



# Status and Social Capital: A Cross-Sectional Quantitative Investigation of Flood Survivors in South Punjab, Pakistan

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**Abstract** A growing body of evidence underscores that social capital mitigates the impact of natural hazards such as floods. But we know less about the distribution of social ties in developing countries regularly hit by shocks. Our study examined the differences between demographic groups in South Punjab, Pakistan affected by the 2010 floods, comparing respondents' levels of social capital measured through proxies such as received social support, perceived community cohesion, accessibility to leadership, and general level of trust. We carried out univariate and multivariate analyses of factors including gender, education, occupation, landholding, family size, annual income, number of livestock, and home stability. Using data collected in face-to-face interviews with 450 flood survivors, our analysis showed no statistically significant difference in the flood victims' scores on all four scales based on gender and family size. However, education, occupation, landholding, annual income, and home stability statistically correlated with levels of social capital. Respondents with high levels of education, high levels of land, higher home stability, and a government job typically had higher scores in all four measurements of social ties. Our results show strong inequality in the distribution of social capital, with better connections and assistance coming to those who already have better socioeconomic positions in society.

**Keywords** Flood survivors · Pakistan · Social capital · South Punjab

## 1 Introduction

Extreme events such as floods affect the lives of millions of people each year and their impact will only increase due to global climate change and increasing population density and greater vulnerability of people living in disaster-prone areas (UNDRR 2020). Floods adversely affect the built environment and social fabric of communities (Albrecht 2018), bringing loss of life, business disruptions, and damage to homes and crops (Kaniasty and Norris 2004). These disasters often force evacuation and relocation, which can result in deterioration of social life and loss of social connections, erosion of communal bonds, demoralization, and disorientation (Sørensen and Albris 2015). Observers have underscored that those disasters are in no way “natural” (Smith 2006). Instead, the impact of a hazard such as a flood event depends strongly on issues of societal choices, vulnerability (Wisner et al. 2003), and access to mitigating resources such as social capital (Aldrich 2012).

As disasters are often regional events that transcend individual capacity to overcome their consequences, higher levels of the community-level resource of social capital make neighborhoods more resilient to shocks (Jovita et al. 2019). Different aspects of social capital have proved to be beneficial during the different stages of disasters including mitigation, preparedness, and recovery (Akbar and Aldrich 2018; Aldrich et al. 2018). At the individual and household level, catastrophes tend to activate dormant social resources such as weak and strong social ties (Casagrande et al. 2015). At institutional and government levels, efficient responses from government agencies and volunteers can further deepen the

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levels of trust among disaster victims and between survivors and the state (Akbar and Aldrich 2016).

While much is known about the importance of social ties before, during, and after disasters and shocks (Aldrich 2019), less is known about the distribution of social and communal resources to mitigate these events, especially in developing countries. Social and status inequalities can lead to resilience inequalities that need to be better documented and analyzed (Hudson et al. 2021). This study examined group differences in four different manifestations of social capital: (1) post-flood received social support; (2) perceived community cohesion; (3) accessibility to leadership; and (4) general level of trust. We conducted the study to fill the research gap on the differential distribution of social capital among flood-affected households in South Punjab, Pakistan. Based on past research in developed countries, we hypothesized that social capital is not equally distributed among different flood-hit communities (Inaba 2008). In the United States and other developed countries, for example, inequality decreases trust in others (Gould and Hijzen 2016). So we argued that, given strong economic and land-holding disparities across the region of Punjab (Haq and Ali 2014), flood survivors will likely hold different levels of social ties. Using face-to-face interviews with 450 survivors, we found that several demographic factors correlate strongly with higher levels of social ties. While we might hope to find equitable distribution of social capital, more of it rests with families already well-resourced economically.

Our article advances the literature on disasters and resilience in three ways. First, it is—to our knowledge—the first to carry out a large-sample quantitative analysis of social resources among flood-impacted residents in South Punjab. While past quantitative research has focused on the area (Farid et al. 2020), it has rarely looked at social capital in relationship to shocks such as an extreme weather event. Second, where other studies relied on multipurpose census questions (Farid and Abbasi 2019), our study draws from a unique dataset generated by our team. Because of our control over the survey instruments, we were able to capture several different measures of social capital to better alleviate concerns that our findings may be an artifact of our questions (Krishna 2004). Finally, we moved beyond qualitative impressions and descriptive statistics of relationships between variables of interest to more advanced regression techniques that can control for potentially compounding factors.

The study was conducted in Muzaffargarh District of Punjab Province. We focused on this particular district for study because of its vulnerability to shocks and because of the measured impact that recent natural hazards have had on its population (Mahmood et al. 2021). Muzaffargarh District is located in the southern part of Punjab Province, stretching over an area of 8435 km<sup>2</sup>. In the local language, the district

is called *Doaba*, meaning a piece of land that lies between two rivers (Akram and Aijazi 2010). The district is located between the Chenab River on the eastern side and the Indus River on the western side. Its land is flat; so floodwaters run unrestricted. Geographically, this district is anchored in the range of riverine floods and its population is highly vulnerable to flooding (District Police Office 2015).

During the 2010 flood disaster, Muzaffargarh was one of the highly affected districts of Punjab Province. The majority of the district's population (87%) lives in villages. The rural areas of the district were badly hit (Akram and Aijazi 2010). The district consists of 93 Union Councils (UCs), out of which 63 UCs were badly affected. More than 700,000 people were displaced due to floods from the Chenab and Indus Rivers and breaches in canals (Akram and Aijazi 2010). Out of a total population of 3.504 million, more than 2 million residents were affected (FFC 2010). According to the Provincial Disaster Management Authority of Punjab approximately 300,000 households were impacted (PDMA 2011), with the average household consisting of seven members.

The land of the district is fertile and suitable for agriculture. The floods destroyed 91% of the cotton, 93% of the rice, 70% of the sugar cane, and 97% of the animal fodder. Out of 783,283 acres of agricultural land, 398,203 acres were submerged. Fish farms on 1700 acres of land were swept away by water (Mahmood et al. 2019). Muzaffargarh is the second largest district of Punjab Province in terms of livestock. During the floods, 33 veterinary health facilities out of 89 were destroyed. Thousands of houses in 599 villages were destroyed or damaged, 805.82 km (30%) of roads were destroyed, and 600 schools were affected (Mahmood et al. 2021). The traffic network between Muzaffargarh and other districts was interrupted and suspended because the floods destroyed the roads and bridges making the flow of traffic impossible. A railway track of 9 km was washed away by floodwaters. Water continued to flow in the flooded areas for more than a month, which is beyond the normal flood that recedes after a few days (FFC 2010). The floods severely affected many villages that were located near or in the floodplains. However, the scale of the flood was so large that it also hit many far-flung areas. Because of its proneness to flood disasters and because it was a highly affected district during the 2010 floods, Muzaffargarh represents a logical place for this study.

## 2 Disasters and Social Capital

The concept of social capital, while at times challenging to capture empirically (Krishna 2004), has risen to prominence across all social science disciplines (Woolcock and Narayan 2000), including political science, sociology, and economics—despite the different assumptions social capital holds

when compared with mainstream economics (see Griffin 2009). Scholars have tied levels of social capital to civic engagement, good governance, economic development, mental and physical health, mortality rates, crimes, general well-being, longevity, and academic achievement (Putnam 1993; Woolcock and Narayan 2000). Given that human beings live in groups, network connections such as bonding social capital can be found in every society as residents associate with groups and circles of mutual trust for support, work, and recreation (Daubon and Saunders 2002). While definitions vary across disciplines and research groups, social capital generally refers to social networks among people that result in reciprocal gains (Lin 2005).

As with other complex social concepts, researchers disagree about what constitutes social capital and how it should be measured qualitatively and quantitatively (Abdul-Hakim et al. 2010), and it may be that agreement on a single measure is impossible (Woolcock and Narayan 2000). As a result, social capital has been measured through a variety of proxies, including the number of contacts one has with others, and the depth and frequency of those contacts, along with membership in horizontal and voluntary organizations (Adger 2000). However, any proxies need to be historically and culturally relevant (Aldrich 2012). Voluntary associations and similar Western-style community groups, for example, are rarely present in Pakistani rural society, and such measures would be inappropriate to use in South Punjab. Instead, in rural areas of developing countries the underlying stock of social capital can better be measured through informal social connections (Woolcock and Narayan 2000).

For our in-person interviews in South Punjab, we drew on our knowledge of local norms along with past social science research to structure questions that capture ties between individuals along with social behaviors of helping other people caught in crisis—norms of reciprocity, helping, and social support (Kaniasty and Norris 1995; Norris et al. 2008). Further, given broad acceptance of horizontal measures of social ties (bonding and bridging ties that capture kin / homogeneous members, and weak/thin ties, respectively) (Bourdieu 1986; Woolcock and Narayan 2000) and vertical ties to decision makers (Nakagawa and Shaw 2004; Aldrich 2012, 2019), we wanted to include these concepts as well, such as disaster victims' accessibility to local

leadership (which captures linking social capital). We asked about flood victims' perceptions of community cohesion/bonding (bridging social capital) and flood victims' level of trust (Putnam 1993, 1995a, 1995b), the quality of relationships between disaster victims and community leadership (linking social capital), and general levels of trust (cognitive social capital) (Uphoff 2000). We list these proxies and their theoretical underpinnings in Table 1.

Scholars have highlighted social capital's explanatory power for community resilience in the context of disasters across a variety of levels of development (Aldrich 2012; Aldrich and Meyer 2015). Those with strong kin support, dense and broad social networks, and network resources can more easily bounce back (or bounce forward through transformational adaptation) by using these communal sources (Tobin and Whiteford 2002; Aldrich 2019). After a disaster, the active collaboration of residents in cleanup, disaster mapping, and rebuilding can activate forgotten cultural ties and social resources. Through communication, problem solving, and a shared vision of the future, disaster survivors draw on and strengthen their ties to each other (Oyane 2010).

However, the resource of social capital may not be evenly distributed across society. While the "marginalized populations are not only more likely to be vulnerable to disasters due to self-evident problems of geography and resources, but are also considerably disadvantaged by less obvious social and cultural phenomena" (Seidenberg 2006, p. 5). Adler (2008, p. 53) contended that "disasters impact the social capital in nuanced and complicated ways, based on human vulnerabilities and buoyancies." Obvious vulnerabilities—especially in developing countries—include a lack of socioeconomic and financial resources. Studies that looked simultaneously at socioeconomic conditions of disaster survivors along with their networks have noticed correlations between these (at least in developed countries). For disadvantaged neighborhoods in New Orleans after Hurricane Katrina in 2005, for example, localized social capital was insufficient to serve as an engine of rapid recovery. During the course of dislocation, disadvantaged individuals could not use their trans-local ties either due to scarcity of financial capital or due to the fact that they did not have such ties, or such kinds of ties might not have been able to help them. The study emphasized the need for the availability of financial capital

**Table 1** Social capital proxies in South Punjab, Pakistan

Theory/concept	Scholarship	Proxy
Bonding social capital	(Bourdieu 1986; Kaniasty and Norris 1995; Aldrich 2012)	Social support
Bridging social capital	Woolcock and Narayan (2000)	Community cohesion
Cognitive/associational social capital	Uphoff (2000)	General levels of trust
Linking social capital	(Putnam 1993; Nakagawa and Shaw 2004; Aldrich 2019)	Access to leadership

to convert the human vulnerability into capability (Elliott and Sams-Abiodun 2010). Here we recognize that social capital's distribution may map strongly onto financial and fiscal resources and seek to find the correlations between them.

### 3 Materials and Methods

This study focused on flood victims, who were affected by the 2010 floods in Pakistan, and were living in South Punjab in the period from January 2013 to August 2013. Data about the worst flood-affected communities were assembled by the District Disaster Management Authority of three districts of the region: Lyyah, Muzaffargarh, and Rajanpur. These data included the contact numbers and home addresses of the heads of the households who received disaster aid from the central government of Pakistan (GoP) through the Watan Card program (a scheme launched by the GoP to support the flood-affected families). From this sampling framework, a sample of 493 flood victims was drawn by using a simple random sampling method. Face-to-face interviews were conducted with heads of the selected households through a structured interview framework.

#### 3.1 Sampling Frame

In order to help the flood victims to recover and rehabilitate speedily, the government of the Punjab distributed Watan Cards (WCs) among the flood victims. Initially the government decided to distribute 80,000 rupees (roughly USD 400) to every flood victim in four installments. A holder of a WC was eligible to draw 20,000 rupees from any bank branch of Pakistan in one transaction. However the flood affectees eventually were able to draw only one installment and the program was suspended due to financial constraints. One WC was distributed to the head of each flood-affected household through the National Database and Registration Authority (NADRA). Only highly affected households qualified for a WC. These households were identified by government officials after conducting windshield and walking surveys. At the district level, the District Disaster Management Authority (DDMA) was responsible for identifying and distributing the WCs among the flood victims. The DDMA was also responsible for ensuring transparency and redressing the grievances of flooded communities.

For our study a list of the flood victims' households who received WCs was obtained from the DDMA office. This sampling frame enabled the researchers to draw a representative sample of the flood victims by using a simple random method. A random number table was used to draw a representative sample. It also helped to locate the households and victims who received the WCs because the sampling

frame contained the household addresses and mobile phone numbers. In order to locate the severely affected households and distribute the WCs efficiently, Muzaffargarh District was divided into nine zones. These zones were created on administrative basis, keeping in mind the magnitude of the flooding in these areas. The rural population of Muzaffargarh District is homogeneous (World Food Program 2010). This means that the majority of the population has similar socioeconomic characteristics.

#### 3.2 Sample Size

Sample size was calculated by using the following formula proposed by Yamane (1967). This formula is applied when a sampling frame is available and the study is cross-sectional in temporal terms.

$$n = \frac{N}{1 + Ne^2}$$

where  $n$  = required sample size;  $N$  = target population size (No. of households impacted by flood) = 242,234;  $e$  = Margin of error (level of significance) = 0.045.

$$n = \frac{242234}{1 + 242234(0.045)^2}$$

$$n = 492.82$$

$$n = 493$$

Out of the 493 selected households, 450 respondents were interviewed. Only 9 of the selected household heads declined to participate in interviews due to shortage of time, and 34 household heads could not be contacted because many skilled and semiskilled wage earners seasonally migrate to other cities, particularly Karachi, Lahore, Quetta, Peshawar, Rawalpindi, and Multan, to earn their livelihood. The overall response rate was 91.3%.

#### 3.3 Instrument

We employed a pre-coded interview framework for data gathering that consisted of four parts. The first part consisted of sociodemographic variables, while the other three parts involved closed-ended questions on elements of social capital, including received social support, flood victims' level of trust, accessibility to local leadership, and perceived community cohesion (see Table 1 for the scholarship underlying these proxies). The sociodemographic items included gender, education, occupation, size of landholding, number of livestock, family size, and annual income of flood victims. Before the formal data collection, the scales were pilot tested for local contextualization and to remove any ambiguities in language. The interviews were conducted in Urdu, which is the national language of Pakistan.

### 3.3.1 Social Support Scale

Social support was measured by whether a respondent's friend or family loaned them resources after a flood disaster. This scale was adopted from Kaniasty and Norris (2000), Norris et al. (2001), and Kaniasty (2012). The respondents were asked about social support received from immediate social ties, that is, family members (people to whom the respondent was related by blood or marriage), friends (including companions, neighbors, and co-workers), and relatives. Informal social support is implicit manifestation of the respondents' social embeddedness. The respondents were asked about different types of social support received: (1) emotional social support; (2) informational social support; and (3) physical social support. The 5-point Likert scale contains 28 items and response categories ranged from "never" to "many times." The respondents who scored high on this scale were likely to receive a high level of informal support from their support network. Nunnally (1978) stated that the Cronbach alpha for a scale should be equal to or greater than 0.70 if the items of that scale are used compositely. But many studies also used this measure below this threshold. The Cronbach alpha for this scale was calculated as 0.878.

### 3.3.2 Trust Scale

Two types of trust were measured in this study. Mutual trust and partnership with neighbors represents the trust of familiars, while trust in state government and district government and trust in NGOs represents institutional trust. The survey asked whether after their flood experiences the respondents' trust in the government, government institutions, and people around them had increased or decreased. This scale was used to assess the flood victims' level of trust in different social actors. The scale was adapted from Nakagawa and Shaw (2004) who used it to measure the trust level of natural hazard-related disaster victims and its relationship with their pace of recovery. The respondents were asked whether the flood experience had increased or eroded their trust in the state government, district government, nongovernmental organizations (NGOs), and their mutual trust and partnership with neighbors. The questions were asked on a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree." The score obtained for a respondent represents the level of trust. The Cronbach alpha for this scale was calculated as 0.782.

### 3.3.3 Accessibility to Leadership Scale

Four questions were asked about accessibility of flood victims to local political leaders, efforts of the leaders to restore physical infrastructure, local leaders' connectivity to

national and international actors, and their sympathy with the flooded communities. This scale measures the flood victims' accessibility to local leadership and the leaders' role during the recovery process. These items were based on the perceptions of flood victims during preliminary informal interviews, as well as research by Kelly (2004), Kweit and Kweit (2004), Nakagawa and Shaw (2004), Fluker (2005), and Beckett et al. (2010). The 5-point Likert scale was set from "strongly disagree" to "strongly agree." A high score on this scale represented positive perceptions about local leadership while a low score represented negative perceptions. The Cronbach alpha for this scale was calculated as 0.946. Previous studies (for example, Nakagawa and Shaw 2004) demonstrated that the presence of active leadership speeded up the recovery pace of communities hit by disaster.

### 3.3.4 Perceived Community Cohesion Scale

To measure perceived community cohesion, the respondents were asked whether after their disaster experience people had become more collaborative and open. The scale was adapted from Kaniasty (2012), who measured the perceptions of flood victims in Poland with regard to the presence of communal solidarity and sense of community. Before starting the interviews the following statement was read to respondents: "These questions ask about your feelings and opinions about other people, particularly about how the community members feel towards each other close to three years after the flood disaster. Please answer as these questions apply to the people who live in your community and immediately living around you." Three items of this scale (3, 5, 7) were reverse scored because they were negatively stated. A 5-point Likert scale was used to record the response of the flood victims. Scores ranged from "strongly disagree" to "strongly agree." The respondents with high scores on this scale are assumed to have experienced a greater level of community cohesion after the flood disaster.

In order to put the perceived community cohesion scale into the rural context in Pakistan, the scale was pilot tested. Minor changes were made in the wording of two (out of 10) items. There was no neutral category in the original scale. Many respondents suggested adding a neutral category during pilot testing. A neutral category "undecided" was incorporated by the researchers to give the respondents more freedom about their views regarding the perceived impact of flooding on social cohesion. The Cronbach alpha for this scale was calculated as 0.822.

## 3.4 Ethical Considerations

In order to protect the respondents from physical and psychological harm, a strict code of ethics was observed during the interviews. As this study was conducted to investigate

the experiences of respondents during and after a disastrous situation (floods), prior consent of the respondents was sought before the interviews. The respondents were also told that they could withdraw from interviews at any stage.

## 4 Data Analysis and Interpretation

To ensure that the data were clean and ready for analysis, data screening was conducted. No missing values or extreme outliers were found. Because the data were collected in face-to-face interviews, the respondents were asked to choose only one response among the set of response items for each question. We used the SPSS 20 version for data analysis. Details of the descriptive and multivariate analysis are presented below.

### 4.1 Descriptive Analysis

The final sample consisted of 450 respondents; of which 400 respondents were male and 50 respondents were female. In terms of their levels of education, 139 respondents were illiterate, 62 respondents had achieved fifth grade education, 40 respondents had been educated up to the eighth grade, 98 respondents had obtained 10th grade education, and 111 respondents had achieved an intermediate level of education, that is, grade 12 and above.

For the category of employment, 131 respondents were government servants, 86 were farmers, 82 were self-employed, 29 were private employees, 91 were wage earners, and 31 heads of the household were women. In the Pakistani context, a government employee is a person who has a permanent job in some government sector organization. A private employee is a person who works in a private sector organization, and a wage earner is an individual who is unskilled or semiskilled and works day-to-day to earn his/her livelihood.

The average annual income of the respondents was 320,000 Pakistani rupees (roughly USD 1982 in 2021). The mean  $\pm$  one standard deviation (S.D.) of landholding (acres) was  $5.26 \pm 0.49$  (95% CI 0.59–0.68). Of the respondents, 162 (about 36%) had no land at all, 71 (about 15%) had 1 acre, 73 (17%) owned 2 to 4 acres, 72 (16%) owned 5 to 8 acres, and 72 (16%) owned 9 acres or more. The maximum landholding was 80 acres. The mean  $\pm$  one S.D. of the

number of livestock was  $2.06 \pm 0.13$  (95% CI 1.80–2.32). Of the respondents, 216 owned only one head of livestock, 24 owned 2 heads of livestock, 109 owned 3 heads of livestock, 31 owned 4 heads of livestock, and 70 owned 5 heads of livestock or more. The livestock includes goats, buffaloes, and cows.

The mean  $\pm$  one S.D. of family size was  $4.69 \pm 2.6$  (95% CI 4.45–4.94). The overwhelming majority of the 450 respondents—281 (62.4%)—suffered high loss, 91 (20.2%) respondents suffered medium loss, and 71 (15.8%) respondents suffered very high material loss. Some respondents did not want to disclose their damage due to some specific reasons. They thought that disclosing their actual loss can deprive them of government aid.

### 4.2 Multivariate Analysis of Variance (MANOVA)

The MANOVA analyses group differences by taking into account multiple continuous variables. The MANOVA is used to compare the test whether or not independent variables simultaneously explain a statistically significant amount of variance in the dependent variable. We carried out a multivariate analysis of variance (MANOVA) to capture the group differences of the four dependent variables that capture social capital: (1) post-flood received social support; (2) flood victims' accessibility to leadership; (3) perceived post-flood community cohesion; and (4) trust level of flood victims. We tested gender, education, occupation, landholding, family size, annual income, and number of livestock. The analysis showed that there were no statistically significant differences in the flood victims' scores regarding gender ( $F(5, 432) = 676, p = 0.642, \text{partial } \eta^2 = 0.008$ ), and family size ( $F(15, 1,176) = 1.790, p = 0.31, \text{partial } \eta^2 = 0.021$ ). The respondents' scores were statistically significant on these scales in terms of education ( $F(20, 1,433) = 4.181, p < 0.001, \text{partial } \eta^2 = 0.046$ ), landholding ( $F(20, 1,414) = 4.37, p < 0.001, \text{partial } \eta^2 = 0.049$ ), annual income ( $F(20, 1,414) = 8.233, p < 0.001, \text{partial } \eta^2 = 0.087$ ), and number of livestock ( $F(20, 1,414) = 2.36, p = 0.001, \text{partial } \eta^2 = 0.027$ ).

Our univariate analysis showed that the gender of the respondents (Table 2) was not significantly different in their scores on the post-flood received social support scale ( $F(1, 432) = 0.103, p = 0.748, \text{partial } \eta^2 = 0.000$ ), accessibility to leadership ( $F(1, 432) = 0.658, p = 0.418,$

**Table 2** Mean scale scores (M) and standard errors (SE) by gender

Scale values	Male (n = 400) M (SE)	Female (n = 50) M (SE)	Partial $\eta^2$	p-value
Received social support	2.95 (0.036)	2.98 (0.100)	0.000	0.748
Access to leadership	2.15 (0.059)	2.20 (0.165)	0.002	0.418
Community cohesion	2.39 (0.035)	2.22 (0.100)	0.006	0.118
Trust level	2.73 (0.042)	2.80 (0.118)	0.003	0.254

partial  $\eta^2 = 0.002$ ), perceived post-flood community cohesion ( $F(1, 432) = 2.456, p = 0.118, \text{partial } \eta^2 = 0.006$ ), or trust level ( $F(1, 432) = 1.305, p = 0.254, \text{partial } \eta^2 = 0.003$ ). The difference between both genders was nonsignificant, likely because of the small proportion of female household heads in the sample (in South Punjab men tend to answer questionnaires).

Table 2 shows the adjusted mean scores of the respondents on the four scales with respect to the gender of the respondents. Women achieved slightly higher scores than men on all the scales except on the post-flood community cohesion scale. However, these differences are minimal and our lack of a more balanced sample with respect to gender makes deeper analysis impossible at the moment.

Univariate tests showed that respondents of varied educational backgrounds (Table 3) differed significantly in their scores on the post-flood received social support scale ( $F(4, 435) = 7.86, p < 0.001, \text{partial } \eta^2 = 0.067$ ), accessibility to leadership  $F(4, 435) = 4.72, p = 0.001, \text{partial } \eta^2 = 0.042$ , and trust level of flood victims ( $F(4, 435) = 4.48, p = 0.001, \text{partial } \eta^2 = 0.039$ ), while no significant difference was found on the post-flood community cohesion scale ( $F(4, 435) = 1.880, p = 0.113, \text{partial } \eta^2 = 0.017$ ). Because of the large sample size, small differences among the groups may appear statistically significant; therefore  $\eta^2$  was computed to see the effect size. Cohen (1988) regarded the values of partial  $\eta^2$  of 0.01, 0.06, and 0.14 as small, medium, and large effects, respectively. According to the values of partial  $\eta^2$ , there were medium level differences among respondents on the scale of post-flood received social support, accessibility to leadership, and trust level of flood victims. The respondents did

not differ significantly on the post-flood community cohesion scale.

Table 3 shows the adjusted mean scores of the respondents on the four scales. The respondents with 12 grades or more education achieved high mean scores on all our scales as compared to respondents with less education. This indicates that respondents who had a higher level of education received more social support, had more access to the local leadership, had a higher level of trust, and reported higher community cohesion than respondents who had a lower level of education.

Univariate tests showed that respondents of varied occupations (Table 4) differed significantly in their scores on the post-flood received social support scale ( $F(5, 436) = 9.65, p < 0.001, \text{partial } \eta^2 = 0.100$ ), accessibility to leadership ( $F(5, 436) = 3.25, p = 0.007, \text{partial } \eta^2 = 0.036$ ), the perceived post-flood community cohesion scale ( $F(5, 436) = 3.90, p = 0.002, \text{partial } \eta^2 = 0.043$ ), and trust level of survivors ( $F(5, 436) = 7.55, p < 0.001, \text{partial } \eta^2 = 0.043$ ). The values of partial  $\eta^2$  showed the small and medium differences in respondents' scores on accessibility to leadership, post-flood community cohesion, and the trust scale, while a large difference was found among respondents on the received social support.

Table 4 shows the adjusted mean scores of the respondents of different occupations on the four scales. Government servants obtained higher scores on received social support, perceived accessibility to leadership, perceived community cohesion, and the trust scale. Farmers obtained higher scores on received social support, high scores on community cohesion, and the trust scale but low scores on the accessibility to

**Table 3** Mean scale scores (M) and standard errors (SE) by years of education

Scale values	0 (n = 139) M (SE)	5 (n = 62) M (SE)	8 (n = 40) M (SE)	10 (n = 98) M (SE)	12 and Above (n = 111) M (SE)	Partial $\eta^2$	p-value
Received social support	2.73 (0.083)	2.64 (0.099)	2.79 (0.114)	3.23 (0.091)	3.18 (0.097)	0.067	0.001
Access to leadership	1.66 (0.133)	2.03 (0.160)	1.61 (0.184)	2.11 (0.146)	2.37 (0.156)	0.042	0.001
Community cohesion	2.09 (0.083)	2.28 (0.099)	2.22 (0.114)	2.22 (0.091)	2.38 (0.097)	0.017	0.113
Trust level	2.47 (0.092)	2.59 (0.111)	2.40 (0.128)	2.76 (0.101)	2.97 (0.108)	0.039	0.001

**Table 4** Mean scale scores (M) and standard errors (SE) by occupation

Scale values	GS (n = 131) M (SE)	F (n = 86) M (SE)	SE (n = 82) M (SE)	PE (n = 29) M (SE)	WE (n = 91) M (SE)	HW (n = 31) M (SE)	Partial $\eta^2$	p-value
Received social support	2.84 (0.102)	3.37 (0.111)	2.93 (0.102)	2.56 (0.137)	2.82 (0.116)	2.97 (0.142)	0.100	0.001
Access to leadership	2.38 (0.164)	1.87 (0.178)	2.23 (0.165)	1.65 (0.221)	1.67 (0.186)	1.95 (0.228)	0.036	0.007
Community cohesion	2.54 (0.102)	2.05 (0.111)	2.39 (0.103)	2.07 (0.137)	2.12 (0.116)	2.30 (0.142)	0.043	0.002
Trust level	2.86 (0.114)	2.66 (0.124)	2.78 (0.114)	2.56 (0.153)	2.10 (0.129)	2.90 (0.158)	0.043	0.001

GS Government servant, F farmer, SE self-employed, PE privately employed, WE wage earner, HW Housewife

leadership scale. Self-employed respondents obtained high scores on all four scales. Private employees obtained high scores on social support, level of trust, and the perceived community cohesion scale but low scores on the accessibility to leadership scale. Wage earners obtained low scores on all scales as compared to respondents of other professions. Housewives obtained high scores on received social support and the level of trust scale and low scores on the accessibility to leadership scale.

Univariate tests showed that respondents with various amounts of landholdings (Table 5) differed significantly in their scores on the post-flood received social support scale ( $F(4, 429) = 3.42, p = 0.009$ , partial  $\eta^2 = 0.031$ ), the post-flood community cohesion scale ( $F(4, 429) = 3.110, p = 0.015$ , partial  $\eta^2 = 0.028$ ), and the trust level of flood victims ( $F(4, 429) = 7.98, p < 0.001$ , partial  $\eta^2 = 0.069$ ), but not on the accessibility to leadership scale ( $F(4, 429) = 0.67, p = 0.61$ , partial  $\eta^2 = 0.006$ ). The values of partial  $\eta^2$  showed medium and large differences among flood victims holding different amounts of land, while no statistical difference was found with regard to the accessibility to leadership scale.

Table 5 shows the adjusted mean scores of the respondents with different amounts of landholdings. Our analyses show that respondents with the highest amounts of land achieved high to medium scores on received social support, the accessibility to leadership scale, perceived community cohesion, and the trust scale as compared to respondents who had no or less than 1 acre land. Respondents with landholdings of more than 9 acres achieved higher scores on the received social support scale. Compared to other

respondents, those who were landless obtained the lowest scores on accessibility to leadership and the perceived community cohesion scale.

Univariate tests showed that respondents with different levels of annual income (Table 6) differed significantly in their scores on the post-flood received social support scale ( $F(4, 429) = 6.60, p < 0.001$ , partial  $\eta^2 = 0.058$ ), the accessibility to leadership scale ( $F(4, 429) = 15.49, p < 0.001$ , partial  $\eta^2 = 0.126$ ), the post-flood community cohesion scale ( $F(4, 429) = 13.46, p < 0.001$ , partial  $\eta^2 = 0.111$ ), and trust level of survivors ( $F(4, 429) = 13.93, p < 0.001$ , partial  $\eta^2 = 0.115$ ). The values of partial  $\eta^2$  showed that there were medium and large differences among the respondents on all four scales.

Table 6 shows the adjusted mean scores of the respondents with different levels of annual income. Respondents with higher levels of annual income had higher scores on all scales. The respondents who had annual incomes between 300,001 to 600,000 rupees (roughly USD 1500 to 3000 in 2021) or more obtained high scores on all four scales. The respondents with annual incomes between 150,001 to 300,000 (roughly USD 750 to 15,000) rupees achieved relatively lower scores as compared to those with higher annual incomes. The respondents with the lowest annual incomes achieved lower scores on the received social support scale, the perceived community cohesion scale, and the level of trust scale. These respondents achieved the lowest scores on the accessibility to leadership scale.

Univariate tests showed that respondents who owned different amounts of livestock (Table 7) differed significantly in

**Table 5** Mean scale scores (M) and standard errors (SE) by landholdings (acres)

Scale values	0 (n = 162) M (SE)	1 (n = 71) M (SE)	2–4 (n = 73) M (SE)	5–8 (n = 72) M (SE)	≥ 9 (n = 72) M (SE)	Partial $\eta^2$	p-value
Received social support	2.97 (0.078)	2.93 (0.087)	2.77 (0.083)	2.99 (0.084)	3.20 (0.093)	0.031	0.009
Access to leadership	2.0 (0.123)	2.10 (0.138)	2.21 (0.131)	2.02 (0.133)	2.20 (0.147)	0.006	0.015
Community cohesion	2.24 (0.077)	2.38 (0.086)	2.45 (0.082)	2.52 (0.083)	2.21 (0.092)	0.028	0.015
Trust level	2.70 (0.083)	2.21 (0.093)	2.75 (0.089)	2.89 (0.090)	2.77 (0.099)	0.069	0.001

**Table 6** Mean scale scores (M) and standard errors (SE) by annual income (PKR)

Scale values	≤ 100,000 (n = 121) M (SE)	100,001–150,000 (n = 72) M (SE)	150,001–300,000 (n = 88) M (SE)	300,001–600,000 (n = 80) M (SE)	≥ 600,001 (n = 89) M (SE)	Partial $\eta^2$	p-value
Received social support	2.78 (0.074)	2.69 (0.083)	3.17 (0.077)	3.15 (0.088)	3.07 (0.094)	0.058	0.001
Access to leadership	1.54 (0.117)	1.57 (0.132)	2.02 (0.122)	2.80 (0.139)	2.61 (0.149)	0.126	0.001
Community cohesion	2.12 (0.073)	2.02 (0.082)	2.22 (0.076)	2.78 (0.087)	2.66 (0.093)	0.111	0.001
Trust level	2.27 (0.079)	2.29 (0.089)	2.74 (0.082)	3.06 (0.094)	2.97 (0.100)	0.115	0.001



**Table 7** Mean scale scores (M) and standard errors (SE) by number of livestock

Scale values	1 (n = 216) M (SE)	2 (n = 24) M (SE)	3 (n = 109) M (SE)	4 (n = 31) M (SE)	≥ 5 (n = 70) M (SE)	Partial $\eta^2$	p-value
Received social support	2.92 (0.059)	2.65 (0.138)	2.88 (0.068)	3.14 (0.125)	3.29 (0.083)	0.051	0.001
Access to leadership	2.33 (0.093)	2.03 (0.218)	2.21 (0.108)	2.06 (0.198)	1.90 (0.130)	0.016	0.136
Community cohesion	2.46 (0.058)	2.38 (0.136)	2.39 (0.067)	2.35 (0.123)	2.21 (0.081)	0.013	0.227
Trust level	2.79 (0.063)	2.52 (0.147)	2.78 (0.073)	2.49 (0.133)	2.21 (0.081)	0.015	0.172

their scores on the post-flood received social support scale ( $F(4, 429) = 5.78, p < 0.001$ , partial eta squared = 0.051). The respondents did not differ significantly in their scores on the accessibility to leadership scale ( $F(4, 429) = 1.76, p = 0.136$ , partial  $\eta^2 = 0.016$ ), the perceived community cohesion scale ( $F(4, 429) = 1.417, p = 0.227$ , partial  $\eta^2 = 0.013$ ), and trust level of flood victims ( $F(4, 429) = 1.605, p = 0.172$ , partial  $\eta^2 = 0.015$ ). In terms of the number of livestock, partial  $\eta^2$  showed small to medium differences among the respondents on the received social support scale.

Table 7 shows the adjusted mean score of the respondents based on different numbers of livestock. Respondents with more heads of livestock (5.00+) had higher scores on the received social support scale.

Univariate tests showed that respondents with different family size (Table 8) differed significantly in their scores on the accessibility to leadership scale ( $F(3, 428) = 4.32, p = 0.005$ , partial  $\eta^2 = 0.029$ ) but respondents did not differ significantly in their scores on the post-flood received social support scale ( $F(3, 428) = 0.79, p = 0.499$ , partial  $\eta^2 = 0.005$ ), the perceived community cohesion scale ( $F(3, 428) = 1.30, p = 0.275$ , partial  $\eta^2 = 0.009$ ), and trust level of flood victims ( $F(3, 428) = 1.95, p = 0.122$ , partial eta squared = 0.013). Partial  $\eta^2$  values showed small to medium differences among the respondents on the accessibility to leadership scale. However, the respondents did not differ significantly on received social support, the perceived community cohesion scale, and the trust scale.

Table 8 depicts the adjusted mean scores of the respondents with respect to family size. It reveals that respondents with a family size of 3 to 5 members achieved higher scores on the received social support scale, the accessibility to leadership scale, the perceived community cohesion scale,

and the level of trust scale while the respondents with large family sizes of 7 or more members had the lowest score on all four scales.

## 5 Discussion

Our study provides insights into the distribution of social capital among rural communities in flood-affected communities in South Punjab, Pakistan. We examined group differences and compared the respondents' scores on different manifestations of social capital. Using univariate and multivariate analysis of variance we captured group differences on four aspects of social capital: (1) post-flood received social support; (2) perceived community cohesion; (3) accessibility to leadership; and (4) general level of trust—taking into account gender, education, occupation, landholding, annual income, number of livestock, and family size of flood survivors. The analysis showed that there was no statistically significant difference in the flood survivors' scores regarding gender. However, the respondents' scores were statistically significant on these scales regarding education, occupation, landholding, annual income, and number of livestock. The analysis underscored how existing inequalities in the distribution and continuation of wealth are reproduced further in the way social resources are available to disaster survivors (Abramson et al. 2010). Our findings reinforce the outcomes of studies of South Punjab that found that inequality is perpetuated across generations, with male children displaying similar levels of social capital as their fathers (Shareef et al. 2015; Farid et al. 2020; Farid et al. 2021).

Why farmers and self-employed respondents negatively evaluated the local leadership remains an important question,

**Table 8** Mean scale scores (M) and standard errors (SE) by family size

Scale values	≤ 3 (n = 115) M (SE)	4–5 (n = 185) M (SE)	6–7 (n = 73) M (SE)	≥ 8 (n = 77) M (SE)	Partial $\eta^2$	p-value
Received social support	3.04 (0.083)	2.94 (0.059)	3.00 (0.080)	2.90 (0.079)	0.005	0.005
Access to leadership	2.19 (0.131)	2.05 (0.094)	2.39 (0.126)	1.80 (0.124)	0.029	0.499
Community cohesion	2.42 (0.082)	2.39 (0.058)	2.39 (0.079)	2.24 (0.077)	0.009	0.275
Trust level	2.77 (0.088)	2.65 (0.063)	2.73 (0.085)	2.52 (0.084)	0.013	0.122

and an answer may lie in the sociopolitical environment of the flood disaster that hit the South Punjab communities. After the flood disaster many questions arose about the possible causes of such a high-scale flood. People questioned why the floodwaters were diverted to a particular area that inundated the crops of small farmers and destroyed the businesses of small businessmen. After the onset of the flood disaster, rumors persisted that the local political feudal system, in collusion with “corrupt government officials,” diverted floodwaters to the land of poor farmers, to save their crops instead of diverting it to pond areas of the river. The local feudal system had illegally occupied these pond areas of the river and used them as hunting resorts and for cultivating crops. This scenario also reflects how the flood disaster led to the erosion of trust in government institutions. Past studies of other Southeast Asian countries have shown that vertical ties—the linking social capital between survivors and their decision makers—are critical for effective recoveries (Joshi and Aoki 2013; Akbar and Aldrich 2016; Miller 2016; Uslaner 2016; You et al. 2020).

As with any research, ours comes with limitations. This study was conducted in the rural areas of Pakistan, so the findings of the study cannot be generalized to urban settings such as Karachi or Lahore. Secondly, this was a cross-sectional study that did not cover the changes in the level of different manifestations of social capital with the passage of time. Due to resource constraints, this study lacked long-term panel data and could not test claims that severe natural hazards change the social capital of communities and cause social distrust among individuals (Kaniasty and Norris 2004; Akbar and Aldrich 2016, 2017; Albrecht 2018; Akbar et al. 2020). Future research involving a longitudinal study would reveal the trends in the level of social capital with the passage of time.

## 6 Conclusion

Our study concluded that social capital is unequally divided among flood-affected communities. Those with low incomes, the unemployed, and the landless had to bear the brunt of the disaster, particularly those who were unskilled wage earners and working as agricultural laborers. As the crops in most of the flood-affected area were destroyed or severely damaged, those who were working in the agricultural sector faced severe economic hardship. The pervasive power structure in Pakistan further marginalized them and added to their suffering. Those at the top of the social hierarchy received more social support, evaluated the local leadership positively, and displayed high levels of trust and high community cohesion. These findings also confirm the argument that the disabled, low wage earners, and the homeless continue to suffer as the

losers during disasters (Scanlon 1988; Irshad et al. 2012; Walters and Gaillard 2014; Han et al. 2017; Vickery 2018).

Our analysis resonates with past claims that the benefits of social capital are not equally distributed within societies (Putnam et al. 1993; Chua and Ng 2015; Shadi et al. 2018). Different social groups (for example, minorities and women) lack access to social capital, further reinforcing their positions far from those at the top of the social hierarchy (Lin 2000). Our analyses demonstrating low levels of trust in government officials matches work done on Hurricane Katrina where the disaster—and its mismanagement—further eroded societal connections to decision makers (Nicholls and Picou 2013).

Given that social capital remains a significant source of community resilience (Norris et al. 2008), poorer, marginalized households and communities need horizontal and vertical ties to provide social, emotional, and informational support. But regular disasters can destabilize poorer households and weaken community cohesion at least in the short term (Sweet 1998; Alam-Chowdhary 2011; Lê et al. 2013; Calo-Blanco et al. 2017). Our study further confirmed that such negative effects are not equally distributed even in developed countries. As our world looks to a future with more disasters, the need to shore up trust and connections becomes more imperative than ever. The results suggest that governments and disaster response agencies should ensure that local communities are involved in flood preparedness and mitigation plans and that the voices of unheard are heard.

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## References

- Abdul-Hakim, R., N.A. Abdul-Razak, and R. Ismail. 2010. Does social capital reduce poverty? A case study of rural households in Terengganu, Malaysia. *European Journal of Social Sciences* 14(4): 556–566.
- Abramson, D.M., T. Stehling-Ariza, Y.S. Park, L. Walsh, and D. Culp. 2010. Measuring individual disaster recovery: A socioecological

- framework. *Disaster Medicine and Public Health Preparedness* 4(S1): S56–S54.
- Adger, W.N. 2000. Social and ecological resilience: Are they related?. *Progress in Human Geography* 24(3): 347–364.
- Adler, F.K. 2008. *Natural disasters as a catalyst for social capital: A study of the 500-year flood in Cedar Rapids, Iowa*. Lanham, MD: University Press of America.
- Akbar, M.S., and D.P. Aldrich. 2016. Flood damage and victims' perceptions about political leadership. *Risk, Hazards & Crisis in Public Policy* 6(4): 329–343.
- Akbar, M.S., and D.P. Aldrich. 2017. Determinants of post-flood social and institutional trust among disaster victims. *Journal of Contingencies and Crisis Management* 25(4): 279–288.
- Akbar, M.S., and D.P. Aldrich. 2018. Social capital's role in recovery: Evidence from communities affected by the 2010 Pakistan floods. *Disasters* 42(3): 475–497.
- Akbar, M.S., M.H. Bhutta, N. Hashmi, A.M. Khan, and A. Afzaal. 2020. Flood experience and victims' perceptions about community cohesion. *International Journal of Disaster Recovery and Business Continuity* 11(1): 2181–2195.
- Akram, S., and O. Aijazi. 2010. *Rapid assessment report of flood-affected communities in Muzaffargarh District, Punjab, Pakistan*. [http://reliefweb.int/sites/reliefweb.int/files/resources/24E2D643A00C38E34925778600836155-Full\\_Report.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/24E2D643A00C38E34925778600836155-Full_Report.pdf). Accessed 12 Jul 2022.
- Alam-Chowdhary, M.J. 2011. Social cohesion and natural disaster loss recovery of households: Experience from Bangladesh. <https://www.oecd.org/dev/pgd/46988916.pdf>. Accessed 13 Oct 2013.
- Albrecht, F. 2018. Natural hazard events and social capital: The social impact of natural disasters. *Disasters* 42(2): 336–360.
- Aldrich, D.P. 2012. *Building resilience: Social capital in post-disaster recovery*. Chicago: University of Chicago Press.
- Aldrich, D.P. 2019. *Black wave: How networks and governance shaped Japan's 3/11 disasters*. Chicago: University of Chicago Press.
- Aldrich, D.P., and M.A. Meyer. 2015. Social capital and community resilience. *American Behavioral Scientist* 59(2): 254–269.
- Aldrich, D.P., M.A. Meyer, and C.M. Page-Tan. 2018. Social capital and natural hazards governance. In *Oxford research encyclopedia*, ed. D.P. Aldrich, and M.A. Meyer. Oxford: Oxford University Press. <https://doi.org/10.1093/acrefore/9780199389407.013.254>.
- Beckett, J.V., S. Wilkinson, and P. Potangaroa. 2010. Post-disaster recovery: Multiagency leadership and coordination. Paper presented at the 2010 Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors, 2–3 September 2010, Paris, France.
- Bourdieu, P. 1986. The forms of capital. In *Handbook of theory and research for the sociology of education*, ed. J.G. Richardson, 241–258. Westport, CT: Greenwood.
- Casagrande, D.G., H. McIlvaine-Newsad, and E.C. Jones. 2015. Social networks of help-seeking in different types of disaster responses to the 2008 Mississippi river floods. *Human Organization* 74(4): 351–361.
- Calo-Blanco, A., J. Kovářík, F. Mengel, and J.G. Romero. 2017. Natural disasters and indicators of social cohesion. *PLoS ONE* 12 (6): Article e0176885.
- Chua, V., and I.Y. Ng. 2015. Unequal returns to social capital: The study of Malays in Singapore through a network lens. *Asian Ethnicity* 16(4): 480–497.
- Cohen, J. 1988. *Statistical power analysis for the behavioral sciences*, 2nd edn. New York: Academic Press.
- Daubon, R.E., and H.H. Saunders. 2002. Operationalizing social capital: A strategy to enhance communities' "capacity to concert". *International Studies Perspectives* 3(2): 176–191.
- District Police Office. 2015. *Muzaffargarh District Overview*. [https://dpomzg.punjabpolice.gov.pk/district\\_overview](https://dpomzg.punjabpolice.gov.pk/district_overview). Accessed 12 Jul 2022.
- Elliott, J.R., and P. Sams-Abiodun. 2010. Limits to social capital: Comparing network assistance in two New Orleans neighborhoods devastated by hurricane Katrina. *Sociological Quarterly* 51: 624–648.
- Farid, S., and S.-U.-R. Abbasi. 2019. Structure of Punjab and social reproduction: Role of capital. *Pakistan Journal of Social Sciences* 39(4): 1811–1822.
- Farid, S., S.-U.-R. Abbasi, and M.B. Akram. 2020. An assessment of class reproduction theory in Southern Punjab, Pakistan. *FWU Journal of Social Sciences* 14(1): 15–27.
- Farid, S., S.U.R.S. Abbasi, and Q.K. Mahmood. 2021. Modelling Bourdieusian social reproduction theory. *Social Indicators Research* 157(1): 297–333.
- FFC (Federal Flood Commission). 2010. *Annual flood report 2010*. [https://mowr.gov.pk/SiteImage/Misc/files/2010%20Annual%20Flood%20Report%20of%20FFC\(1\).pdf](https://mowr.gov.pk/SiteImage/Misc/files/2010%20Annual%20Flood%20Report%20of%20FFC(1).pdf). Accessed 12 Jul 2022.
- Fluker, W.E. 2005. Needed: Ethical leadership in the aftermath of Katrina. *Diverse: Issues in Higher Education* 22(17): 33–35.
- Gould, E.D., and A. Hijzen. 2016. Growing apart, losing trust? The Impact of Inequality on Social Capital. IMF Working paper 16/176. Washington, DC: International Monetary Fund.
- Griffin, C. 2009. Gender and social capital: Social networks post-disaster. Working paper. University of North Carolina, Chapel Hill, NC, USA. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.458.5202&rep=rep1&type=pdf>. Accessed 12 Jul 2022.
- Han, Z., H. Wang, Q. Du, and Y. Zeng. 2017. Natural hazards preparedness in Taiwan: A comparison between households with and without disabled members. *Health Security* 15(6): 575–581.
- Haq, R., and A. Ali. 2014. Development disparities and peculiarities: An empirical investigation. *Social Indicators Research* 115(2): 715–729.
- Hudson, P., M. Pham, L. Hagedoorn, A. Thieken, R. Lasage, and P. Bubeck. 2021. Self-stated recovery from flooding: Empirical results from a survey in Central Vietnam. *Journal of Flood Risk Management* 14 (1): Article e12680.
- Inaba, Y. 2008. Social capital and income-wealth gap: An empirical analysis in Japan. *The Nonprofit Review* 8(1): 1–12.
- Irshad, H., Z. Mumtaz, and A. Levay. 2012. Long-term gendered consequences of permanent disabilities caused by the 2005 Pakistan earthquake. *Disasters* 36(3): 452–464.
- Joshi, A., and M. Aoki. 2013. The role of social capital and public policy in disaster recovery: A case study of Tamil Nadu State, India. *International Journal of Disaster Risk Reduction* 7: 100–108.
- Jovita, H.D., H. Nashir, D. Mutiarin, Y. Moner, and A. Nurmandi. 2019. Social capital and disasters: How does social capital shape post-disaster conditions in the Philippines?. *Journal of Human Behavior in the Social Environment* 29(4): 519–534.
- Kaniasty, K. 2012. Predicting social psychological well-being following trauma: The role of postdisaster social support. *Psychological Trauma: Theory, Research, Practice, and Policy* 4(1): 22–33.
- Kaniasty, K., and F.H. Norris. 1995. Mobilization and deterioration of social support following natural disasters. *Current Directions in Psychological Research* 4(3): 94–98.
- Kaniasty, K., and F.H. Norris. 2000. Help-seeking comfort and receiving social support: The role of ethnicity and context of need. *American Journal of Community Psychology* 28(4): 545–581.
- Kaniasty, K., and F.H. Norris. 2004. Social support in the aftermath of disasters, catastrophes, and acts of terrorism: Altruistic, overwhelmed, uncertain, antagonistic, and patriotic communities. In *Bioterrorism: Psychological and public health interventions*, ed. R.J. Ursano, A.E. Norwood, and C.S. Fullerton, 200–229. Cambridge: Cambridge University Press.
- Kelly, M. 2004. Leading in a crisis. *Executive Excellence* 21(10): 4–4.

- Krishna, A. 2004. Understanding, measuring and utilizing social capital: Clarifying concepts and presenting a field application from India. *Agricultural Systems* 82(3): 291–305.
- Kweit, M.G., and R.W. Kweit. 2004. Citizen participation and citizen evaluation in disaster recovery. *American Review of Public Administration* 34(4): 354–373.
- Lê, F., M. Tracy, F.H. Norris, and S. Galea. 2013. Displacement, county social cohesion, and depression after a large-scale traumatic event. *Social Psychiatry and Psychiatric Epidemiology* 48(11): 1729–1741.
- Lin, N. 2000. Inequality in social capital. *Contemporary Sociology* 29(6): 785–795.
- Lin, N. 2005. A network theory of social capital. In *The handbook of social capital*, ed. D. Castiglione, J.W. van Deth, and G. Wolleb, 50–69. New York: Oxford University Press.
- Mahmood, S., A.U. Rahman, and A. Sajjad. 2019. Assessment of 2010 flood disaster causes and damages in district Muzaffargarh, Central Indus Basin, Pakistan. *Environmental Earth Sciences* 78(3): 1–11.
- Mahmood, S., A. Sajjad, and A.U. Rahman. 2021. Cause and damage analysis of 2010 flood disaster in district Muzaffar Garh, Pakistan. *Natural Hazards* 107(2): 1681–1692.
- Miller, D.S. 2016. Public trust in the aftermath of natural and na-technological disasters: Hurricane Katrina and the Fukushima Daiichi nuclear incident. *International Journal of Sociology and Social Policy* 36(5/6): 410–431.
- Nakagawa, Y., and R. Shaw. 2004. Social capital: A missing link to disaster recovery. *International Journal of Mass Emergencies and Disasters* 22(1): 5–34.
- Nicholls, K., and J.S. Picou. 2013. The impact of Hurricane Katrina on trust in government. *Social Science Quarterly* 94(2): 344–361.
- Norris, F.H., A. Murphy, K. Kaniasty, J. Perilla, and D.C. Ortis. 2001. Postdisaster social support in the U.S. and Mexico: Conceptual and contextual considerations. *Hispanic Journal of Behavioral Sciences* 23(4): 469–497.
- Norris, F.H., S.P. Stevens, B. Pfefferbaum, K.F. Wyche, and R.L. Pfefferbaum. 2008. Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology* 41(1–2): 127–150.
- Nunnally, J.C. 1978. An overview of psychological measurement. In *Clinical diagnosis of mental disorders*, ed. B.B. Wolman, 97–146. New York: Springer.
- Oyane, J. 2010. Reflections on the concepts of social capital and resilience in sociological disaster research. *The Senshu Social Capital Review* 1: 105–138.
- PDMA (Provincial Disaster Management Authority). 2011. *Muzaffargarh*. <https://pdma.punjab.gov.pk/system/files/Muzaffargarh.pdf>. Accessed 12 Jul 2022.
- Putnam, R.D. 1993. The prosperous community: Social capital and public life. *The American Prospects* 4(13): 35–42.
- Putnam, R.D. 1995. Bowling alone: America's declining social capital. *Journal of Democracy* 6(1): 65–78.
- Putnam, R.D. 1995. Turning in, turning out: The strange disappearance of social capital in America. *Political Science and Politics* 28(4): 664–683.
- Putnam, R.D., R. Leonardi, and R.Y. Nanetti. 1993. *Making democracy work: Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.
- Scanlon, T.J. 1988. Winners and losers: Some thoughts about the political economy of disaster. *International Journal of Mass Emergencies and Disasters* 6(1): 47–63.
- Seidenberg, J. 2006. Cultural competency in disaster recovery: Lessons learned from the Hurricane Katrina experience for better serving marginalized communities. <https://www.law.berkeley.edu/library/resources/disasters/Seidenberg.pdf>. Accessed 8 Jul 2022.
- Shadi, Y., M.H. Lotfi, S. Nedjat, M. Amini Rarani, and E. Khedmati Morasae. 2018. Explaining unequal levels of social capital in Tehran. *Social Indicators Research* 140(1): 243–265.
- Shareef, F., I.S. Chaudhry, and T. Azid. 2015. Transmission of social capital through gender lens: A case study of Multan District. *Pakistan Journal of Social Sciences (PJSS)* 35(1): 11–23.
- Smith, N. 2006. There's no such thing as a natural disaster. <https://items.ssrc.org/understanding-katrina/theres-no-such-thing-as-a-natural-disaster/>. Accessed 12 Jul 2022.
- Sørensen, B.R., and K. Albris. 2015. The social life of disasters: An anthropological approach. In *Disaster research: Multidisciplinary and international perspective*, ed. R. Dahlberg, O. Rubin, and M. Thanning, 80–95. London: Routledge.
- Sweet, S. 1998. The effect of a natural disaster on social cohesion: A longitudinal study. *International Journal of Mass Emergencies and Disaster* 16(3): 321–331.
- Tobin, G.A., and L.M. Whiteford. 2002. Community resilience and volcano hazard: The eruption of Tungurahua and evacuation of Faldas in Ecuador. *Disasters* 26(1): 28–48.
- UNDRR (United Nations Office for Disaster Risk Reduction). 2020. *Global assessment report on disaster risk reduction*. Geneva: UNDRR.
- Uphoff, N. 2000. Understanding social capital: Learning from the analysis and experience of the participation. In *Social capital: A multifaceted perspective*, ed. P. Dasgupta, and I. Serageldin, 215–249. Washington, DC: World Bank.
- Uslaner, E.M. 2016. Disasters, trust, and social cohesion. *Ritsumeikan Language Culture Study* 28(1). [http://www.ritsumei.ac.jp/acd/re/k-rsc/lcs/kiyou/pdf\\_28-1/RitsIILCS\\_28.Ipp.183-191USLANER.pdf](http://www.ritsumei.ac.jp/acd/re/k-rsc/lcs/kiyou/pdf_28-1/RitsIILCS_28.Ipp.183-191USLANER.pdf). Accessed 12 Jul 2022.
- Vickery, J. 2018. Using an intersectional approach to advance understanding of homeless persons' vulnerability to disaster. *Environmental Sociology* 4(1): 136–147.
- Walters, V., and J.C. Gaillard. 2014. Disaster risk at the margins: Homelessness, vulnerability and hazards. *Habitat International* 44: 211–219.
- Wisner, B., P. Blaikie, T. Cannon, and I. Davis. 2003. *At risk—natural hazards, people's vulnerability and disasters*, 2nd edn. London: Routledge.
- Woolcock, M., and D. Narayan. 2000. Social capital: Implications for development theory, research, and policy. *The World Bank Observer* 15(2): 225–249.
- World Food Program. 2010. *Pakistan flood impact assessment*. <https://documents.wfp.org/stellent/groups/public/documents/ena/wfp225987.pdf>. Accessed 12 Jul 2022.
- Yamane, T. 1967. *Statistics: An introductory analysis*, 2nd edn. New York: Harper and Row.
- You, Y., Y. Huang, and Y. Zhuang. 2020. Natural disaster and political trust: A natural experiment study of the impact of the Wenchuan Earthquake. *Chinese Journal of Sociology* 6(1): 140–165.