Social capital and community disaster resilience in a disaster-prone area in Indonesia

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Abstract

Background: Communities in disaster-prone areas face repeated exposure to natural hazards, yet the role of social capital in enhancing disaster resilience is underexplored in Indonesia.
Purpose: This study aimed to examine the relationship between dimensions of social capital—social cohesion, social participation, and reciprocity—and community disaster resilience in Sukabumi, West Java.
Methods: A cross-sectional survey was conducted among 700 residents aged ≥18 years using an online questionnaire. Disaster resilience was measured with the Brief Resilience Scale, and social capital with validated subscales. Multiple linear regression analyzed associations between social capital and resilience.
Results: Older age, higher education, experience of housing damage (22.4%), loss of friends or relatives (44.6%), and higher levels of social cohesion, participation, and reciprocity were significantly associated with greater disaster resilience (all $p<0.05$). The regression model explained 56% of the variance ($R^2=0.56$).
Conclusions: Social capital is a significant predictor of community disaster resilience in high-risk areas. These findings can guide health professionals, especially nurses, to design targeted interventions for disaster preparedness and long-term recovery.

Keywords: community resilience; Indonesia; natural disasters; social capital; social cohesion

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Introduction

A disaster disrupts a community, causing widespread losses, societal disruption, and damage that exceeds the community's capacity to manage its resources (World Health Organization, 2019). World Health Organization reports 190 million people affected by natural catastrophes annually (Girardet, 2020). Indonesia experienced 3,350 natural catastrophes in 2022, causing 5,143,027 fatalities, over 1,000 deaths, and a total economic loss of 1,34 trillion Rupiah. These disasters included extreme weather, landslides, fires, earthquakes, and volcano eruptions (Bencana, 2020). However, large-scale disasters often lead to extensive destruction of homes and the migration of populations, resulting in the separation of neighborhoods (Rumpa et al., 2023). Maintaining social relationships after disasters is challenging (Lee et al., 2022).

Social capital is crucial for community disaster recovery and coping (Gallagher et al., 2019; Masud-All-Kamal & Monirul Hassan, 2018; Wei & Han, 2018). The disaster hazards cycle paradigm consists of four phases: mitigation, preparedness, response, and recovery (Tierney, 2019). Social capital plays a crucial role in each phase. At the mitigation stage, communities can take preventative measures like enforcing earthquake-resistant building rules (Lee et al., 2022). Social capital refers to the quantity and quality of social connections in a community, consisting of two dimensions: cognitive (regarding perceived social relations) and structural (regarding actual actions

in social networks). Cognitive dimensions involve residents'perceptions of social relations, while structural dimensions involve their actual actions in their social networks, such as friends, organizations, and social events (Carrillo Álvarez & Riera Romaní, 2017). Social capital is a complex concept with various frameworks defining its measurable parts. Aldrich and Meyer (Saito et al., 2017) propose a framework consisting of bonding, bridging, and linking types of social capital for a comprehensive and grounded theory. However, health outcomes following a disaster may be impacted by a community's amount of social capital. Thus, in order to avert disasters and be ready for them, it is crucial to strengthen social ties within the community.

Resilience is a crucial aspect of human survival after natural disasters, as it helps individuals recover more quickly (Jewett et al., 2021; Laurence & Kim, 2021). Communities with high levels of trust and mutual aid fare better after natural disasters (Saito et al., 2017). Increased cooperative activities, prioritizing group interests over individual interests, are believed to drive this recovery (Ntontis et al., 2008). Resilience is linked to various types of unexpected catastrophes, both natural and man-made (Saito et al., 2017; Rumpa et al., 2023). All humans have the potential for resilience, but their actual degrees are influenced by environmental and personal factors (Vella & Pai, 2019). Protective elements, such as skills and abilities, have been found to bolster resilience (Friedberg & Malefakis, 2022). Resilience, sometimes called psychological resilience or psychological hardiness, is traditionally defined as the capacity to overcome hardship. In the aftermath of a crisis, a resilient community will be one that has established a positive trajectory of functioning and adaptation among its constituent populations through a set of interconnected adaptive skills (Ntontis et al., 2020). A dearth of research on the relationship between social capital and community resilience to disasters has been identified in Indonesia. Community members in Indonesian disaster-prone areas were the focus of this study, which sought to investigate the link between social capital and catastrophe resilience.

Materials and Methods

Study design

A cross-sectional study was conducted in Sukabumi, West Java, Indonesia. Participants were residents aged ≥18 years who completed an online questionnaire. Disaster resilience was measured using the Brief Resilience Scale, while social capital was assessed through validated subscales for social cohesion, social participation, and reciprocity. Associations between social capital and resilience were analyzed using multiple linear regression.

Sample

Participants were residents of West Java, Indonesia, aged 18 years or older and fluent in Bahasa Indonesia. Inclusion criteria required participants to have lived in the community for at least one year and to provide informed consent for participation. Individuals who were unable to complete the online questionnaire independently or lacked internet access were excluded.

A minimum sample size of 664 was calculated to achieve a 95% confidence level and a 5% margin of error based on the total population of West Java. A total of 700 participants were recruited using convenience sampling through social media platforms such as Facebook and Instagram. Although the sample size was statistically sufficient, the convenience sampling method limits the generalizability of the findings. Conducting the survey online introduced selection bias, as only participants with internet access and digital literacy could participate, which may reduce external validity. Additionally, the cross-sectional design allows for identification of associations between social capital and disaster resilience but does not support causal inferences..

Instruments

Sociodemographic variables considered potential confounders included sex, age, monthly income, education, and years of community residence. Participants were also asked about personal disaster experiences, including loss of friends or relatives and housing damage.

Resilience was measured using the Brief Resilience Scale (BRS) developed by Tierney (2019) which assesses the ability to "bounce back" from stress using six items rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The BRS was translated and culturally adapted for the Indonesian context following standard forward-backward translation procedures. In this study, it demonstrated good internal consistency (Cronbach's $\alpha = 0.87$).

Social capital was measured based on three dimensions: social cohesion, social participation, and reciprocity (Saito et al., 2017).

Social cohesion assessed trust, mutual aid, and sense of belonging within the community using three items rated on a 5-point Likert scale (1 = not at all, 5 = strongly agree; Cronbach's $\alpha = 0.81$).

Social participation was measured by three items asking frequency of engagement in sports clubs, hobby groups, and volunteer activities. Each item was scored 0–1 (0 = not participating, 1 = participating regularly), with the total score ranging from 0–3 (Cronbach's $\alpha = 0.83$).

Reciprocity was measured using four yes/no items on mutual support and emotional care. Each "yes" was scored 1, summed to yield a total score of 0–3 (Cronbach's $\alpha = 0.81$).

Individual-level social capital scores were aggregated to the community level by averaging participants' scores within the same community. Higher scores indicate greater social cohesion, participation, and reciprocity (Nakagomi et al.,

Table 1. Descriptive statistics for variables (n=700)

Variables	Min–Max	Mean (SD)
Demographic factors		
Age	18–45	30.3 (7.45)
Gender		
Male		410 (58.6)
Female		290 (41.4)
Duration of residence (years)	1–32	26.71 (21.98)
Education	1–8	
Below senior high school		380 (54.3)
Senior high school		320 (45.7)
Monthly income (USD)		1.66 (0.88)
Disaster personal experience		
Housing damage		
Yes		157 (22.4)
No		543 (77.6)
Losing friends or relatives		
Yes		312 (44.6)
No		388 (55.4)
Community-level social capital	0–3	2.71 (0.48)
Social capital indicators		
Social cohesion	0–3	2.57 (0.87)
Social participation	0–3	2.01 (1.03)
Reciprocity	0–3	2.71 (0.14)
Resilience	1–5	3.56 (1.15)

2019).

Procedure

The study protocol was approved by the Institutional Review Board of STIKes Sukabumi (Approval No.: 0987/ETIK/2022). Data were collected through an online survey conducted in September and October 2022 using a secure internet survey platform. Participants were recruited via social media networks, including Facebook and Instagram groups. Informed consent was obtained electronically before participants completed the self-administered questionnaire.

Results

Of the 700 respondents who completed the online questionnaire (25 had missing data), 58.6% were male and 41.4% were female. Most participants (54.3%) had education below senior high school. The mean age was 30.3 years (SD = 7.45), the mean duration of residence was 26.71 years (SD = 21.98), and the average monthly income was USD 1.66 (SD = 0.88). Approximately 22.4% of respondents had experienced housing damage due to disasters, and 44.6% had lost friends or relatives.

The mean community-level social capital score was 2.71 (SD = 0.48). Subscale means indicated moderate levels: social cohesion 2.57 (SD = 0.87), social participation 2.01 (SD = 1.03), and reciprocity 2.71 (SD = 0.14).

Bivariate correlations (Table 2) showed that disaster resilience was positively associated with age ($r = 0.20$), years of education ($r = 0.34$), monthly income ($r = 0.17$), social cohesion ($r = 0.62$), social participation ($r = 0.57$), and reciprocity ($r = 0.61$), all $p < 0.05$. Experience of housing damage ($r = -0.25$) and loss of friends or relatives ($r = -0.31$) were negatively associated with disaster resilience.

Multiple linear regression indicated that older age, higher education, experience of housing damage, loss of friends or relatives, social cohesion, social participation, and reciprocity were significant predictors of disaster resilience (all $p < 0.05$). The model explained 56% of the variance ($R^2 = 0.56$).

Discussion

This study supports existing literature suggesting a positive association between social capital—including social cohesion, social participation, and reciprocity—and community disaster resilience, consistent with previous findings (Lee et al., 2018). Cohesive communities foster trust, mutual aid, and self-organization during disasters, enabling residents to support each other and reducing the

Table 2. Correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11
Age	1										
Gender		1									
Duration of residence (years)	0.01	0.08	1								
Education	0.09	0.03	0.07	1							
monthly income (USD)	0.06	0.10	0.18*	0.13	1						
Housing damage	0.04	0.05	0.01	0.02	0.04	1					
Losing friends or relatives	0.08	0.03	0.04	0.11	0.02	0.01	1				
Social cohesion	0.12	00.11	0.15**	0.06	0.10	0.17*	0.23**	1			
Social participation	0.18*	0.22**	0.31**	0.10	0.07	0.21**	0.32**	0.45***	1		
Reciprocity	0.19*	0.17*	0.26**	0.12	0.02	0.25**	0.29**	0.53**	0.58***	1	
Resilience	0.20*	0.11	0.34***	0.17*	0.03	-0.25**	-0.31***	0.62***	0.57***	0.61***	1

Note: *p < .05. **p < .01. ***p < .001.

Table 3. Factors associated with disaster resilience (n = 700)

Significant Factors	Unstandardized Beta (SE)	p value	Adjusted R2
Age	0.24 (0.03)	0.011	0.56
Duration of residence (years)	0.27 (0.11)	0.015	
Education	0.31 (0.09)	0.021	
Housing damage	0.21 (0.04)	0.001	
Losing friends or relatives	0.32 (0.15)	0.002	
Social cohesion	0.41 (0.17)	0.001	
Social participation	0.44 (0.10)	0.001	
Reciprocity	0.24 (0.13)	0.011	

burden on government services (Reicher & Stott, 2020; Boyd & Davis, 2021; Drury et al., 2021). Communities with higher social cohesion also distribute coping resources, both monetary and emotional, more effectively, which can reduce negative health outcomes during crises (Reicher & Stott, 2020).

The present study demonstrated that individuals' perceptions of social cohesion and access to social capital strengthened resilience after experiencing disaster-related losses. While disaster damage increased the risk of functional decline, pre-existing community social capital mitigated these effects. Local factors such as small group size, past collaboration, shared livelihood resources, and engagement in recovery activities—like clearing debris, providing medical care, securing relief, and offering psychological support—contributed to the recovery of normal life in Sukabumi, West Jav (Casas-Quiroga & Crujeiras-Pérez, 2020).

Consistent with Graves's classic study (Graves, 2010), is placement and loss of community ties can exacerbate collective trauma, highlighting the importance of maintaining social networks in post-disaster recovery. Disaster experiences, such as housing damage or loss of loved ones, also shaped resilience, possibly by reinforcing social participation and reciprocity within affected communities.

These findings indicate that social capital plays a critical role in both individual and community resilience, facilitating cooperation beyond self-interested survival behaviors. Future research should examine how local contexts influence the mechanisms through which social capital supports

disaster recovery (Aldrich & Meyer, 2015).

Study limitation

Several limitations should be considered when interpreting these findings. First, the cross-sectional design precludes causal inferences, and the observed associations may reflect reverse or reciprocal relationships. Longitudinal studies are needed to clarify the mechanisms linking social capital and disaster resilience.

Second, this study focused on structural social capital (social cohesion, social participation, and reciprocity) and did not examine cognitive aspects, such as shared norms and trust. Future research should include both structural and cognitive components to provide a more comprehensive understanding of how social capital contributes to community resilience.

Finally, the measure of disaster resilience may not fully capture its complex psychological dimensions. Future studies should employ instruments that more accurately reflect the multidimensional nature of resilience in disaster-affected populations.

Implications for Practice

The findings highlight the importance of social capital in supporting community disaster resilience and long-term recovery from repeated catastrophes. Nurses and other health professionals can use insights from the relationships between social capital and resilience to assess and support individuals in disaster-prone communities.

The Brief Resilience Scale (BRS) and social capital measures used in this study were translated, culturally adapted, and validated for the Indonesian context, ensuring their reliability and construct validity. Incorporating these instruments into practice may allow practitioners to systematically evaluate resilience and social capital among affected populations.

Furthermore, nurses may benefit from targeted training on resilience and social capital to develop interventions that strengthen community networks and coping capacities. Enhancing these factors can help reduce stress, depression, and other adverse mental health outcomes, ultimately fostering more resilient communities.

Conclusion

This study demonstrated a significant positive association between social capital—comprising social cohesion, social participation, and reciprocity—and community disaster resilience in West Java, Indonesia. Individuals and communities with higher social capital were better able to cope with the adverse effects of disasters, while experiences of housing damage or loss of relatives negatively affected resilience. These findings underscore the theoretical importance of social capital as a protective factor in disaster contexts and highlight the need to consider both structural and cognitive dimensions in resilience research.

From a practical perspective, enhancing social capital within disaster-prone communities can strengthen collective coping mechanisms and reduce long-term psychological and social impacts. Health professionals, especially nurses, can integrate assessments of resilience and social capital into community-based interventions to foster preparedness and recovery. Future research should employ longitudinal designs and culturally adapted measures to further clarify the mechanisms through which social capital influences resilience over time.

Declaration of Interest

The authors declare no conflict of interest.

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Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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