2). The literature identifies specific interventions capable of addressing these long-term losses, such as programs that tailor teaching to a student's current ability level (rather than a fixed curriculum) (Cardinal, 2020). Another very important incentive in developing nations is conditional cash transfers, which incentivise families to keep children in school by providing cash to prevent them from entering the labour market prematurely.

3.4 International standards in education and disaster risk reduction

The global community has established extensive frameworks for education in emergencies, operating from broad international commitments down to school-level technical guidance. At the apex sits the Sendai Framework for Disaster Risk Reduction 2015–2030, which aims to push disaster management “from prevention, mitigation and preparedness to response, recovery and rehabilitation” (Sakurai and Sato, 2016, p. 402). The Sendai Framework’s Target 18(d) calls for the “substantial reduction of disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities” (UNDRR, 2015). Below this, two complementary frameworks translate this ambition into education-specific practice. The Comprehensive School Safety Framework (CSSF) 2022–2030, led by the Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector (GADRRRES), organises school safety around four pillars: enabling systems and policies, safer learning facilities, school safety and educational continuity management, and risk reduction and resilience education (GADRRRES, 2022). Furthermore, the INEE Minimum Standards provide the foundational framework for delivering quality education across the humanitarian-development nexus, defining minimum requirements for quality education, equity, and human dignity that cannot be lowered without violating rights (INEE, 2024). Across these frameworks, several core principles are highlighted. The CSSF requires that existing school facilities be assessed for “repair, retrofit, replacement or relocation,” and that new buildings meet standards for site selection, drainage, and construction quality (GADRRRES, 2022, p. 8). The INEE Minimum Standards further prescribe that education authorities integrate DRR into Education Sector Plans, establish school-level safety committees, and maintain localised evacuation procedures (INEE, 2024). Furthermore, there is emphasis on maintaining gender-responsive Water, Sanitation and Hygiene (WASH), while the Menstrual Health Management in Emergencies Toolkit specifies that female-friendly toilets must include doors with internal locks, lighting, and discrete waste disposal (GADRRRES, 2022; IRC, 2017).

Beyond these flagship documents, a broader body of literature outlines detailed operational guidance for education in emergencies (Sinclair, 2002; Tarricone et al., 2021; UNESCO-IIEP, 2010). Tarricone et al. (2021) emphasise that effective planning requires the detailed development of specific documents, including education sector plans, institutional and business continuity plans, and disaster response plans. Tarricone et al. (2021, p. 5) further highlight that

intergovernmental organisations and non-governmental organisations (NGOs) may function as critical agents that “fill the gaps where government capacity is limited,” particularly in rural or remote contexts where schools “mainly depend on community partnerships” and external support (Dalangin, 2025, p. 29). However, a prolonged reliance on this kind of state-avoidance can lead to unintended consequences: unsustainable operational standards, weak accountability among service providers, humanitarian agencies failing to build lasting local capacity, and service providers themselves attracting hostility from the state because of the political role they end up playing (Batley & McLoughlin, 2010).

However, a well-documented gap persists between these standards and their implementation in resource-constrained, rural settings where administrative capacity is limited (Bromley & Andina, 2010; Dalangin, 2025). Bromley and Andina (2010, p. 576) argue that such standards often produce a “decoupling” between formal policy and on-the-ground practice. This is precisely why a school-level assessment is needed: it can measure risk where it actually occurs, in the specific administrative and economic conditions of Naseerabad Division.

3.5 A review of risk assessments

The dominant conceptual framework for disaster risk is provided by the Intergovernmental Panel on Climate Change (IPCC), which defines risk as arising from the interaction of hazard, exposure, and vulnerability (IPCC, 2014, 2022). Exposure is the presence of people, assets, or systems in places where they could be adversely affected, while vulnerability is the predisposition of a system to be harmed (IPCC, 2022). Vulnerability is itself composed of two elements: sensitivity, the degree to which a system is affected by a hazard, and adaptive capacity, the ability of a system to adjust to, cope with, and recover from harm (IPCC, 2014; Sharma and Ravindranath, 2019). This conceptualisation of risk has been applied to flood-risk research at various scales.

At the household and community level, several studies apply the full IPCC formula in South Asian contexts. Shah and Malakar (2024) construct a composite risk index for the Indian Himalayan regions. They operationalise vulnerability in two dimensions: sensitivity is measured through indicators such as the percentage of the female population and the percentage of households with roof materials of Grass/Thatch/Bamboo/Wood/Mud, while adaptive capacity is captured through indicators such as access to bathroom facilities and access to two-wheelers. Thangjam et al. (2024) apply the same framework to farmers in northeast India, using changes in

productivity as the sensitivity variable and the household head's land ownership and education as indicators of adaptive capacity.

At the school level, the literature on risk to educational facilities is limited; the most direct precedent is the geospatial risk-assessment methodology developed by UNESCO-IIEP (2024). UNESCO-IIEP (2024) demonstrates how the IPCC risk framework can be operationalised at the individual facility level using education management information systems and open-source geospatial platforms. In its worked example, however, the spatial model incorporates only hazard and exposure, treating exposure as the distance from schools to the hazard and omitting vulnerability and capacity when facility-level data are unavailable. Narrowing further to flood-specific assessments, Ochola et al. (2010) scored schools in Kenya's Nyando River catchment on biophysical variables including distance from rivers, soil type, slope, and flood history. Their findings established that physical indicators of construction are valid proxies for flood sensitivity: the most vulnerable schools were those built largely of mud, with ground-level floors, no drainage, and no boundary walls. However, their analysis assessed only vulnerability, without incorporating exposure or the full risk framework. Dawkins et al. (2024) provide the most comprehensive school-level application of the IPCC formula to assess overheating risk across approximately 20,000 schools in England, combining hazard projections, exposure data, and physics-based building models.

While there are flood-risk research studies in Pakistan (Mukhtar, 2024; Saif et al., 2024), the educational dimension remains largely unexamined. To my knowledge, no study has applied a combined hazard-exposure-vulnerability risk index to school-level flood data in Pakistan, nor has any study paired such a spatial assessment with qualitative fieldwork to examine why flooding produces prolonged educational disruption in specific contexts. Tangney (2020) argues that the IPCC's guidance nonetheless "perpetuates a positivist hierarchy of knowledge for policymaking" that implicitly prioritises the objective calculation of probable consequences over values, perception, and other forms of knowledge. For Tangney, risk is better understood as "one of a number of useful conceptual frames" rather than a default. This critique is significant for the present study because a purely quantitative risk index captures only the calculable dimensions of risk and cannot represent the lived experience that determine how flood risk translates into actual educational disruption. The mixed-methods design addresses this limitation: the spatial index

quantifies structural risk, while qualitative interviews capture contextual and experiential knowledge that a quantitative framework alone leaves out.

Chapter 4: Conceptual Framework: Risk, Exposure and Vulnerability

The previous chapter introduced the IPCC concepts of risk, exposure, and vulnerability. This chapter defines how these concepts are operationalised in the present study.

This study is grounded in the IPCC's conceptualisation of climate risk as a function of three interacting components: hazard, exposure, and vulnerability (IPCC, 2014). Following the IPCC's recommended use of "risk to" a specified human system (IPCC, 2020), the affected human system in this study is school education, and the adverse consequence of concern is the disruption of children's schooling. The unit of analysis is the individual school facility, which serves as the receptor for the hazard, exposure, and sensitivity scores.

A defining property of the framework is that vulnerability and its components are theoretical, internal properties of a system that cannot be measured directly (Hinkel, 2011). They must be operationalised through measurable proxy indicators during assessment (Sharma and Ravindranath, 2019). Of the three components that produce risk, hazard is largely unmanageable in the short term, whereas vulnerability is a property that can be managed and reduced (Sharma and Ravindranath, 2019). Vulnerability itself comprises of sensitivity and adaptive capacity; with the relationship being: vulnerability rises as sensitivity increases and falls as adaptive capacity strengthens (Sharma and Ravindranath, 2019). That means either lessening sensitivity, for example by improving construction quality, or strengthening adaptive capacity, for example by building institutional preparedness. The potential for risk reduction lies in the components that can be changed, not in the hazards that cannot.

Adaptive capacity extends beyond a building's physical condition. It concerns institutional preparedness, community resources, and economic resilience, the factors that determine whether a system can respond when disaster strikes (Pal et al., 2023; Shah and Malakar, 2024). López-Marrero and Yarnal (2010) argue that enhancing adaptive capacity requires addressing the multiple factors that create unsafe conditions rather than focusing solely on the hazard. Smit and Wandel (2006, cited in López-Marrero and Yarnal, 2010) make the same point: adaptive capacity is shaped by livelihood conditions, economic resources, health, and the relationship between communities and government. At the school level, UNESCO-IIEP (2024) operationalises adaptive capacity

through institutional indicators: the existence of contingency plans, disaster risk reduction mechanisms, and emergency funding. That operationalisation shifts the focus from household-level proxies such as savings or literacy toward the governance structures that determine whether a school system can anticipate, absorb, and recover from a flood. It is this institutional understanding of adaptive capacity that guides the qualitative component of this study, which examines how education authorities in Naseerabad Division prepared for, responded to, and recovered from the 2022 floods.

The two elements of vulnerability cannot be measured with the same data, which shapes the study's design. Sensitivity can be assessed at the school level because the physical attributes that make a school susceptible are recorded in administrative data. Adaptive capacity cannot be measured; it concerns institutional preparedness, community resources, and economic resilience, and is assessed through household or community indicators that do not exist at the level of the individual school (Pal et al., 2023; Shah and Malakar, 2024). In keeping with the IPCC's requirement to state explicitly where an assessment does not fully incorporate the dimensions of vulnerability (IPCC, 2020), this study's quantitative component operationalises hazard, exposure, and physical sensitivity. Adaptive capacity is not omitted; rather, it is examined qualitatively. The spatial analysis maps the risk of disruption to educational provision and compares it across districts, school levels, and gender. The qualitative section examines the adaptive capacity that determines how that risk translates into actual disruption and recovery. Together, they provide a fuller account of vulnerability than either alone.

Chapter 5: Research Methods

This chapter outlines the study's research design, data sources, qualitative and spatial analysis procedures, and approach to integration. The aim of this study is to examine how flood hazard, exposure, and physical sensitivity interact to shape educational risk across schools in Naseerabad Division, Balochistan, and how institutional adaptive capacity and socioeconomic vulnerabilities shape the disruption and recovery that follow. This was done by combining spatial analysis with semi-structured interviews. The study is organised around the following research questions:

Main Research Question: How do flood hazard, exposure, and physical sensitivity intersect to produce differential educational risk across government schools in Naseerabad Division,

Balochistan, and how do adaptive capacity and socioeconomic conditions shape the resulting disruption and recovery? The following table presents details on the sub-research questions.

Table 1: Sub-Research Questions, Methods, and Aims

RQ	Method	Aim
RQ1: Which schools are most at risk, and how does risk vary by district, level, and gender?	GIS spatial join; H–E–S risk scoring in QGIS	Classify school risk by district, level, and gender
RQ2: What physical conditions shaped disruption during the floods?	Semi-structured interviews (n=7); thematic coding	Identify physical sensitivity indicators to operationalise in the spatial index
RQ3: What institutional factors shaped preparedness and response?	Semi-structured interviews (n=7); thematic coding	Explain institutional adaptive capacity the index can't measure
RQ4: What socioeconomic conditions increased susceptibility to disruption?	Semi-structured interviews (n=7); thematic coding	Explain socioeconomic/gendered vulnerabilities that deepen risk into disruption

5.1 Research paradigm

This study adopts a pragmatic worldview, which draws primarily on the work of Peirce, James, Mead, and Dewey (Cherryholmes, 1992). A pragmatist studies the consequences of actions (James, 1907/1981, as cited in Cherryholmes, 1992), as this research does, examining the consequences of a specific event: the 2022 floods in Pakistan. As a philosophical underpinning for mixed-methods studies, pragmatism focuses on the research question and uses pluralistic approaches to gather data on that problem (Morgan, 2007; Patton, 1990; Tashakkori & Teddlie, 2010, as cited by Creswell and Creswell, 2022).

5.2 Research design

Hence, in this study, I employ a mixed-methods, sequential, exploratory design. The first phase uses seven semi-structured interviews with education officials, headteachers, and practitioners in Naseerabad Division, Balochistan, with two aims: to identify which physical sensitivity indicators should be operationalised in the spatial risk index, and to examine the institutional and socioeconomic dimensions of adaptive capacity that the index cannot measure directly. The second phase maps and assesses risk across all schools in the division, disaggregated by district, gender, and school level. These two phases are not governed by incompatible paradigms; rather, they are

complementary lines of inquiry unified under a pragmatic worldview that prioritises the research question, the workability of methods, and the practical consequences of knowledge produced (Cherryholmes, 1992).

5.3 Study area and type of research

This study uses a single-case study design, defined by Merriam (2015) as an “intensive, holistic description and analysis of a single, bounded unit” (p. 232). The bounded case is Naseerabad Division in eastern Balochistan, Pakistan, comprising six districts: Jaffarabad, Usta Mohammad, Nasirabad, Sohbatpur, Kachhi, and Jhal Magsi. The unit of analysis for the spatial component is the individual government school, while the qualitative component examines education actors involved in disruption and recovery after the 2022 floods. Naseerabad Division was selected because it combines recurrent flood exposure, educational fragility, and agrarian socioeconomic vulnerability, making it a suitable case for examining differential flood risk to schools (Akhtar & Amjad, 2024; GOB, 2023; OCHA, 2010, 2022). Figures 1 and 2 locate the 2022 flood extent nationally and situate Naseerabad Division within eastern Balochistan.

Figure 1: 2022 Flood Extent, Pakistan (Source: UNOSAT 2022)

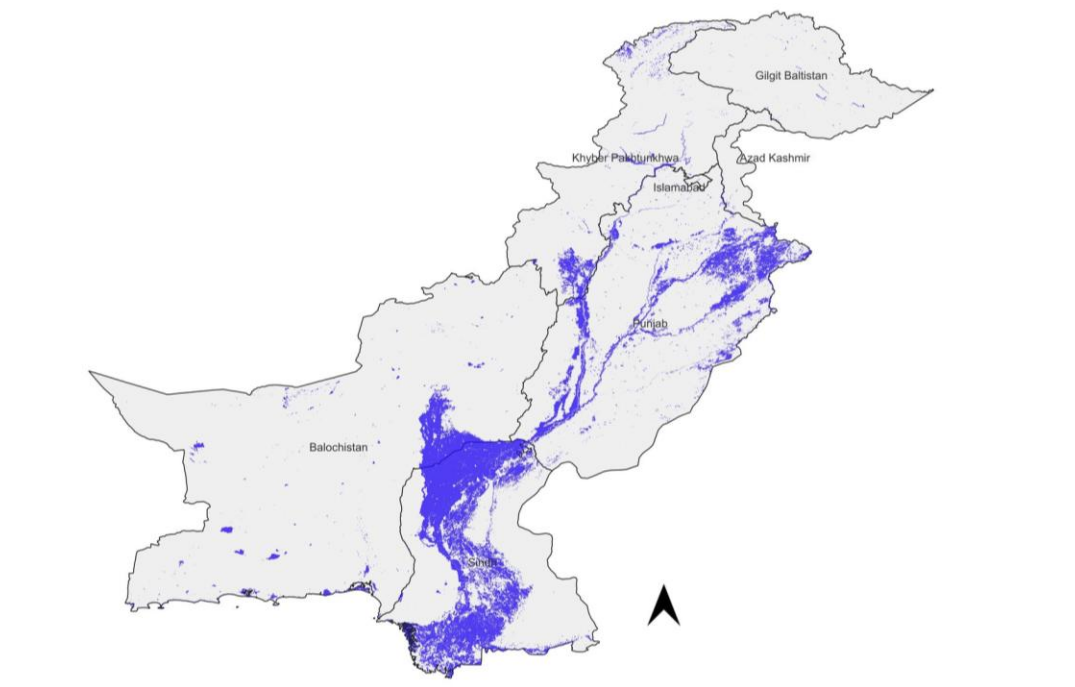


Figure 2: Study Area, Naseerabad Division, Balochistan, Pakistan



5.4 Role of researcher

I must acknowledge my positionality within this research, as I occupy both insider and outsider status simultaneously. I am an insider insofar as I share the same nationality and speak the national language, which facilitated communication with participants. However, Pakistan comprises multiple ethnic identities that are largely provincial, and I do not belong to the province of Balochistan. Furthermore, I am based in a European country, which introduces a layer of distance that could foster trust and shape power dynamics between the participants and me. As Merriam et al. (2001) observe, a researcher can be an insider and outsider “at many different levels and at different times” (p. 411); positionality is thus determined by where one stands in relation to “the other.”

5.5 Qualitative data collection

5.5.1 Sampling strategy and participant profile

In this study, I employ purposive sampling, which deliberately selects participants, contexts, or materials that share characteristics relevant to the phenomenon under study and can meaningfully

address the research question (Creswell & Poth, 2017). This profile was deliberately constructed to capture perspectives across the full institutional spectrum within education, from the school level to the district and provincial levels.

Seven participants were recruited across three institutional levels, with access facilitated primarily through a UNICEF Programme Manager for Balochistan who connected the researcher to relevant contacts across the education system. The participant profile comprised: three teachers and headteachers from schools in Jaffarabad district who experienced the 2022 floods directly at the school level; one civil engineer working in Naseerabad Division with expertise in school building construction and flood-resilient infrastructure; two District Education Managers, one serving Nasirabad district and one with cross-district experience spanning Jaffarabad, Nasirabad, and Sohbatpur during the flood response; and one UNICEF Programme Manager overseeing education programming across twenty districts of Balochistan. I was only put in touch with participants from the districts of Nasirabad and Jaffarabad, as these were the areas my network could access. However, the interview with the UNICEF programme manager, who oversees the entire division, provides a broader, division-wide picture.

I have used the following pseudonyms for the participants to maintain their anonymity.

Table 2: Interview participant profile

Pseudonym	Role	District / Area	Years in role	Gender
Saman	Secondary School Teacher	Jaffarabad	12	Female
Sara	Head Teacher	Jaffarabad	7	Female
Zaryab	District Education Manager	Jaffarabad	4	Male
Waseem	Head Teacher	Jaffarabad	8	Male
Sajjad	District Education Manager	Nasirabad	4	Male
Haseeb	UNICEF Programme Manager	20 districts, Balochistan	8	Male
Ali	Civil Engineer	Naseerabad Division	4	Male

Note. All participants are identified by pseudonym to preserve anonymity. Jaffarabad and Nasirabad are districts within Naseerabad Division, Balochistan.

Seven interviews limit saturation and representativeness; however, the sample was sufficient for the study's exploratory aims and reflected the access constraints of interviewing officials and practitioners about institutional flood response. This aligns with the broader scholarly consensus that the adequacy of purposive sampling depends on what the researcher seeks to know,

the nature of the research question(s), and the available resources (Patton, 2015; Campbell et al., 2020; Hennink & Kaiser, 2022, as cited in Ahmad & Wilkins, 2025).

5.5.2 Interview Design

A semi-structured interview guide was developed around the thematic areas corresponding to RQ2–RQ4: physical school conditions, institutional preparedness and response, and socioeconomic and gendered disruption (see Appendix A).

Interviews were conducted remotely due to the geographic distance between the researcher, based in Europe, and participants located in Balochistan, Pakistan. Six of the seven interviews were conducted via Zoom video call; one was conducted by telephone. Each interview lasted approximately 45 minutes. All interviews were conducted in Urdu, the shared professional language of the participants and the researcher, and the language in which respondents were most comfortable discussing technical and contextual matters. Verbal informed consent was obtained from each participant prior to recording, with the researcher explaining the purpose of the study, the voluntary nature of participation, and the right to withdraw at any point without consequence. All interviews were audio-recorded with participants' agreement.

5.5.3 Transcription and Translation

All seven interviews were transcribed and translated by the researcher. Given that interviews were conducted in Urdu and the thesis is written in English, transcription and translation were carried out simultaneously. My approach was guided by three factors identified by Vulliamy (1990): my own autobiography, my knowledge of the culture under study, and my fluency in the target language of the write-up. Translation prioritised conceptual equivalence over literal rendering, especially for local construction terms. For example, construction types locally referred to as *kacha* (mud or mixed-material) and *pakka* (permanent brick or concrete) were rendered throughout as “mud or mixed-material construction” and “cement-made construction,” respectively, to preserve conceptual clarity for an international readership while retaining fidelity to participants' descriptions.

5.5.4 Qualitative data analysis

The seven semi-structured interviews were analysed using the framework method, a structured approach to qualitative data analysis originally developed by Ritchie and Spencer in the late 1980s

for applied policy research (Gale et al., 2013; Klingberg et al., 2024). The framework method was selected over Thematic Analysis because the study's aims are descriptive and exploratory rather than interpretive. Thematic Analysis typically captures implicit, underlying meanings and develops themes as the analyst's own interpretive construction, and is strongest where the aim is to theorise how participants make sense of their experience (Braun & Clarke, 2013). The present study seeks to document the mechanisms of flood disruption and recovery and to connect them to the spatial findings, rather than to interpret the subjective meanings respondents attach to the floods. As Klingberg et al. (2024, p. 604) explain, Framework Analysis (FA) is helpful for "answering specific questions and creating actionable insights", precisely the logic driving RQ2 through RQ4.

It is acknowledged that the framework method was originally designed for large qualitative datasets, where data management is itself a primary challenge (Gale et al., 2013; Parkinson et al., 2016). With seven interviews, this study does not face that challenge. However, the selection of the method was driven by analytical fit rather than data volume. Parkinson et al. (2016, p. 124) note that the framework method is especially well-suited where data are more factual and can follow a "systematic approach to data analysis".

The analysis adopted a hybrid deductive-inductive approach. After familiarisation with the transcripts, I coded the interviews line by line in NVivo, generating initial descriptive codes from the data. This corresponds to the early stages of the Framework Method, in which the researcher becomes immersed in the data and applies labels to passages that appear analytically relevant (Gale et al., 2013). These initial codes were then organised into a thematic framework structured around the research questions: educational disruption and recovery, institutional and governance capacity, socioeconomic and community vulnerability, and structural and infrastructural vulnerability. This reflects the hybrid deductive-inductive logic of Framework Analysis, where categories can be informed both by prior research questions and by patterns emerging from the data (Gale et al., 2013; Klingberg et al., 2024). The coding process therefore moved from initial descriptive codes to a consolidated framework of analytical categories, which is presented in Appendix B.

A framework matrix was then created in NVivo, with participants as rows and thematic categories as columns. This stage corresponds to what Gale et al. (2013) describe as "charting," in which summarised data are entered into a matrix to allow systematic comparison across cases and themes. In this study, the matrix allowed comparison across participant types and institutional

levels, including teachers, district officials, a UNICEF programme manager, and a civil engineer. It was used to identify recurring patterns, divergences, and connections between physical school conditions, institutional response, and socioeconomic disruption. This comparative function is central to the Framework Method, which is designed to support applied policy research by making patterns across cases visible while retaining links to individual accounts (Ritchie & Spencer, 1994; Gale et al., 2013; Parkinson et al., 2016). A shortened version of the framework matrix is provided in Appendix C.

5.6 Spatial Analysis

5.6.1 Data sources

School-level data were obtained from the Government of Balochistan's Education Management Information System (EMIS), accessible via the official EMIS web portal (www.emis.gob.pk). This system holds records for government schools across Balochistan and includes school names, district and tehsil classifications, school level (primary, middle, high, higher secondary), gender category (boys, girls, co-educational), building construction type (mud or cement), boundary wall status, and enrolment figures. Data was collected from the EMIS portal, including attribute data accessed through the portal's spatial data interface, which provided geographic coordinates for the schools included in the final dataset. The EMIS data used in this study reflect the most recent school records available at the time of data collection, corresponding to the 2023–2024 academic year.

A critical data quality step was applied prior to spatial analysis: the merged dataset was cross-referenced against the most recent functional school list published by the Government of Balochistan to ensure that only schools confirmed as functional at the time of the study were included. Schools recorded as non-functional or closed were excluded. The final cleaned dataset comprises 1,836 functional government schools across the six districts of Naseerabad Division.

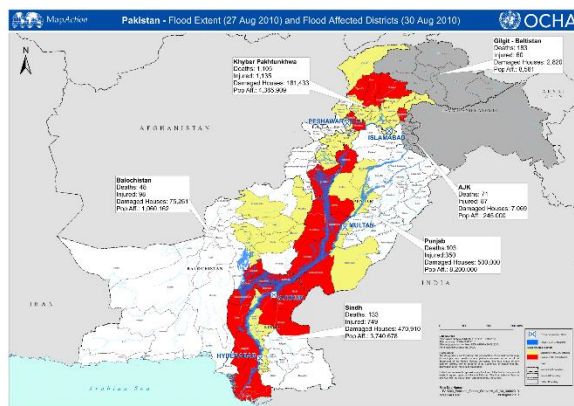
The flood extent data used in this study were obtained from United Nations Satellite Centre (UNOSAT), specifically the cumulative satellite-detected water product for Pakistan covering the period from 1 July to 31 August 2022. This product was derived from VIIRS (Visible Infrared Imaging Radiometer Suite) satellite imagery and represents the cumulative extent of surface water detected across the two-month period encompassing the peak of the 2022 Pakistan monsoon floods. The data were downloaded directly from the UNOSAT website as a shapefile and imported

into QGIS for spatial analysis. The use of a cumulative flood extent product, rather than a snapshot of flood water on a single date, was deliberate. A cumulative product captures the flood's maximum spatial footprint across the season.

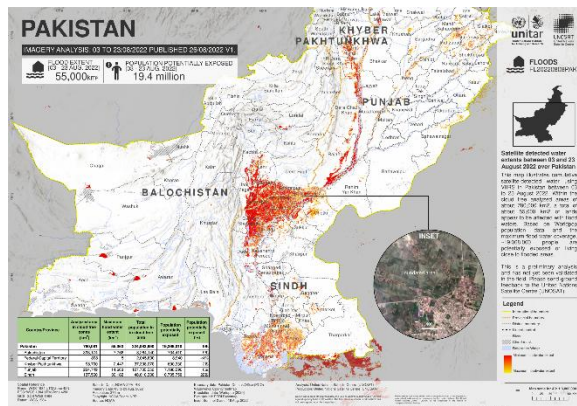
It is important to acknowledge a limitation inherent in this approach. The UNOSAT flood extent represents the observed 2022 event and does not constitute a probabilistic measure of flood hazard; that is, it cannot indicate the likelihood of flooding in any given year under normal or future climate conditions. Schools identified as flooded in 2022 are not necessarily at high annual flood risk, and schools outside the 2022 flood extent are not necessarily safe from future flooding. This distinction between flood event exposure and flood hazard probability is discussed further in the limitations section of this chapter.

To assess whether the 2022 flood extent reflected a recurring flood corridor rather than an isolated spatial anomaly, it was compared with Pakistan's previous major flood extent from 2010 (OCHA, 2010; UNOSAT, 2022). This comparison cannot establish a return period or annual flood probability. However, both events show severe flooding concentrated along Balochistan's eastern corridor bordering Sindh, including the districts of Naseerabad Division. This recurrence supports treating the 2022 extent as a reasonable proxy for flood exposure in the division, while recognising that it cannot substitute for a probabilistic hazard model. Figure 3 shows the two flood extents side by side.

Figure 3: Flood Extent in Pakistan, 2010 and 2022



(a) 2010 flood extent (OCHA, 2010)



(b) 2022 flood extent (UNOSAT, 2022)

5.6.2 Hazard–Exposure–Physical-Sensitivity risk framework

All spatial layers were projected in the WGS 84 geographic coordinate system (EPSG:4326), and all spatial analysis was conducted in QGIS version 3.44.10. Flood status was determined using the Join Attributes by Location function in QGIS, which overlays the school point layer with the UNOSAT flood extent polygon and assigns each school a binary status based on whether its coordinates fall within the polygon. Schools within the flood extent were classified as flooded and included in risk scoring; all others were classified as unflooded and excluded from risk scoring. Because the observed flood extent is treated as a binary exposure layer, it defines which schools enter the risk scoring rather than differentiating between flooded schools. Variation in the final score is therefore carried by enrolment exposure and physical sensitivity.

Exposure is operationalised through enrolment, on the principle that a flooded school serving more children represents a greater magnitude of educational disruption than one serving fewer. Enrolment was divided into three categories using terciles of the enrolment distribution across all schools. Based on terciles, schools enrolling up to 35 pupils are classed as Low exposure (score 1), those enrolling 36 to 73 pupils as Medium exposure (score 2), and those enrolling more than 73 pupils as High exposure (score 3). Where enrolment was missing or recorded as zero (126 schools), a conservative Low exposure score of 1 was assigned. The total student-exposure figures reported in the findings chapter, therefore, represent a minimum estimate.

In the spatial index, vulnerability is operationalised only through physical sensitivity, one of the two components of vulnerability in the IPCC framework. Adaptive capacity is not included in the spatial score because reliable school-level indicators were not available; it is instead examined through the qualitative interviews. Sensitivity captures the physical susceptibility of the school structure to flood damage. The sensitivity component here is therefore a structural measure, built from two indicators available in the EMIS dataset: building construction type and boundary wall status. The choice of these two indicators was informed by the qualitative interviews, in which school staff and district education officials consistently identified both non-permanent construction and the absence of a boundary wall as the physical factors that most amplified flood damage and endangered children. It is also consistent with the school-level flood-vulnerability literature, which identifies mud and temporary construction as the conditions most associated with total structural collapse during floods (Ochola et al., 2010). This grounding of the sensitivity indicators in the interview findings aligns with Creswell and Clark's (2017) description of

instrument development in an exploratory sequential design, in which qualitative insights shape the construction of quantitative measures. It is the first of the two points at which the qualitative and quantitative phases are integrated in this study.

The sensitivity score is constructed additively from a baseline of one. Every flooded school begins with a sensitivity score of 1, to which a further point is added if the school is built of mud or mixed materials, and another if the school has no boundary wall. This produces a sensitivity score ranging from 1 to 3. The baseline of one, rather than zero, reflects the fact that the two available indicators do not capture every source of physical fragility. Building age, the number and condition of classrooms, roofing, and the quality of even permanent construction are not recorded in EMIS, so no school can be treated as entirely free of sensitivity on the basis of construction type and a boundary wall alone.

Construction type is coded from the EMIS building-structure field. Mud and mixed construction each add a point of sensitivity, while pakka (permanent brick or concrete) construction adds none. Boundary wall status adds a point where a wall is absent and none where it is present. For the 183 schools with no recorded construction type, the construction component simply adds no point, and the school is scored on the baseline and its recorded boundary wall status. These schools are flagged in the dataset as having missing construction data, so that the basis of their score is transparent, rather than being excluded from the analysis or assigned an imputed construction value.

The total risk score for each flooded school is the sum of its exposure and sensitivity scores:

$$\textbf{Risk Score} = \textbf{Exposure (1-3)} + \textbf{Sensitivity (1-3)}$$

This produces a risk score ranging from 2 for a small, low-exposure school with a baseline sensitivity to 6 for a large, high-exposure school with mud or mixed construction and no boundary wall.

The framework is additive rather than multiplicative. An additive model was chosen so that a school with low sensitivity still receives a meaningful risk score based on its exposure, rather than being reduced to zero as a multiplicative model would when one component is small. This reflects the reality that a structurally sound but large school in the flood zone poses a substantial educational risk due to the number of children affected, independent of its building quality. The additive form also keeps the two components on the same one-to-three scale, so that neither dominates the score by construction, and the contribution of each remains legible.

The continuous risk scores were grouped into three risk bands using a Jenks natural breaks classification in QGIS, which helps determine the best arrangement of values into different classes (Chen et al., 2013). Applied to the flooded schools, the classification placed breaks between scores of 3 and 4, and between 4 and 5. This yields three bands: Low risk (scores 2-3), Medium risk (score 4), and High risk (scores 5-6). The classification was confirmed both computationally and within the GIS software used for mapping. Together with the unflooded schools, which lie outside the flooded population and are not assigned a risk score, this produces the set of categories carried into the findings chapter.

Hence, the quantitative results identify which schools and districts carry the highest risk scores and map the spatial distribution of that risk, while the qualitative evidence deepens this picture by explaining the institutional and socioeconomic conditions that determine how that risk translates into actual educational disruption. This is the second point of integration between the quantitative and qualitative phases, occurring in the interpretation of findings.

5.7 Ethical Considerations

To maintain rigour and reliability in my research, I followed the practices identified by Gunawan (2015) as central to qualitative research: careful transcription, systematic coding, and triangulation. The interview data were coded across multiple iterations, with codes closely aligned with respondents' actual statements. The study relied on methodological triangulation, combining quantitative spatial analysis with qualitative interviews to examine flood risk through two different data sources. Where the two strands diverged, the difference was not smoothed over but reported as an analytical finding.

To maintain confidentiality, all seven respondents were assigned pseudonyms. Informed consent was obtained before each interview, and participants were made aware of their right to withdraw. The secondary datasets, such as EMIS school records, the UNOSAT flood extent, and World Bank poverty estimates, used in this research are publicly available and posted by official sources.

Chapter 6: Findings

This chapter presents the study's findings. It brings together the two strands of the mixed-methods design: a qualitative analysis of seven semi-structured interviews with actors across the education

system, and a spatial analysis of flood risk across all government schools in Naseerabad Division. The chapter opens with the qualitative findings on overall education disruption after the 2022 floods and insights on one of the indicators of vulnerability: adaptive capacity. The chapter then presents the spatial analysis of where and why risk concentrates. It returns to the qualitative evidence to explain the school-level patterns the index identifies but cannot interpret, and to trace the household economics that convert physical damage into permanent withdrawal. This movement between the quantitative and qualitative strands follows Morgan's (2007) definition of abductive reasoning in mixed-methods research: moving back and forth between different forms of data and theory to answer the research question.

6.1 Educational disruption after the floods

This section presents the findings of the qualitative phase, drawn from seven semi-structured interviews with respondents positioned at different levels of the education system in Naseerabad Division: schoolteachers and head teachers, district education managers, a UNICEF programme manager, and a civil engineer who led post-flood school rehabilitation. Refer to Table 2 for the participant profiles.

Before examining adaptive capacity, the scale of disruption that the system failed to absorb must be established. The 2022 floods produced what respondents consistently described as a severe and widespread collapse of educational activity across Naseerabad Division.

Most respondents estimated the period of direct closure at 3 to 4 months. Sara, a teacher in Jaffarabad, described studies as suspended across the whole of the post-monsoon period:

Studies were very disturbed. For some time, water remained stagnant in our school.

From August to December, we were disturbed. We left this area. Opening the school was not possible. (Sara)

Participants described a chain of consequences beyond the flood itself: standing water that persisted for weeks, contaminated water sources, destroyed furniture and teaching materials, and collapsed boundary walls. Direct flood damage was the first mechanism of school closure, but it was not the only one. Zaryab introduced an important extension: in some areas, the disruption lasted a full year because roads became impassable.

There are villages where, for a whole year after the flood, there was no road for children to go to school. If children go by bike, rickshaw, or local transport, there

is no facility to reach school. Such schools remained non-functional for the entire year. (Zaryab)

This is consistent with evidence from Nepal, where Chaudhary and Timsina (2017) found that 85.9% of students reported being unable to reach school because roads were impassable during flooding. The finding suggests that access infrastructure is an additional, independent condition for educational continuity.

Furthermore, the district education managers identified health consequences for the students. Zaryab highlighted flooded schools accumulated filth and mosquitoes, posing a significant health risk to students, since the structures remained unsanitary for months afterwards. Sajjad highlighted that children and teachers also experienced acute trauma linked to the disasters they witnessed and the displacement many of them went through. Recovery took months, and it was only after district education managers pushed for dedicated Mental Health and Psychosocial Support (MHPSS) sessions that students began to recover.

6.2 Girls' compound vulnerabilities

Female students faced a distinct set of barriers operating at the intersection of cultural norms and menstrual health. An important insight was that the boundary wall served a dual purpose. It acted as a physical barrier, keeping floodwater out of the school. But it also had a social function. Sara explained that in Balochistan, privacy and *parda* are deeply important, and hence a boundary wall makes it acceptable for girls to attend school. Waseem, another headteacher, reiterated the problem when he described how the boundary walls were destroyed during the floods, which directly affected girls' attendance.

The second threat was that many schools, especially girls' schools, had their education disrupted due to severe building damage. With boundary walls, girls feel secure. When they were affected, enrolment declined significantly. Especially on girls' education. (Waseem)

However, the school census data show that 42.4% of all girls' schools across the division lack a boundary wall, and one district exceeds 50% outright (Sohbatpur, 55.3%), with a second sitting exactly at that threshold (Jhal Magsi, 50.0%). Even before the floods, nearly half of all girls' schools lacked the very structure that families require before sending their daughters to school.

Table 3: Boundary Wall Presence in Girls' Schools, by District

District	Girls' total schools	Girls' no wall	Girls' no wall %
Jaffarabad	47	12	25.5%
Usta Mohammad	74	34	45.9%
Nasirabad	127	53	41.7%
Sohbatpur	141	78	55.3%
Kachhi	67	10	14.9%
Jhal Magsi	84	42	50.0%
Total	540	229	42.4%

Note. No wall = number of girls' schools within each district without a boundary wall. Source: EMIS, Government of Balochistan

The second barrier was distance from schools; for cultural reasons, women travelling long distances alone are not deemed appropriate. Saman highlights that middle and high schools are located in town centres, further from rural communities, so the transition from a nearby primary school to a more distant secondary school often marked the point at which girls' attendance ended permanently. This barrier predates the floods and is not specific to the disaster, but it shaped how girls experienced the disruption differently from how boys did. Saman described how girls had managed this constraint by travelling together, but this arrangement was fragile. Once one girl stopped attending, the entire peer group unravelled, and families used the absence of a travel companion as justification to end their daughter's education permanently. Saman's account also linked girls' withdrawal from schooling to early marriage and domestic confinement, suggesting that flood-related disruption can reinforce pre-existing patterns of gendered educational exit.

"She studied up to eighth, that is enough." They marry them off and make them sit at home. [...] If going on foot, it is fine if two or three girls go together. But if they make one sit at home, then [...] she should not go either." And that girl becomes confined to the house. (Saman)

A third dimension, raised by both district education manager Sajjad and UNICEF programme manager Haseeb, concerned menstrual health: the destruction of toilet facilities removed a basic precondition for girls' attendance that pre-flood schools had only marginally met.

Girls are always more vulnerable, mainly due to the lack of menstrual health and hygiene facilities in schools. (Haseeb)

6.3 Poverty: socioeconomic and community vulnerability

Another notable finding from the interviews concerned the socioeconomic conditions of the population. People in these communities were already economically vulnerable, facing high poverty (Ortega et al., 2024). Child labour, exam fees, and transport costs were already barriers to attendance before the flood. Saman described those pre-existing pressures.

The financial problem is: where will they buy notebooks from? Then, the exam fee for board exams, how to pay that? If the school is a bit far from the city, how will I pay the rickshaw fare? Those are the problems. (Saman)

All participants agreed that during the flood months, household attention was entirely on survival, including food, clean water, and milk. Sajjad captured the resulting hierarchy of needs.

When we went to families whose houses were submerged, their only question was: 'Have you brought food for us? Dry milk for our child? Bottles of clean water?' Their minds were completely on survival, not education. (Sajjad)

This sentiment was repeated among multiple participants, such as Waseem, Haseeb, and Zaryab, all of whom were involved in door-to-door enrolment campaigns and had direct interactions with parents. They all reported that the first priority during the floods was basic survival and health. This finding is consistent with the broader literature on education as a normal good: Bandara et al. (2015) and Zhang et al. (2025) document that household demand for education declines as income declines among flood-affected populations.

A major theme that emerged was that child labour was a result of the poverty that families experienced post-flood. When the floods destroyed crops, livestock, and homes of an already poor district, they erased the financial mobility that had allowed some families to keep children in school. Mudavanhu (2014) traces a similar pattern in Zimbabwe, where flood-induced crop and livestock losses led to children being drawn into labour and reduced school attendance. Waseem describes the situation: families now need more sources of income after taking on debt following the flood.

But when they were crushed under those debts... many of their children left school, many children. So we also went to them. But they said that, brother, we are poor anyway. Our child is bringing something home by earning. If we teach him, then who will earn for him? (Waseem)

Another connection drawn by Zaryab was between the condition of the school and child labour, arguing that where a school offered no better environment than the home, sending a child to work became a rational household strategy:

When a school looks bad, fewer children will come. When the child experiences the same heat, sweating, and lack of drinking water at school as at home, the parents think it is better for them to go out and work. (Zaryab)

Furthermore, Waseem highlighted the lack of institutional response to address this major issue. He reported that when he would go on enrolment drives to convince parents to send their children to school, they would raise financial concerns, and he had no roadmap or government solutions to support them. He was candid that the enrolment drives largely failed and explained why.

What could we say to them? That we will give you aid, we will give you money? But we didn't have any such plan from the government's side. Nor had they told us how to convince them. (Waseem)

In sum, families were choosing survival over education out of necessity; there was no institutional response offered to alter that choice. The qualitative evidence indicates that child labour emerges as a rational household strategy when the opportunity cost of schooling exceeds the family's affordability. The literature further identifies a poverty-disaster-education trap in which flood-induced asset losses pull children into the labour market and school attendance collapses (Mudavanhu, 2014; Zhang et al., 2025).

6.4 Vulnerability of primary schools

An important insight concerned the reality of a primary school. Zaryab, the district education manager in Jaffarabad, said that primary schools face another layer of vulnerability, as they tend to be older buildings constructed with weaker materials and are usually single-room classrooms. Since primary schools typically have a single classroom, the destruction of that one room eliminates any alternative space for instruction, leaving no backup rooms to accommodate students.

Primary sections are more at risk because they lack boundary walls, are old, and consist of single classrooms. High schools at least have more than 1 or 2 rooms, so we can use alternate classrooms. In primary grade, we have multi-grade classes, where everyone sits together. Here we don't have any buildings, when the flood comes. (Zaryab)

6.5 Selecting the sensitivity variables

One aim of the qualitative interviews was to identify the types of vulnerability within schools and the communities that serve them, and to determine which of those vulnerabilities could be operationalised as indicators in the spatial risk index. Two primary findings directly informed the index design.

The first concerned construction type. The civil engineer explained that mud or mixed-material schools could not withstand the flooding; nearly all were destroyed. This observation was repeated by Zaryab, the district education manager in Jaffarabad.

In these flood areas, 99% of those kacha² schools collapsed and were demolished.
(Ali)

This finding led to the inclusion of construction type, mud or mixed-material versus cement-made, as one of the two sensitivity indicators in the risk index.

The second concerned boundary walls, which participants described as helping to keep floodwater out of school compounds. Sajjad reported that only about 40 to 50% of schools had boundary walls, and Ali explained the mechanism:

Many of these buildings had no boundary wall. Without a boundary wall or the building raised high, water kept standing. (Ali)

This point was corroborated by Waseem and Sajjad and led to the inclusion of the absence of a boundary wall as the second sensitivity indicator. Together, these two variables, construction quality and boundary wall presence, form the sensitivity component of the risk index. Other sensitivities raised by respondents are not used in this index. Civil engineer Ali and district education manager Zaryab both identified the height of the school building as a second condition, beyond the boundary wall, that determines whether floodwater drains or stands in the compound, and several teachers repeated the same point. Neither of the sensitivity indicators in the spatial index captures this. This study does not use building elevation as a third indicator because it is not recorded in the EMIS dataset the index draws on, unlike construction type and boundary wall status, and no reliable substitute measure was available across all 1,836 schools.

² Mud or mix construction

6.6 Adaptive capacity: a vulnerability indicator

This section uses the interview evidence to assess the adaptive capacity of the education system in Naseerabad Division, that is, how far the system was able to anticipate the 2022 floods, absorb their impact, and recover from them. There was complete consensus across all participants that no flood-preparedness plan for education existed before 2022. Both district education managers revealed clearly that education was entirely absent from any pre-disaster framework. Zaryab and Saman both highlighted that while the government took some steps for the health sector, education itself lacked any proactive planning.

There was no plan from the government side. Looking at health, health had a plan. Health had some facilities on high alert beforehand. But for schools, there was no such plan. No plan for schools or education. (Zaryab)

This is a notable pattern in disaster management more broadly. Bisello et al. (2017, as cited in Pal et al., 2023) observe that in the face of disasters, health and material needs tend to be prioritised over education during the recovery phase. Across the interviews, participants expressed consistent frustration with the government's handling of both flood preparedness and recovery. Waseem drew a direct line between institutional inaction and the long-term educational consequences, arguing that children who are now in child labour might have remained in school had the government responded differently.

If they had handled it properly, some of ours who left and are currently engaged in higher education might perhaps be studying now, or they would have completed their education. (Waseem)

Waseem explained that whatever planning existed was confined to senior levels and never communicated downward as instructions teachers could follow.

No such instructions from the government have come. If they have some planning, then it is limited only to them. But we have not received any such instruction, etc., that we have planned this and that, and that you have to do this and that. (Waseem)

Compounding this was the absence of basic data. Haseeb, who was collecting information during the emergency itself from UNICEF's end, identified the deeper failure that the government lacks updated data and wastes time collecting it during a disaster:

There is no database with the government, no proper setup. During the emergency, we were collecting data on teachers and schools. But we should already know that information before the disaster. (Haseeb)

6.7 Limited government involvement and NGO substitution

A recurrent theme emerged during the interviews with all the participants: the government withdrew from educational recovery, and international organisations filled the vacuum. This NGO-versus-government contrast was the single most consistent cross-cutting theme in the dataset, appearing in every interview. Haseeb highlighted that the government was passively waiting for UNICEF and other organisations to take the lead in the rehabilitation efforts.

The government does not have a plan to support schools, they do not know how to collect data, and they lack a proactive approach for school emergencies. When such situations happen, they always look to UNICEF and provide data that they themselves collected from UNICEF. (Haseeb)

This pattern is consistent with the broader literature on disaster recovery in low-capacity settings. Dalangin (2025) argues that intergovernmental organisations and NGOs may function as critical agents that fill the gaps where government capacity is limited. The participants highlighted that the work involved rebuilding schools and homes, providing school materials for students, working on Temporary Learning Centres, providing precautionary sessions, and taking the lead on the rehabilitation work within education (see Appendix D). Waseem had pointed out that some students preferred the Temporary Learning Centres over their own schools because of the facilities provided by international organisations, such as books and stationery, and the improved learning environment. However, Saman, the teacher from a small village, highlighted that the NGOs mainly worked on school buildings and physical facilities but lacked focus on children's psychosocial needs.

Some NGOs came. First, they looked at the buildings and asked us about them. They were mostly focusing on buildings, surveying what was missing where. They gave something for the washroom facilities. But nothing very special came for the child's own needs. Nothing very special came here. (Saman)

Lassa (2023) also argues that Post-Disaster Needs Assessments (PDNAs) focus too heavily on tangible physical assets and monetary losses, often overlooking non-physical impacts such as the quality of learning and the number of missed school days. The pattern suggests that recovery

efforts help to restore infrastructure but do not fully address the child-centred dimensions of educational disruption.

Furthermore, aid distribution by NGOs was not always equitable: Haseeb noted that nationally based organisations with political affiliations frequently routed assistance through party channels to influential community members rather than to the most affected households.

Others come and provide in the same area. Influential community members divert aid to their own homes. Most of the time, national NGOs are connected to political parties and route aid through those parties to influential people. (Haseeb)

6.8 Community involvement

The participants described how communities and teachers took the initiative during and after the disaster in the absence of government action. Saman revealed that teachers themselves dewatered schools using buckets, hiring labour at their own expense. Waseem, another head teacher, described how teachers went door to door to bring students back to school after the flood:

Through our own help, as much as we could, together with other teachers, if any books or copies were available at school, we managed for the children. We gave a little help. [...] We had to remove the water from the classes and the corridor ourselves. Through buckets, through the children, through the peon, through hired labour. (Saman)

This pattern of community self-reliance is documented in the wider literature. Gul (2024) finds that local communities were often the primary actors in restoring education on a self-help basis, cleaning schools and providing uniforms and books, whereas government rehabilitation was frequently viewed as insufficient or failing to follow through on funding promises.

Across these accounts, a consistent picture emerges: the education system in Naseerabad lacked the institutional preparedness, data infrastructure, and financial accountability required for effective disaster response. One interesting insight came from Zaryab, who noted that the Benazir Income Support Programme, a national conditional cash transfer tied to child enrolment, had sustained attendance among some families who were otherwise disengaged from education. Because the payment depended on the child being in school, it directly affected the household's economic costs of attendance, whereas the awareness-based enrolment drives did not. The contrast suggests that adaptive capacity at the household level can be enhanced, and that this may, in turn,

increase enrolment, but only through instruments that address the economic barrier (Cardinal, 2020).

6.9 The school composition and the scale of flood exposure

Before presenting the risk analysis, it is necessary to establish the scale and composition of the schools affected by the flood. Naseerabad Division contains 1,836 functional government schools enrolling 161,424 children. Table 4 provides a breakdown of schools by district. There are a few notable highlights from the schools' breakdown.

First, the schools are overwhelmingly primary. Of the 1,836 schools, 1,496 (81%) are primary schools. Middle, high, and higher secondary schools together account for fewer than one in five. Second, boys' schools outnumber girls' schools by more than two to one across the division (1,296 to 540), and the imbalance is sharpest in Kachhi, where boys' schools outnumber girls' schools by more than four to one (289 to 67). This helps to set the scene for the Naseerabad division.

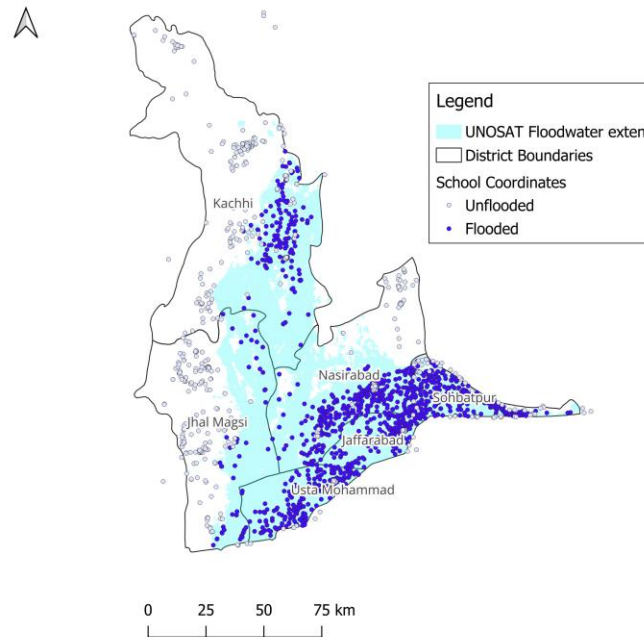
Table 4: School Breakdown of Naseerabad Division by District, Gender, Level, Enrolment, and 2022 Flood Status

District	Total	Boys	Girls	Primary	Middle	High	H. Sec	Enrolment	Flooded	Flood %
Jaffarabad	175	128	47	149	15	11	0	20,176	161	92.0
Usta Mohammad	223	149	74	180	25	16	2	25,524	207	92.8
Nasirabad	415	288	127	330	43	37	5	38,962	326	78.6
Sohbatpur	411	270	141	342	40	28	1	34,832	344	83.7
Kachhi	356	289	67	291	30	33	2	25,911	149	41.9
Jhal Magsi	256	172	84	204	30	21	1	16,019	59	23.0
Total	1,836	1,296	540	1,496	183	146	11	161,424	1,246	67.9

Note. H. Sec = higher secondary. Unflooded schools are 590.

Figure 4 maps the distribution of schools in the division, overlaid with the floodwater extent in 2022. Flooded schools, shown in dark blue, dominate the eastern half of the division, tracing the path of the floodwater from Usta Mohammad in the south through Jaffarabad, Nasirabad, and Sohbatpur. Unflooded schools are concentrated in the western and northern parts of Kachhi and Jhal Magsi.

Figure 4: Government Schools in Naseerabad Division by 2022 Flood Status



Note. Shown over the UNOSAT floodwater extent.

The flood extent reflects the underlying topography of eastern Balochistan, an area NDMA (2025) describes as particularly flood-prone due to its terrain and proximity to major river systems, leaving it exposed to hydrological hazards during periods of intense rainfall. The region's low-lying land and proximity to the Indus River make it especially susceptible to overflow (NDMA, 2025)

This pattern is consistent with broader observations about the geography of vulnerability. Woodward (2019) argues that human life concentrates in what he calls the Goldilocks zone: conditions that are not too extreme for communities to live in. Applying this logic to Naseerabad, schools sit inside the same zone that makes the division agriculturally viable: they are built near population centres and agricultural land, along the canals and floodplains that sustain livelihoods but also deliver floodwater. In this sense, the same geography that supports the region's economy also produces its flood exposure. Douglas et al. (2008) observe that poor communities often build homes and grow food on river floodplains in towns and cities, placing both livelihoods and social infrastructure in the path of recurrent hazard.

6.10 Classifying flood risk

Each of the 1,246 flooded schools was scored on a composite scale combining exposure (derived from enrolment) and sensitivity (derived from construction type and boundary-wall presence), each scored one to three, summed to give a risk score of two to six. A Jenks natural-breaks classification applied in QGIS placed breaks between scores three and four, and between four and five, producing three risk bands: low (scores 2–3), medium (score 4), and high (scores 5–6). Table 5 presents the result.

Table 5: Flood Risk Classification of Flooded Schools

Risk band	Schools	% of flooded schools	Children enrolled	% of children	Avg enrolment
Low (2–3)	504	40.4	12,802	12.6	25
Medium (4)	503	40.4	58,699	57.6	117
High (5–6)	239	19.2	30,440	29.9	127
Total	1,246	100	101,941	100	82

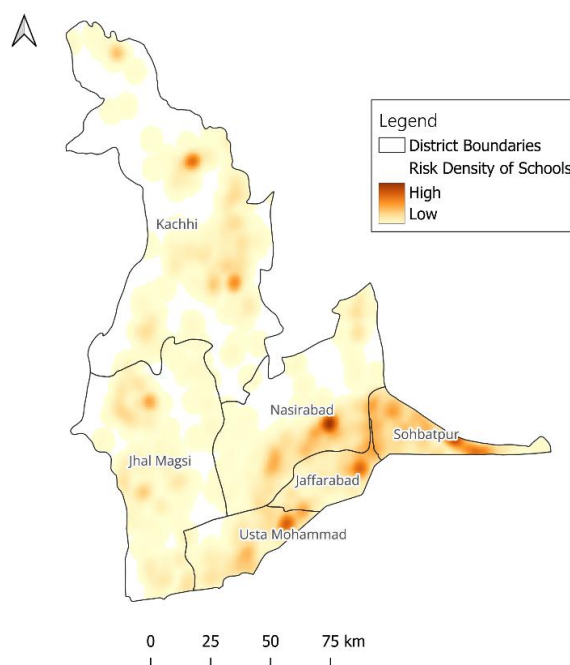
Table 5 shows that medium- and high-risk schools together account for 742 of the 1,246 flooded schools, exceeding both the 504 low-risk schools and the 590 schools that did not flood at all. Furthermore, high-risk schools are a minority, close to one in five, but they hold a disproportionate share of children: 19% of flooded schools, which are high risk, contain 30% of the children. The medium band is the largest single category based on enrolment, with 58,699 children, accounting for more than half of all children in flooded schools. This medium-risk band should not be read as a lower priority simply because it falls below the high-risk threshold; targeted measures such as boundary wall repairs or drainage improvements could reduce its risk score before the next flood season.

District Level Bifurcation

To further bifurcate the risk of schools across districts, kernel density estimation (KDE) was applied to visualise the spatial concentration of school-level risk across the division (Figure 5). KDE is a non-parametric method that estimates the density of point locations across a continuous surface, producing a smooth heatmap that reflects how tightly schools of a given value cluster in space (Amador Luna et al., 2024). Figure 5 shows risk concentrating at the junction of Nasirabad, Jaffarabad, and Sohbatpur. A second, smaller peak appears in central Kachhi, and a diffuse band of moderate risk extends along the rest of the eastern corridor through Sohbatpur towards the coast.

Jhal Magsi and northern Kachhi remain pale throughout, consistent with their lower flood exposure (Table 6).

Figure 5: Kernel Density of School Risk (Risk Score 2–6)



Note. The eastern corridor cluster and the Kachhi cluster are spatially distinct.

Table 6 disaggregates the risk bands by district. Jaffarabad records the highest share of its flooded schools in the high-risk band (24%), followed by Kachhi (22%) and Nasirabad and Sohbatpur (both 19%), while Jhal Magsi sits well below the rest at 7%. In absolute terms, however, Sohbatpur and Nasirabad carry the greatest burden, with 64 and 62 high-risk schools respectively, holding 8,250 and 7,526 children between them, more than half of all children enrolled in high-risk schools across the division.

Table 6: Schools in Risk Categories by District (Flooded Schools)

District	Flooded	Low	Low %	Medium	Med %	High	High %	Children in high-risk
Jaffarabad	161	61	38	62	39	38	24	5,063

District	Flooded	Low	Low %	Medium	Med %	High	High %	Children in high-risk
Usta Mohammad	207	89	43	80	39	38	18	5,647
Nasirabad	326	127	39	137	42	62	19	7,526
Sohbatpur	344	143	42	137	40	64	19	8,250
Kachhi	149	53	36	63	42	33	22	3,692
Jhal Magsi	59	31	53	24	41	4	7	262
Total	1,246	504	40	503	40	239	19	30,440

6.11 What is driving risk in each district?

The composite risk score is the sum of exposure and sensitivity, so understanding what drives risk in each district requires decomposing the score into its two parts. Table 7 sets out the component averages by district and shows that different districts reach high risk for different reasons, with direct implications for what needs to be addressed where.

In the eastern corridor, the primary driver of risk is high enrolment. Jaffarabad, Sohbatpur, Nasirabad, and Usta Mohammad all record high average exposure scores (1.94–2.11), reflecting the fact that these districts contain the division’s larger schools, averaging 77–90 pupils per flooded school, while their sensitivity scores are comparatively moderate (1.67–1.76). The risk in these districts is therefore primarily a function of scale: large schools in the flood path place many children at risk, even when the buildings themselves are not the weakest. The intervention priority here is managing the consequences of flooding for large school populations through early warning systems, evacuation planning, and the provision of temporary learning spaces (INEE, 2024). The province’s post-flood assessment (GOB, 2022) itself identified district-based early warning systems and evacuation plans as priority actions, yet as the qualitative evidence on adaptive capacity shows, none of these measures existed in Naseerabad before the 2022 floods.

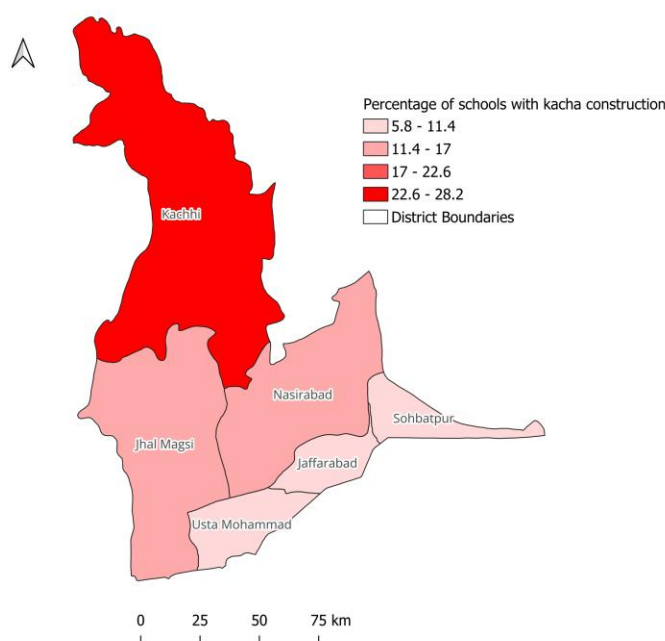
Table 7: Risk Components by District (Flooded Schools)

District	Flooded	Avg risk	Avg exposure	Avg enrolment	Avg sensitivity	% mud/mixed	% no wall
Jaffarabad	161	3.78	2.11	90	1.67	10.6	56.5
Usta Mohammad	207	3.69	1.94	78	1.74	5.8	68.6
Nasirabad	326	3.75	1.99	77	1.75	14.1	61.0

District	Flooded	Avg risk	Avg exposure	Avg enrolment	Avg sensitivity	% mud/mixed	% no wall
Sohbatpur	344	3.69	1.94	87	1.76	7.6	68.0
Kachhi	149	3.81	1.83	64	1.98	28.2	69.8
Jhal Magsi	59	3.49	1.64	54	1.85	13.6	71.2

Note. “% mud/mixed” = share of flooded schools built from mud or mixed-material construction.

Figure 6: Share of Flooded Schools Built From Mud or Mixed-Material Construction, by District



Note. Kachhi (28.2%) stands apart from the other five districts (5.8–14.1%).

Kachhi tells a different story. This district records the highest average sensitivity score in the division (1.98), with the highest share of mud or mixed-material construction (28.2%) (see Figure 6). Its average exposure, by contrast, is lower than any of the four eastern-corridor districts (1.83 versus 1.94–2.11), because its schools are smaller (64 pupils on average). Jhal Magsi records the lowest exposure score in the division overall (1.64), but its low sensitivity score (1.85) and low flood exposure rate (Table 6) mean it does not carry the same combined risk as Kachhi.

Poverty and risk

Poverty is widely recognised as a driver of disaster vulnerability, not because it causes direct hazard exposure, but because it determines the capacity of households and institutions to anticipate, absorb, and recover from damage (Askman et al., 2018). The World Bank combines the Pakistan Social and Living Standard Measurement Survey (PSLM 2019–20) and the Household Income and Expenditure Survey (HIES 2018–19) to produce district-by-district poverty rates (Ortega et al., 2024). As Table 8 shows, Kachhi and Nasirabad have the highest poverty rates in the division.

Table 8: District Poverty Indicators, Naseerabad Division

District	Poverty Rate (%)
Kachhi	48.91
Nasirabad	48.84
Jaffarabad	33.26
Sohbatpur	24.90

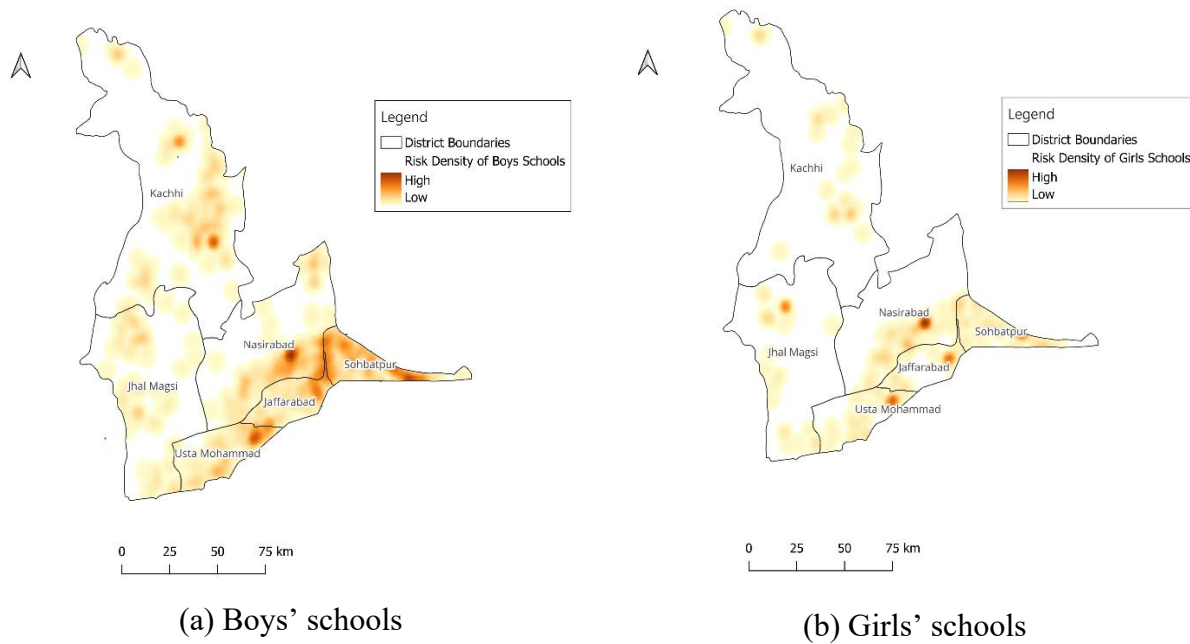
Note. Poverty rates from the World Bank Poverty Map 2019–20, Pakistan. Estimates are not available for Usta Mohammad (administratively part of Jaffarabad at the time of the survey) or Jhal Magsi (not sampled).

On construction quality, across the four districts for which poverty data are available, the two poorest have the weakest school construction. Kachhi, with a poverty rate of 48.91%, records the highest share of mud or mixed-material construction among its flooded schools. Nasirabad, nearly identical in poverty (48.84%), records 14.1% mud or mixed-material construction. Whether poverty directly constrains the budget available for school construction, or whether poorer districts receive less government investment in infrastructure, cannot be determined from these data alone. Mudavanhu (2014) documents the same pattern in Zimbabwe, where poverty and a lack of resources to maintain school structures left buildings vulnerable to flooding, creating a cycle in which the communities most exposed to hazards are also the ones with the least resilient infrastructure.

Gender

To examine how risk varies by school gender³, two risk density maps were produced (Figure 7). The boys' map shows a broader and more intense concentration of risk across the eastern corridor and in central Kachhi, reflecting larger enrolment and higher exposure. The girls' map is more localised, with the strongest density in Nasirabad. This lower density on the index should not be read as lower vulnerability, because the dimensions on which girls' schools score better (smaller size, higher wall presence) are not the dimensions on which girls' education is most fragile.

Figure 7: Kernel Density of Flood-Risk Concentration Among Government Schools, by School Type



Note. Darker shading indicates a higher spatial concentration of at-risk schools. Both panels share the same density classification.

Table 9 confirms the pattern quantitatively. Girls' schools average a risk score of 3.40, compared with 3.85 for boys', and only 8.6% fall into the high-risk band, compared with 23.5% for boys' schools. The decomposition shows why: girls' schools are smaller (64 pupils vs 89) and more likely to have a boundary wall (53.3% walled vs 27.3%).

³ In Balochistan, government schools are typically single-sex, with separate schools designated for boys and girls (GOB, 2023)

Table 9: Risk and Its Components by School Gender (Flooded Schools)

Group	n	Avg risk	Avg exposure	Avg enrolment	Avg sensitivity	% high risk	% boundary walls
Boys' schools	884	3.85	2.01	89	1.85	23.5	27.3
Girls' schools	362	3.40	1.80	64	1.60	8.6	53.3

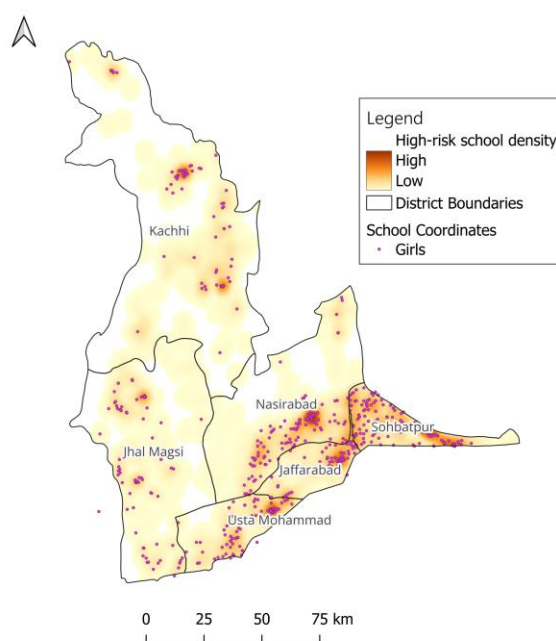
However, the qualitative evidence shows that girls face a higher risk of dropout than the index suggests, for reasons the spatial analysis cannot capture. When a boundary wall is destroyed, it removes the privacy parents require before sending their daughters to school and often coincides with the destruction of WASH facilities. The loss of a travel companion can end a girl's schooling outright, since girls in this context rarely travel alone. These barriers operate beneath the level the index can measure, so the spatial distribution of the highest-scoring girls' schools is only the starting point for a response that must also reach the schools the index ranks lower.

In terms of the risk index, the 31 girls' schools that reach the high-risk band are concentrated in the eastern corridor, with a further cluster in Kachhi (Figure 8): 14 in Nasirabad, 6 in Kachhi, 4 each in Jaffarabad and Sohbatpur, and 3 in Usta Mohammad.

Table 10: High-Risk Girls' Schools and Their Enrolment by District (Flooded Schools, Risk Score 5–6)

District	High-risk girls' schools	Enrolment
Nasirabad	14	1,154
Kachhi	6	526
Jaffarabad	4	514
Sohbatpur	4	484
Usta Mohammad	3	293
Jhal Magsi	0	0
Total	31	2,971

Figure 8: Girls' Schools Shown Over the High-Risk School Density Surface



Note. High-risk girls' schools are concentrated in Nasirabad.

Literacy

Attention should not stop at the high-risk band. Because disruption in girls' schools compounds into dropout more readily than in boys', medium- and low-risk girls' schools warrant the same scrutiny. Schools in Nasirabad warrant extra attention (Table 11): it has the lowest overall literacy rate in the division (29.0%) and the lowest girls' literacy rate (21.2%), and it holds the largest concentration of high-risk girls' schools, enrolling 1,154 girls. Against a girls' literacy rate of 21.2%, flood-induced dropout threatens to push an already fragile system into further decline.

Table 11: District Literacy Rates by Gender, Naseerabad Division

District	Literacy (%)	Rate	Boys' Literacy (%)	Girls' Literacy (%)
Jaffarabad	35.5	44.3	26.4	
Usta Mohammad	n/a	n/a	n/a	
Nasirabad	29.0	36.4	21.2	
Sohbatpur	41.0	53.3	28.4	
Kachhi	30.2	36.5	23.2	

District	Literacy (%)	Rate	Boys' Literacy (%)	Girls' Literacy (%)
Jhal Magsi	30.1		37.9	22.1

Note. Source: Government of Balochistan, Planning & Development Department.

School level

The level decomposition follows a clear pattern. Primary schools have the lowest average exposure of any level (1.77), because they enrol the fewest students (49 on average), and the highest average sensitivity (1.85), because they are the most likely to be built from non-permanent materials. The index records both facts simultaneously: primary schools score lower on exposure and higher on sensitivity. As the level rises, the relationship inverts: higher secondary schools enrol, on average, 637 students, giving them the highest exposure score (3.00), while their newer, larger buildings produce the lowest sensitivity (1.17). Table 12 sets this out across all four levels.

Table 12: Risk and Its Components by School Level (Flooded Schools)

Level	n	Avg risk	Avg exposure	Avg enrolment	Avg sensitivity
Primary	1,029	3.63	1.77	49	1.85
Middle	119	4.15	2.65	147	1.50
High	92	4.20	2.92	328	1.27
Higher secondary	6	4.17	3.00	637	1.17

Note. The higher secondary row is based on only 6 schools. Its figures should be read as indicative rather than representative, given the small sample size relative to the other three levels.

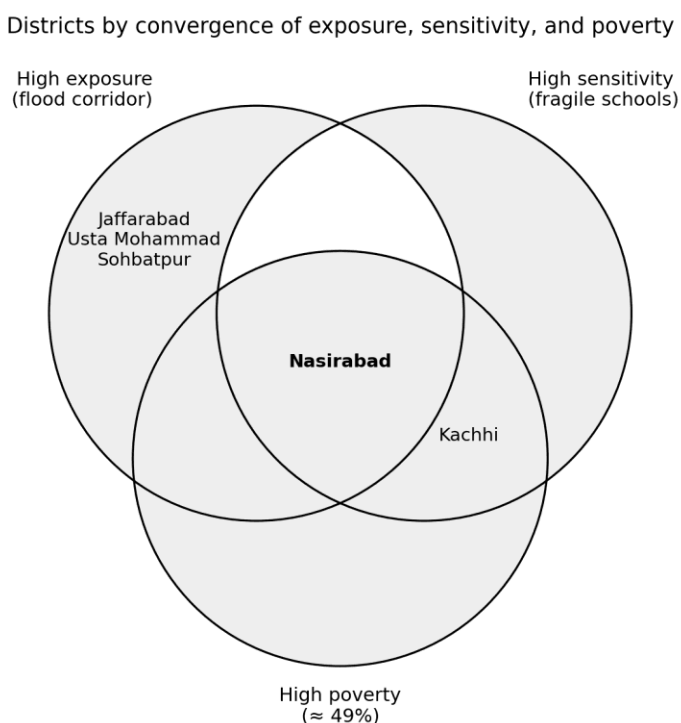
The risk ranking across levels is therefore a function of school size, rather than the sensitivity component. What the sensitivity score does not capture, and what the qualitative evidence adds, is that primary schools are typically built as one or two rooms, so the loss of a single room can close the school entirely, with no remaining classrooms to fall back on. Since there is no data on the number of classrooms in a school available at this level, the index cannot capture this nuance. Primary schools, therefore, face a structural vulnerability that the index captures only indirectly: they are the most fragile in construction yet the smallest in enrolment, so the sensitivity that matters most, the loss of a single room, is invisible to a score built on construction type and pupil count.

6.12 The schools most at risk: an integrated prioritisation

Bringing the spatial and qualitative evidence together allows the analysis to move from describing risk to prioritising response. At the district level, three conditions identify where attention is most needed: exposure (the number of students in the flood path), structural fragility (high sensitivity),

and household poverty (limited capacity to recover), the last drawn from the qualitative interviews. A fourth qualitative signal was that girls' faced heightened likelihood of dropout. Each condition is met by a different subset of districts. The exposure condition is met by the eastern corridor: Jaffarabad, Usta Mohammad, Nasirabad, and Sohbatpur, which contain the division's largest school enrolments. The fragility condition is met by Kachhi and, to a lesser degree, Nasirabad, both of which have weaker school infrastructure. The poverty condition, measured at a headcount of around 48% or higher, is met in Nasirabad and Kachhi. Of the four districts with available poverty data, only Nasirabad meets all three; poverty data are unavailable for Usta Mohammad and Jhal Magsi, so their position against this condition cannot be assessed. Nasirabad lies in the corridor, has structurally sensitive schools, is among the poorest, has the lowest girls' literacy in the division (21.2%), and contains 14 of the 31 high-risk girls' schools. Nasirabad also contains a large number of primary schools, which the qualitative evidence identifies as a priority. Figure 9 expresses this convergence.

Figure 9: Districts by Convergence of Exposure, Sensitivity, and Poverty



Note. Jhal Magsi – outside all three conditions (low exposure, lower risk-profile). Nasirabad sits in the triple overlap. The map is built on the district-level conditions; the gender and school-level signals operate within districts and are taken up in the school-level tiers below.

Sohbatpur and Nasirabad have similar high-risk school counts (64 and 62), but the nature of the risk differs between them. Sohbatpur's risk is exposure-led: low poverty, few fragile buildings, and schools entering the high-risk category through size and position. Nasirabad reaches a comparable count through the convergence of exposure, sensitivity, and poverty, making it the district with the strongest claim on limited resources. Kachhi is the second priority: the most fragile schools in the division and among the poorest households, where a future flood would convert latent fragility into realised loss.

Table 13: District-Level Prioritisation

District	In flood corridor	School Fragility	Poverty (%)	High-risk schools	Children at high risk	Priority type
Jaffarabad	Yes	Moderate	33.3	38	5,063	Exposure-led
Usta Mohammad	Yes	Moderate	n/a	38	5,647	Exposure-led
Nasirabad	Yes	High	48.8	62	7,526	Convergence (highest)
Sohbatpur	Yes	Low	24.9	64	8,250	Exposure-led
Kachhi	No	Highest	48.9	33	3,692	Fragility + poverty
Jhal Magsi	No	Moderate	n/a	4	262	Lower

Note. Poverty rates from the World Bank Poverty Map 2019–20. Fragility label reflects each district's share of mud or mixed-material construction

Taken together, these tiers translate the analysis into an action sequence. The district-level convergence identifies where limited resources should be concentrated first, while the school-level tiers identify which schools within those districts should be reached before the next flood season.

Chapter 7: Discussion

To answer the research question, this study finds that hazard, exposure, and physical sensitivity intersect to produce differential educational risk across schools. Districts reach high risk through different pathways: either through large, exposed school populations or through structurally weak buildings. The type of risk that dominates in each district therefore calls for a different disaster risk reduction response. In the eastern corridor, where risk is driven primarily by large exposed enrolments, the priority is to manage the consequences of flooding for large school populations through early warning systems, evacuation planning, temporary learning provision, and, where needed, double-shift schools or alternative learning spaces (INEE, 2024). In Kachhi, where risk stems more from construction quality, the priority is investment in the physical

condition of school buildings, including permanent construction, drainage, elevation, and boundary walls.

This distinction is important because it shows that risk reduction cannot be reduced to flood control alone. Smit and Wandel (2006, cited in López-Marrero and Yarnal, 2010) argue that building adaptive capacity requires addressing the full range of conditions that create unsafe situations, rather than treating the hazard itself as the only object of intervention. The interviews surface several such conditions in Naseerabad: fragile school buildings, weak institutional planning, severe poverty, and gendered barriers to education. Before the 2022 floods, the education system had addressed none of these systematically. As a result, the floods did not simply disrupt schooling; they exposed the absence of institutional capacity to anticipate, absorb, and recover from the shock.

This absence is clearest in relation to planning. The Government of Balochistan's Flood Recovery Plan calls for education systems to be integrated into national recovery tracking and for school-level bodies to support safe reopening and community mobilisation (GOB, 2022). Similarly, the Sendai Framework calls for disaster risk reduction to be integrated into development planning, while the INEE Minimum Standards require education authorities to build disaster risk reduction into education sector plans (UNDRR, 2015; INEE, 2024). However, the interviews show that these commitments had not translated into a functioning district-level plan. No respondent, including the two district education managers, described school-level disaster plans, warning protocols, evacuation procedures, emergency education funds, or clear instructions reaching schools before the flood. In Naseerabad, then, the problem is not the absence of guidance, but the failure of guidance to become operational. Bromley and Andina's (2010) concept of "decoupling" is useful here: formal policy exists, but it is disconnected from practice at the level where schools actually experience disaster.

What adaptive capacity did exist came largely from outside the education system. The government response prioritised health, which matters for overall disaster response capacity, but within education the primary source of support was external actors. NGOs and international organisations, principally UNICEF, kept schools from closing entirely by rebuilding structures, distributing materials, and running Temporary Learning Centres. Wamsler et al. (2012) distinguish between measures that directly reduce a component of risk and measures that build a society's own

capacity to reduce risk going forward. The NGO response in Naseerabad falls largely into the first category: it addressed immediate damage but did not necessarily build the district's capacity to plan for the next flood. The risk is that the more reliably NGOs fill the gap, the less pressure there is on the government to build that capacity itself. In this way, the coping mechanism and the institutional gap it covers can continue side by side.

A third source of adaptive capacity came from teachers and communities themselves. The qualitative evidence shows that they adjusted to the disaster's aftermath without waiting for institutional support, cleaning schools, salvaging materials, and mobilising families to bring children back. These actions restored partial function to schools that the state had made no provision to protect. However, this should not be romanticised as resilience. It was coping under conditions of institutional absence. The difference matters because coping may allow schooling to resume after one disaster, but it does not necessarily reduce vulnerability before the next.

The socioeconomic findings show why physical reopening is not the same as educational recovery. Poverty in Naseerabad was high before the floods arrived, and the education system was already fragile, with low literacy rates and schools lacking basic facilities. The interviews show how this fragility shaped household decisions. Parents weighed the difficulty of sending children to schools without water, proper buildings, or supplies against the immediate income a working child could bring. In this context, child labour was not simply a matter of parental preference or low awareness; it was a rational household response to economic pressure. This supports the literature that identifies income shock and opportunity cost as central mechanisms through which floods disrupt education, especially in agrarian settings where crop loss directly affects household survival (Mudavanhu, 2014; Muñoz-Morales, 2025). This has direct implications for recovery. If poverty is one of the mechanisms through which flood risk becomes dropout, then education recovery cannot rely only on rebuilding classrooms or encouraging families to return. It must also change the material conditions under which schooling decisions are made. Participants noted that children preferred Temporary Learning Centres because NGOs provided learning materials and better facilities, suggesting that even modest improvements in school quality can shift household calculations. Providing basic supplies, transport support, and safer facilities would reduce the opportunity cost of schooling from the school side, while conditional cash transfers would address the same withdrawal mechanism from the income side (Cardinal, 2020). In this sense, social

protection is not external to disaster recovery; it is one of the conditions that determines whether children return to school.

Gender sharpens this point further. The spatial index identifies risk partly through enrolment, which means girls' schools may appear less risky because they often enrol fewer children. Yet the interviews suggest that girls' education is more fragile in practice. For girls, boundary walls, toilets, privacy, and safe routes are not secondary facilities; they are conditions that make attendance socially acceptable. Once these are damaged, families may withdraw girls even after schools formally reopen. This aligns with disaster and gender literature showing that floods intensify pre-existing gender inequalities by increasing domestic responsibilities, mobility restrictions, early marriage risk, and parental concerns about safety (Fordham, 2013; Gul et al., 2024). The implication is that risk scores must be interpreted alongside gendered vulnerability. A girls' school with lower enrolment may still require urgent prioritisation if damage to privacy, sanitation, or safe access increases the risk of permanent withdrawal.

The long-term implications of this disruption are significant. Andrabi et al. (2020) studied a different disaster in the same country and found that four years after the 2005 Pakistan earthquake, household living standards had fully recovered, but children whose schools had closed for an average of 80 days remained 1.5 to 2 years behind their peers. The closures respondents described in Naseerabad lasted three to four months on average, and considerably longer where roads remained impassable. If a similar relationship holds here, then the learning deficit created by the 2022 floods will not be closed by household recovery or school reopening alone. Pinto and Jones (2020) show that learning loss carries long-term economic costs, since a one standard deviation gain in cognitive test scores is associated with a 10 to 20 per cent increase in adult wages. The cost of the 2022 closures may therefore become visible only years later, in reduced learning, lower progression, and weaker future livelihoods.

Two interventions from the literature address this kind of loss directly. Teaching children at their current ability level, rather than continuing the grade-fixed curriculum as scheduled, can help recover lost learning faster than standard instruction (Cardinal, 2020). Conditional cash transfers address the withdrawal mechanism from the household-income side by making continued enrolment materially possible. Neither appears to have featured centrally in Naseerabad's recovery so far. Both could be incorporated into future disaster response planning alongside physical reconstruction.

Finally, the relationship between education and adaptive capacity is circular. Wamsler et al. (2012) argue that formal education can strengthen adaptive capacity by shaping how individuals and communities identify risk, access support, and respond to climate-related disasters. At the same time, disasters can negatively affect education itself, thereby reducing future adaptive capacity and reproducing vulnerability over time. This is directly relevant to Naseerabad Division. The floods disrupted schooling in a province that already has the lowest literacy rate in Pakistan, meaning that educational loss is not only an outcome of weak adaptive capacity, but also a mechanism through which weak adaptive capacity may be reproduced. If prolonged school closure reduces learning, progression, and return to school, then the 2022 floods may deepen the very conditions that make communities less able to prepare for and recover from future disasters.

7.1 Limitations

Several limitations of the study's methodology warrant explicit acknowledgement.

First, the flood extent data used to identify flooded schools represents the observed 2022 event rather than a probabilistic measure of flood hazard. Schools outside the 2022 flood extent are not necessarily at low long-term flood risk, and schools within it are not necessarily flooded every year. The 2022 extent is therefore used as a proxy for recurrent flood exposure, a reasonable assumption given that the same corridor was also affected in 2010, though this should be treated with caution: flood corridors shift between events, and the proxy cannot fully substitute for a probabilistic hazard model. A related data gap concerns pluvial (rainfall) flooding; such data are not yet publicly accessible in Pakistan and making them available would enable more comprehensive future assessments.

Second, qualitative interviews identified school elevation as an additional determinant of flood damage, yet elevation data were not available in the EMIS dataset and could not be incorporated into the spatial index. Neither of these gaps should systematically bias the risk ranking, but they do mean the index underestimates structural vulnerability in some schools and does not capture a condition that participants identified as significant.

Third, adaptive capacity is examined qualitatively rather than measured at the school level, so the institutional and socioeconomic mechanisms discussed in this chapter are evidenced as mechanisms rather than tested as statistically generalisable across all schools in the division. Poverty and literacy data were also unavailable for Usta Mohammad and Jhal Magsi, respectively, which limits how far the poverty-risk association can be extended to those two districts.

Fourth, the qualitative component is based on seven interviews. Hence, the findings cannot be considered representative of all educational stakeholders across the division. They are treated in this study as illustrative and interpretive rather than statistically generalisable. The composition of the sample is a further limitation. Of the seven respondents, five were male officials or managers, and one was a UNICEF programme manager, leaving two female teachers as the only respondents with direct classroom experience; no parents, students, or girls themselves were interviewed. Every claim about girls' disruption, dropout risk, or the compound barriers described earlier in this chapter is therefore mediated through the accounts of teachers and officials rather than drawn from girls' own testimony. Furthermore, the sample does not include participants from other districts in Naseerabad division apart from Nasirabad and Jaffarabad due to limitations in accessing those actors. Hence, this thesis should be read with these limitations in mind.

Conclusion

Flooding is globally the most frequent and costly natural hazard, and its effects on education are well documented: damaged buildings, disrupted access, learning loss, and increased child labour (Field et al., 2012; Lassa et al., 2023; Bandara et al., 2015). The IPCC defines risk as the interaction of hazard, exposure, and vulnerability, yet most school-level flood assessments examine only one or two of these components, leaving out the others (UNESCO-IIEP, 2024; Ochola et al., 2010). There is also a gap in the context of Pakistan which is very flood-prone. This gap matters because risk is not uniform across schools; districts reach high risk for different reasons, and the type of risk that dominates determines what response is needed. In this study, I address this gap by combining a spatial risk index built on the IPCC framework and applied to all 1,836 government schools in Naseerabad Division, Balochistan, with qualitative interviews with seven education stakeholders, including headteachers, district education managers, a civil engineer, and a UNICEF programme manager.

The spatial analysis shows that 1,246 schools, or 67.9% of government schools in the division, fell within the 2022 flood extent. The index further reveals that high-risk schools represent only 19% of flooded schools but hold 30% of enrolled children in flooded schools. Risk is concentrated in two distinct clusters: an eastern corridor where large schools sit in the flood path, and Kachhi, where the most fragile school buildings are concentrated. The district of Nasirabad stands out as the district where exposure, fragility, and poverty converge, making it the

strongest claim on limited resources. A further finding is the gender paradox. Girls' schools score lower on the risk index because they enrol fewer children, yet qualitative evidence shows that girls face a higher risk of permanent dropout. The destruction of a boundary wall removes the privacy parents require, the loss of a travel companion ends attendance, and the absence of gender-responsive sanitation becomes an insurmountable barrier to return. This evidence is consistent with Gul et al. (2024), who found similar dropout patterns among girls after the 2022 floods in the province of Khyber Pakhtunkhwa, and with the broader literature on gendered educational consequences of disasters (Fordham, 2013; Mudavanhu, 2014). A girls' school in a flood-prone area should therefore warrant greater attention than its index score alone suggests.

The qualitative findings also add other contributions for understanding the risk. They show that the problem in Naseerabad is not only damaged infrastructure, but weak adaptive capacity. The role of NGOs is therefore double-edged. UNICEF and other organisations played a crucial role in rebuilding structures, distributing materials, and running Temporary Learning Centres. Without this support, educational disruption would likely have been deeper. However, the findings also suggest that this support substituted for state adaptive capacity rather than building it. Batley and McLoughlin's (2010) warning is relevant here: what is effective for immediate service delivery may not necessarily strengthen state-building. In Naseerabad, the risk is that each flood is met through emergency substitution rather than through a district system prepared before the next disaster arrives.

The study also shows that poverty shaped whether flood disruption became temporary or prolonged. Families who lost crops, income, transport access, and the ability to pay for school-related costs faced a higher opportunity cost of schooling. In these cases, reopening a school did not necessarily mean that children could return. Recovery therefore requires more than repairing buildings; it also requires reducing the economic pressures that push children into work or keep them out of school, through measures such as school supplies, transport support, and cash transfers linked to enrolment.

Future research could add elevation and drainage data to the spatial index, test whether similar patterns of risk appear in other flood-affected regions of Pakistan and examine whether the adaptive capacity deficit documented here is specific to Balochistan or part of a wider national pattern. Incorporating the perspectives of parents, students, and particularly girls would also strengthen the gender analysis considerably. Longitudinal research would also be valuable to

examine whether flood-related closures translate into learning loss, dropout, grade repetition, or delayed progression over time, and to assess which recovery interventions, such as Temporary Learning Centres, cash transfers, transport support, gender-responsive WASH, or remedial teaching, are most effective. This topic gains constant relevance in a world where climate-related flooding is becoming more frequent and more severe, and where the educational systems most affected are the ones least equipped to absorb the shock.

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Appendix A: Interview Guide

Introduction

During the first few minutes of the conversation, I will take time to thank the participant for their availability, facilitate introductions, and explain the purpose and structure of the interview. I will also explain how the information shared will be used, stored, and protected, and emphasize the voluntary nature of participation.

Introductions and rapport building

Hello, my name is Shumiam Zehra and I am a Master's student conducting research on river flood risk and education systems in Pakistan. Thank you very much for taking the time to speak with me today. I really appreciate your willingness to share your experiences. I want to emphasize that this conversation will be informal and conversational. I am interested in hearing about your experiences and perspectives, and there are no right or wrong answers.

Context of the research

I will briefly explain the background of the study:

This research looks at how climate-related risks, particularly flooding, affect education systems in high-risk areas of Pakistan. Part of my research involves mapping areas that are most exposed to flood-related education risk, and this interview helps me understand what these risks look like in practice on the ground, with a particular focus on 2022 floods.

How the insights will be used

I will explain that the insights from this interview will be used solely for academic research as part of my Master's thesis. The goal is to better understand experiences of education disruption and response, not to evaluate individual performance or institutions.

Consent and data protection

I will ask for the participant's consent to take notes and, if applicable, to record the interview for accuracy. I will explain that recordings and notes will be kept confidential, anonymized, and used only for research purposes.

"Do I have your permission to record this interview for note-taking purposes?"

Opportunity for questions

I will ask if the participant has any questions before we begin.

Voluntary participation

I will emphasize that participation is completely voluntary, and that the participant may take a break or stop the interview at any time without any consequences.

Information Collection

I will begin by confirming a few background details to ensure contextual clarity.

- Could you briefly confirm your current role and organization?
- Were you working in this role during the 2022 floods in this area?

Warm-Up Questions

To help build rapport and make the participant comfortable, I will begin with a light, open-ended question related to their work.

- What does a normal working day usually look like for you when there is no emergency or crisis?
- How long have you been working in this area or with this community?

SECTION 1: Education Disruption During Floods

Objective: Understand how education was disrupted by the 2022 floods. I will first ask an opening question and then probe with more specific questions.

For All Participants

Can you describe how education was affected in your school/district during the 2022 floods?

Probing Questions

- What happened to school facilities?
- Were schools closed or damaged?
- How long was education disrupted?
- What were the main difficulties during this period?
- How were your students and teachers affected? Was teaching stopped completely or partially?
- Were alternative arrangements made?
- Did attendance patterns change?

Probing Questions for UNICEF Program Manager:

- From your perspective, how were schools and students affected in the areas your organization worked in during the floods?

- What disruptions to education did you observe or support schools to manage?
- What were the main difficulties during this period?
- Were there differences in impact between schools or communities?

SECTION 2: Infrastructural Conditions

Objective: To understand infrastructural vulnerabilities within the schools in Balochistan high risk districts.

For Headteachers / Teachers

Before the floods, what was the condition of the school buildings and facilities? For example, the type of construction, classrooms, drainage systems, or boundary walls?

Probing Questions

- What type of construction does the school have?
- Were there maintenance issues before the floods?
- How were drainage systems or boundary walls?
- Were any classrooms unfinished or structurally weak?
- Why do you think certain parts of the school were more affected?
- Did existing infrastructure conditions influence the damage or recovery?

For District Officials

- From your perspective, what factors made some schools more affected than others?

Probing Questions

- Were construction types different?
- Were certain areas more exposed due to location?
- Were infrastructure weaknesses already known before 2022?

For NGOs / Experts

- What infrastructural patterns have you observed in flood-prone schools?
- How do building quality and site characteristics influence flood impact?

SECTION 3: Institutional and Governance Factors

Objective: To understand institutional vulnerabilities within governance and policy plans.

For District Officials

- How would you describe the district's approach to flood preparedness before 2022?

Probing Questions

- Was flood risk considered in planning or budgeting?
- Who was responsible for preparedness decisions?
- Were schools involved in planning?
- Were these issues reported before the floods?
- If yes, what happened afterward?
- Were there resource constraints?
- Were there preparedness measures in place? Were there contingency plans?
- How was coordination handled between departments?
- How did these institutional conditions influence the scale or duration of disruption in 2022?

For Headteachers

- Before the floods, did your school receive any guidance on preparedness or risk management?
- Were there any contingency plans in place?

For NGOs / Experts

- How would you assess institutional preparedness in this district?
- What governance gaps increase vulnerability to flood related education disruption?

SECTION 4: Socioeconomic Conditions

Objective: Understand household and community conditions affecting education continuity.

For Headteachers

- How were students and families affected during and after the floods?
- Did some students struggle more than others to return?
- Were economic pressures a factor?
- Did displacement affect attendance?
- Did you observe changes in dropout or absenteeism?

For District Officials

- Were certain communities more severely affected? Why?
- How do poverty, livelihood patterns, or geographic isolation influence education continuity during floods?
- Were certain student groups more affected (girls, rural, displaced)?

- Did families prioritize income over schooling afterward?

For NGOs / Experts

- What socioeconomic factors make schools or communities more vulnerable in flood prone areas?
- How did these conditions shape recovery efforts?

SECTION 5: Current Vulnerability and Future Risk

Objective: Explore ongoing vulnerability and potential improvements for resilience.

All Participants:

- Do you believe schools in this district remain vulnerable to future floods?
- Have any infrastructural or institutional improvements been made since 2022?
- What would most effectively reduce flood related education risk here?

Closing Questions

At the end of the interview, I will ask reflective questions to allow participants to share broader insights.

- Looking back, what do you think worked well in responding to education disruption?
- What would you want education planners or decision-makers to understand about education in flood-prone areas?
- Is there anything else you would like to add that we have not discussed?

Thank you / Wrap Up

- I will thank the participant for their time and openness. “Those are all the questions I have. Thank you very much for sharing your experiences with me.”
- I will reiterate confidentiality and data protection. “I would like to remind you that everything you shared will remain confidential and will be used only for academic research purposes.”
- I will remind them of their right to withdraw. “If you later have any questions or would like to withdraw your participation, please feel free to contact me.”
- I will thank them again and close the interview politely.

Ethical Considerations

- Participation is voluntary, and participants may skip questions or stop the interview at any time.
- No sensitive personal data will be collected; questions concern professional experiences only.

- Interviews will be conducted online and audio-recorded with consent.
- All data will be anonymized during transcription, and pseudonyms will be used.
- Any insights or analysis of the interviews will be stored on my password-protected University of Glasgow OneDrive

Appendix B: Codebook for Qualitative Interviews

This codebook documents the two coding phases of the Framework Method analysis (Gale et al., 2013). Phase 1 lists the initial descriptive codes generated inductively from the seven interview transcripts. Phase 2 presents the organised thematic framework, in which these initial codes were consolidated and indexed under four parent themes. “Files” denotes the number of transcripts in which a code appears; “References” denotes the total number of coded segments.

Phase 1: Initial Coding

Code	Files	References
Affected Districts	1	1
Boundary Wall	4	5
Child Labour	2	4
Qualitative–Quantitative Integration Points	1	1
Corruption	3	6
Displacement	5	8
Education disruption	5	19
Flood description	4	8
Flood impact on children	4	8
Flood impact on infrastructure	7	35
Flood preparedness	1	1
Flood role	7	13
Gender	5	11
Government pitfalls	5	24
Heavy rainfall	5	8
Height of schools	1	1
Impact on teachers	4	6
Infrastructure solution	5	10
Institutional solution	6	13
Kacha	2	2
Lack of educational planning	4	12
Lack of priority to education in crisis	3	5
Land description	5	6
Local efforts	4	6

Code	Files	References
NGO work	6	24
UNICEF work	2	6
Poverty	4	11
Recurring floods	2	3
Rehabilitation (students)	1	3
Rehabilitation work	6	29
Role	5	10
Rural areas	1	1
School construction	1	2
School problems	3	7
Strength of people	2	2
TLCs	5	7

Phase 2: Thematic Framework and Indexing

Theme / Sub-theme	Files	References
Educational Disruption & Recovery	7	62
Communication through community to bring children back to school	2	2
Displacement of children reduced school enrolment	2	2
Family displacement and migration caused permanent school dropout	4	4
Fear of unsafe buildings as barrier to children returning to school	1	1
Flood-resilient reconstruction — schools rebuilt elevated, new materials, boundary walls added, dewatering	6	15
Local efforts of teachers and community	5	10
School was disrupted for months on end	2	4
Schools non-functional due to damaged roads and inaccessibility	1	2
Teacher vulnerability and role in recovery	2	4
Teacher displacement disrupted school staffing and continuity	1	1
Teachers went above and beyond despite personal loss	2	3
TLCs and School Gari allowed children living in camps to continue education	5	13
Trauma severely affected children; TLCs prioritised psychosocial support	2	5
Institutional & Governance Capacity	7	77
Absence of government data systems and no coordination of aid distribution	1	2
Accountability burden placed on teachers and community	3	3

Theme / Sub-theme	Files	References
Community mobilisation needed for sustainable maintenance of school infrastructure	2	2
Corruption in aid distribution and construction budgets	3	6
Funding channels — contractors lead to inefficiencies vs directly through teachers	2	5
Lack of government priority for education	5	13
NGO vs government — NGO active while government remains passive	6	26
No government flood preparedness plan for education existed before 2022	6	11
No re-enrolment strategy or support for children returning to school	2	3
Post-2022 flood contingency planning after experiencing disaster	2	2
Teacher preparedness training identified as gap — no pre-flood training existed	3	4
Socioeconomic & Community Vulnerability	6	31
Absence of washroom facilities and boundary walls as barrier to girls' enrolment	4	4
Child labour as a means for income, especially when schools lack basic facilities	2	7
Conditional cash transfer incentivised school enrolment — financial motivation for poor families	1	1
Flood destroyed household economic assets — livestock, crops, livelihoods	1	2
Girls withdrawn from school after flood — social norms used as justification	1	2
Poverty as a factor for children not returning to school	2	4
Survival needs displaced education as priority	3	6
Travel distance and lack of escorts a barrier for girls to attend school	2	5
Structural & Infrastructural Vulnerability	7	64
Boundary wall absence allowed floodwater to enter school compounds freely	3	4
Chronic cycle of damage and repair — schools never fully flood-proofed between events	3	4
Extent of damaged schools	3	6
Kacha schools collapsed completely due to floods	2	2
Poor materials used in schools led to collapse of infrastructure	1	1
Recurring floods deeply damaged the school buildings	1	1
Rural schools are more damaged	1	1
School buildings and materials damaged — persisting damage, unsafe conditions, health concerns	6	13
Schools built at ground level — standing water caused structural collapse	4	10
Solutions for schools to become flood-resilient	5	12
Threat of roof collapsing and debris falling on children	6	9

Appendix C: Framework Analysis Matrix

The tables below present the charted framework matrix produced following the Framework Method (Gale et al., 2013). Data are summarised by respondent (rows) across the four parent themes and their constituent sub-themes (columns). Respondents are identified by pseudonym. Cells marked “N/A” indicate the sub-theme did not arise in that respondent’s account. Full charted transcripts are held by the researcher.

Theme 1: Educational Disruption & Recovery

Respondent	School Closure & Enrolment Impact	Teacher Role & Resilience	Emergency Learning Continuity (TLCs / School Gari)	Psychosocial Impact
Saman SST Teacher, Jaffarabad (F)	Delayed return of children; no formal tracking, so returning pupils passed word to absent families. Enrolment recovered only gradually.	Teachers de-watered schools with buckets and hired labour; pooled resources to provide copies for children who lost materials.	No TLC or organised intervention observed in her area.	Lingering floodwater, smells and disease risk made the environment feel unsafe and delayed return.
Sara SST Teacher, Jaffarabad (F)	Closed Aug–Dec; most pupils displaced, only 30/35 continued in TLCs. Studies further disrupted by standing water.	Teachers attended daily despite destroyed roads, using PTSMC funds to de-water and restart classes.	Small remaining cohort taught in tent conditions (TLCs).	Acute fear of structural collapse (a cupboard fell mid-class); lasting psychological barrier to re-enrolment.
Zaryab DISTRICT EDUCATION MANAGER, Jaffarabad (M)	Over 99% of Jaffarabad 's 282 schools damaged; rural schools non-functional for a year as roads were cut. Displacement to cities caused permanent dropout.	Teachers on 40–50K PKR, their own homes collapsed, still reported for duty and taught in TLCs.	UNICEF/ESP/CPD set up roadside TLCs within 20–25 days at camps, drawing in out-of-school children; limited effective disruption to ~1 month.	Filth, mosquitoes and unsanitary buildings compounded displacement trauma for months.
Waseem Head Teacher, Jaffarabad (M)	6–7 months lost (incl. summer) — effectively a full academic year; enrolment fell further from permanent migration.	Displaced teachers recalled but schools understaffed; teachers ran door-to-door enrolment drives.	43 TLCs plus a School Gari reaching camps; one teacher often covered all subjects — minimal but continuous.	N/A
Sajjad DISTRICT EDUCATION MANAGER, Nasirabad (M)	Almost all schools dilapidated 1–2 months; primary/shelter-less worst hit. 35–40% remain unrepaired years later.	DISTRICT EDUCATION MANAGERS and teachers de-watered while their own homes flooded; taught in tents or under trees. Stresses teacher ownership over waiting for NGOs.	TLCs and flood camps set up rapidly with School Gari, giving traumatised children a safe environment to play.	Four months of acute trauma; three weeks of MHPSS sessions rebuilt confidence and restored enrolment from five pupils to full classes.
Haseeb UNICEF Programme Manager (M)	UNICEF recorded 100% of permanent schools damaged; displaced children in squalid camps with no facilities. Reopening campaign launched.	Many teachers relocated to Quetta, Karachi, Hyderabad; UNICEF ran emergency teacher training to enable camp learning.	UNICEF deployed TLC tents within 25 days — internationally recognised; UN Secretary-General visited the Balochistan camp as a model.	ECHO provided psychosocial support; communities in crisis deprioritise education, sometimes exposing children to unsafe situations.

Respondent	School Closure & Enrolment Impact	Teacher Role & Resilience	Emergency Learning Continuity (TLCs / School Gari)	Psychosocial Impact
Ali Civil Engineer (M)	N/A	Community PTSMCs rebuilt kacha schools locally when no government building was provided — community-driven continuity.	N/A	N/A

Theme 2: Institutional & Governance Capacity

Respondent	Pre-Flood Preparedness Failures	Post-Flood Coordination & Planning	Corruption & Funding Inefficiencies	NGO vs Government Roles
Saman SST Teacher, Jaffarabad (F)	N/A	NGOs surveyed buildings and added washrooms, but focus was on buildings — nothing comprehensive for learning needs.	N/A	No government effort to sustain education (health provisions only); NGOs ran health sessions but no equivalent learning support.
Sara SST Teacher, Jaffarabad (F)	No pre-flood plan in 2022; 2025 readiness came only from post-disaster CPD/PITE training, not prior policy.	UNICEF was the central rehabilitation actor, rebuilding rooms higher with better materials; government handled sewerage and drainage.	N/A	Government took some drainage steps; substantive rehabilitation by UNICEF and Al-Khidmat, government in a secondary role.
Zaryab DISTRICT EDUCATION MANAGER, Jaffarabad (M)	No government education plan for floods; health had alert systems but education was absent from any framework.	Buildings weaken yearly yet almost no new construction tenders since 2022 (5–8 buildings); schools still lack walls, washrooms, furniture, books.	Budgets exist on paper but work does not reach schools; reported materials never actually received by children.	Government essentially absent (only PDMA tents); UNICEF, IRC, World Bank and local NGOs carried nearly all rehabilitation.
Waseem Head Teacher, Jaffarabad (M)	No preparedness instructions ever reached school in-charges; any plan never shared at grassroots. Local literacy ~35%.	GPE/UNICEF did renovation, washrooms, water filtration; government contribution minimal. BSDI started building new schools.	Aid corrupted locally; embankment budgets allocated but unspent, with no monitoring.	Education budget only 0.8% of GDP vs 4% recommended; better recovery would have kept child labourers in school.
Sajjad DISTRICT EDUCATION MANAGER, Nasirabad (M)	No government plan before 2022; district administration (Commissioner/DC) responsible but no contingency plan existed.	UNICEF, Qatar Charity, IRC worked in phases; NGO sector carried the larger share. He has since drafted a district flood plan with school-by-school risk mapping.	Tendering breeds inefficiency (contractor commissions absorb >half); new BSDI routes funds through teachers/PTSMC to bypass this.	Government facilitated but relied on NGO/international sector; approved schools repeatedly deferred to 'the next PSDP' and never built.
Haseeb UNICEF Programme Manager (M)	PDMA has a general emergency plan but no education component; government lacked teacher/student data, collecting it reactively from UNICEF.	Government response focused narrowly on physical reconstruction, neglecting learning continuity and re-enrolment; no proper database or setup.	National NGOs often tied to political parties, routing aid to influential figures; distribution fragmented, duplicated and captured.	Government entirely passive ('looking to us') even with full data; GPE, World Bank, ECHO and UNICEF filled the vacuum.
Ali Civil Engineer (M)	No flood risk in original construction: no elevation or DPC standards; ground-level building was the universal norm.	Government awards contracts but fails to supervise; ESP's community-led, teacher-managed model with independent oversight is superior.	Contractors prioritise billing over standards with no oversight; the contractor model is incompatible with quality construction.	N/A

Theme 3: Socioeconomic & Community Vulnerability

Respondent	Economic Devastation & Poverty	Girls' Specific Vulnerabilities	Child Labour & Survival over Education
Saman SST Teacher, Jaffarabad (F)	Girls' families cited exam fees, rickshaw fares and book costs as concrete barriers to returning after the flood.	Social norms invoked to withdraw older girls; peer-dependency dynamic and absence of a safe travel companion drive permanent withdrawal and early marriage. Distance a major barrier.	N/A
Sara SST Teacher, Jaffarabad (F)	N/A	Low boundary wall identified as a barrier to girls' enrolment given parda norms; she escalated it to the District Officer and it was resolved.	N/A
Zaryab DISTRICT EDUCATION MANAGER, Jaffarabad (M)	Flood wiped out livestock, crops, homes and savings; even middle-class families spent two years rebuilding. Poverty drove permanent dropout. BISP cash transfer now pulls children back into school.	Parda norms require paid escort/transport for older girls; girls' access is contingent on family means, which the flood destroyed.	Endemic before the flood, deepened after as children were pulled out; framed as a governance failure — budgets deliberately not spent on schools.
Waseem Head Teacher, Jaffarabad (M)	Flood destroyed assets and pushed families into debt, forcing capable children into hotel/stall/street work; labour migrants never returned — poverty a direct driver of permanent dropout.	Damaged/absent boundary walls severely cut girls' attendance; enclosed compounds are a cultural prerequisite.	Debt-burdened families sent earning children to work ('if we teach him, who will earn?'); teachers ran campaigns with no roadmap or incentives to offer.
Sajjad DISTRICT EDUCATION MANAGER, Nasirabad (M)	Sole priority was survival; submerged families asked only about food and clean water — education not a priority.	Girls from uneducated families faced lack of MHM support, privacy and sanitary materials during displacement; MHM sessions now provided.	Survival needs entirely displaced education: minds 'completely on survival, not education... not as much demand for education as for food.'
Haseeb UNICEF Programme Manager (M)	Families in camps prioritised immediate survival; education not recognised as an emergency need when nutrition is uncertain.	Girls consistently the most vulnerable group; absence of MHM and hygiene facilities a primary driver of girls' difficulty.	N/A
Ali Civil Engineer (M)	N/A	N/A	N/A

Theme 4: Structural & Infrastructural Vulnerability

Respondent	Construction Failures & Material Quality	Scale & Persistence of Damage	Solutions & Flood-Resilient Design
Saman SST Teacher, Jaffarabad (F)	Roof cracked severely, walls fissured allowing water ingress; corridor shades shed debris posing collapse risk during breaks.	Furniture destroyed by prolonged water; watermarks, cracks and rotting fixtures.	Raised foundations with proper drainage outlets; large-scale tree planting for water absorption in high-flood areas.
Sara SST Teacher, Jaffarabad (F)	Five to six feet of standing water left ceilings humidity-damaged, furniture destroyed and the building structurally unsound.	All furniture and materials destroyed; several rooms needed full reconstruction and were rebuilt at higher elevation.	Buildings raised 6–9 feet above ground with high-quality roofing so recurring floods do not repeatedly interrupt schooling.

Respondent	Construction Failures & Material Quality	Scale & Persistence of Damage	Solutions & Flood-Resilient Design
Zaryab DISTRICT EDUCATION MANAGER, Jaffarabad (M)	Bricks dissolved 'like flour' after 6–7 months of standing water; absence of sewerage was the root structural failure.	Buildings weaken every monsoon from recurring inundation and no drainage — a chronic repair-and-damage cycle.	Drainage/sewerage is the primary need; new buildings 4–5 feet above ground — costly but necessary for student safety.
Waseem Head Teacher, Jaffarabad (M)	Third flood compounded pre-existing weaknesses; kacha schools demolished, boundary walls collapsed or never existed.	Buildings still cracked and shedding debris years later; he avoids seating children in certain rooms out of safety concern.	Properly built and maintained canal embankments; government must allocate and actively monitor flood-proofing budgets.
Sajjad DISTRICT EDUCATION MANAGER, Nasirabad (M)	Drainage 'equivalent to non-existent'; 40–50% of boundary walls damaged; roof collapse the dominant danger, some already fallen.	All furniture destroyed; 62–65% of rehabilitation complete, remainder still dilapidated (esp. primary/shelter-less schools).	New buildings raised 4–6 feet above road level; teacher preparedness training and community contingency planning the most urgent non-structural needs.
Haseeb UNICEF Programme Manager (M)	Post-de-watering surveys confirmed many schools structurally dangerous, with walls and roofs at imminent collapse risk.	Full-scale damage across the district — 100% of schools affected.	Government must maintain pre-disaster databases of schools, teachers and pupils; agencies cannot respond well collecting basic data mid-emergency.
Ali Civil Engineer (M)	Poor quality was the root cause: kacha schools, low-grade bricks, no DPC, no rebar — 99% of kacha schools demolished; even pakka structures failed from settled floors and corroded RCC roofs. Many had no boundary wall or earth filling.	99% of kacha schools demolished; pukka structures suffered floor settlement and wall failure. Maintenance a major problem — same issues recur within 3–4 months of handover.	Raise construction 3–4 feet above NSL with DPC and steel reinforcement; annual pre-monsoon inspection; welfare workers to build ownership and ensure maintenance.

Appendix D: Temporary Learning Centres launched by UNICEF during the floods of 2022, Naseerabad Division



Source: Zaryab, District education manager of Jaffarabad

Appendix E: Pictures of Schools in Naseerabad Division



(a) School with boundary wall



(b) Shelter-less school



(c) Girls' school lacking basic facilities



(d) School without boundary wall

Source: Sajjad, District education manager, Nasirabad