Research article

SOCIAL CAPITALS AND EARTHQUAKE: A STUDY OF DIFFERENT DISTRICTS OF TEHRAN, IRAN

Maryam Zareian[1]*

[1]Road, Housing and Urban Development Research Center (BHRC);
m.zareian@bhrc.ac.ir

Correspondence: maryamzareian@yahoo.com; Tel.: 0098 912 849 18 56

Abstract: Earthquakes occur suddenly and cause much physical and socioeconomic damage, especially in less developed countries. Many studies and strategies related to earthquake management in Iran emphasize the physical-based infrastructure, such as National Building Regulations or planning to renovate existing buildings. However, the relevance of social factors has been widely neglected. Addressing this gap, the present paper argues that social capital can play a vital role in different stages of natural disasters, such as preparedness, response, and recovery. Focusing on Tehran, that due to urban decay and geological fault lines is highly earthquake-prone, this study used secondary analysis to examine the data obtained from large cross-sectional studies conducted by Tehran Municipality in 2010 on social capital survey in Tehran and 2017 on quality of life in Tehran The present study is descriptive-analytical and applied research. Univariate analysis including measures of central tendency and dispersion was used to achieve the objectives of this research. The analyzed data show that four urban districts in Tehran (3, 21, 13, 4) have low bonding social capital, while the others have moderate bonding social capital. Moreover, four districts (9, 16, 19, 12) have very low bridging social capital, and the rest of the 22 districts have low bridging social capital. Demonstrating the relevance of social capital for preparing and supporting vulnerable communities during natural disasters, this study suggests social policies that would increase social cohesion, enhance generalized trust and strengthen social networks.

Keywords: social capital, Tehran, earthquake, Iran

1. Introduction

Earthquake has one of the most critical environmental threats in the world, causing severe physical and psychological harm. Hence, all countries tend to minimize this damage to human communities. Strengthening physical infrastructures, renovation of buildings, and enhancing the construction rules have been the common policies adopted to respond to such

risks. However, any amount of investment in physical infrastructures cannot eliminate all threats and vulnerabilities. An alternate approach to mitigating catastrophe consequences is strengthening social infrastructures such as social capital.

Iran was among the first five countries in the world in terms of human and financial losses caused by disasters in the 20th century. This status has not changed over the recent decade. According to World Disaster Report, between 1992 and 2001, 9.8% of the whole Iranian population died or was injured as a result of natural disasters and accidents (World Disaster Report 2002: ch. 8). According to estimates and studies by experts, there are around five large more or less active faults and ten small active faults (JICA, 2001).

The large extent of urban decay in Tehran, numerous vulnerable buildings, and seismic faults indicate that different aspects must be considered to solve earthquakes. The reason is that social structures can supplement technical engineering measures when a disaster happens.

Accordingly, this study asks some main questions: why social capital is important during natural disasters? What is the current status of social capital in resilience against earthquakes in Tehran? What kind of policies and advice can be offered to urban managers, governmental decision-makers, and non-governmental organizations to improve society's conditions against earthquakes?

Various disciplines have shown positive effects of social capital on human communities since its advent explaining how participation in groups can provide positive achievements for the person and society. According to Bourdieu, social capital is a collection of actual or potential resources that creates a durable network of more or less institutionalized relationships of familiarity and mutual recognition (1986,21) Coleman (1988) indicated how social capital and social structures of the relationships can be converted to objective resources for individuals.

Researchers have conducted many studies on the importance of social capital during real disasters using various techniques, such as quantitative surveys, in-depth interviews, and field observations (Cutter, Burton, & Emrich, 2010; Peacock et al., 2010; Sherrieb, Norris, & Galea, 2010).

Among available references, Howard Koh introduces social capital as the most important capital that effectively mitigates the adverse effect of natural disasters (Koh, 2008).

Meanwhile, social capital has opened its way in research as an effective element during natural disasters; many studies have also examined the impact of different forms of social capital during natural disasters.

Putnam (2000) distinguishes between bonding and bridging social capital. When different indicators are combined with tow types of social capital, different outcomes appear for individuals and communities.

Bonding social capital describes the connections between emotionally close individuals, such as friends or family, and leads to strong bonds with loved ones. Strong communications in this type of social capital provide specific personal aids and social support when it is required, or any disaster occurs (Hurlbert et al., 2000).

On the contrary, bridging or intergroup social capital describes relationships with acquaintances or people who have weaker relationships. These bonds provide new information and resources, leading to people's progress in society. In this case, Granovetter's analysis showed (1983) the strength of weak ties in which weak ties created more job opportunities compared to strong ties and intergroup relationships. The bridging social capital is mainly obtained from engagement and membership in civic and political institutions, associations of parents and teachers, and sports gyms (Small, 2010).

Studies show that each of these three social capitals can create a certain level of support for their owners.

Bonding social capital is the first and most common form of social network available for injured individuals during disasters (Norris et., 2002). When a risk occurs, individuals will receive required warnings using their bonding social capital to make themselves prepared against natural disasters. Such social relationships help individuals to find shelter and required resources and emergency first aid (Hawkins & Maurer, 2010; Heller et al., 2005). In other words, due to such bonding social capital or family bonds, relatives are usually the first help providers during natural disasters (Garrison & Sasser, 2009; Hurlbert et al., 2000) and do emergency social measures to meet the needs of victims during such disasters.

Although bonding social capital is the most common available social source, many studies have shown that bridging social capital also provides similar advantages; it means it contributes some opportunities and information to have access to new resources in recovery and long-term survival (Hawkins & Maurer, 2010). In bridging social capital, connections with social organizations and civic institutions provide different supports for members of the communication network; for instance, churches or mosques collect money for injured people and needy families interacting with them.

During crises and after it, Bonding and bridging social capital work distinctly by supplementarily. In general, one of these two social capitals is greater than another one in communities.

Studies conducted by Hawkins and Maurer (2010) indicate that although bonding social capital is important for immediate support bridging social capital allows the collecting of data and resources from other economic classes. In other words, a lack of social capital bridging to the individuals outside the damaged area and a lack of relationship with individuals who have more resources would decrease the resilience and flexibility of injured individuals.

Social capital shapes and keeps social groups and local communities but also enhances residents' participation in the renovation process and forming social bonds. Moreover, it facilitates the recovery and renovation of local society while protecting social bodies available during a disaster and in local society after the disaster (Roosta et al., 2018: 2).

Researchers of natural disasters have found strong evidence of the role of social solidarity and networks during natural disasters. Social networks of people provide financial sources (e.g., loans and cash funds for repairing properties) and non-financial sources (e.g., search and rescue, debris collection, child care, emotional support, providing shelter and information) during crises. Those isolated people who have fewer social bonds are less likely to have a chance of survival, to receive medical aid and preventive measures, such as evacuation, and help from others, such as shelter (Dynes, 2005, 2006).

In 1995, Kobe in Japan experienced the deadliest earthquakes. Hundreds and thousands of people died. Hundreds of people were trapped under the debris and damaged houses. The important point is that surviving people have been rescued by their relatives, neighbours, passersby, and friends (Aldrich, 2012a). Most people who were pulled out from their collapsed houses had been rescued by their neighbours, not firefighters and rescuers (Aldrich, 2012a). Social networks provide access to different sources, such as information, aid, financial sources, child care, and emotional-psychological support during disasters (Elliott, Haney, & Sams-Abiodun, 2010).

According to studies conducted by Dynes (2005), social bonds and networks, shared values, and participation are the most effective factors in overcoming adverse effects of natural disasters because they share vital information to save the lives of people and take effective

measures at the right time. Such support is given by family groups and members, relatives, and friends during a crisis (Poteyeva, 2007).

According to the studies conducted by Allen (2013), Australians voluntarily helped the injured and victims who were affected by some natural disasters, such as fires, storms, and floods. Before the government's arrival for rescue operations, neighbors, relatives, and people gathered in the damaged location and presented the required support and services. Moreover, James' studies show that bonding social capital provided all food and non-food support for flood-affected people in Myanmar and Taiwan before the governmental aid arrived in the place (James, 2012).

Tse-Wei and Wang (2013) found that the more Chinese families are member of larger networks of spring festivals (a social network through which they gather for annual celebrations), the higher the probability of house renovation would be.

Nakagawa and Shaw (2004) studied the Gujarat and Kobe earthquakes and concluded that trust, social norms, participation, and high social networks could save communities during disasters sooner. Even among those communities with different cultural and economic characteristics, the communities with higher social capital are more satisfied with society renovation since they rapidly return to normal life. A sense of trust and mutual dependence enhances the awareness of natural disaster management and voluntary responsibilities, which in turn leads to higher preparedness for natural disasters (Hausman, Hanlon, & Seals, 2007).

Matthew Abunyewah (2023) carried out a study on the influence of personal and collective social capital on flood preparedness and community resilience in Ghana country. Their study showed that flood preparedness and resilience of society can be predicted by using personal and collective social capital. Pandri et al. (2021) addressed the role of social capital in the 2015 Haiti Earthquake and found that higher levels of bonding and bridging social capital among Haiti residents could facilitate the collective measures after the earthquake, and residents cooperated to save the lives of the injured and support them. However, foreign aid marginalized the previous groups that had low social capital compared to those with higher social positions or more political ties since the first group had less access to relief items and funds for reconstruction. In general, it can be said that in the early stages of the disaster, when people need immediate help, the bond social capital makes it possible for people to meet these vital needs. However after the disaster, information and economic resources are needed to return to the normal routine of life, and binding social capital provides this possibility.

2. Methods

2.1. Data

This study uses secondary data analysis is applied. The data derived from two social capital surveys in Tehran were reanalyzed to examine bonding and bridging social capital:
- The measurement of social capital survey in Tehran(Municipality of Tehran ,2010). The data of this research were retrieved from a survey conducted in 2010 with 2400 persons aged above 15 years residing in Tehran.

Atlas of Urban Quality of Life in Tehran Metropolis (Municipality of Tehran, 2017). The data of this research were retrieved from a survey conducted in 2017 with 45,004 persons aged above 18 years residing in Tehran.

According to social capital indexing, a seven-point set with lingual tags was defined that indicated the social capital rate (x) in different districts.

Table2. Ranking valuation of the amount of social capital	
ranking	**social capital**
Full	x≥ 8.54
Very high	7.11≤ x< 0.83
High	5.70≤ x<7.11
Moderate	4.28≤ x<5.70
Low	2.85≤ x<4.28
Very low	1.42≤ x<2.85
Lack of social capital	x< 1.42

2.2. Study area: Tehran

In this survey, Tehran was selected as the study area as it is Iran's capital. It is the most populous city with a population of 9,259,009; it is the 37th most populous city in the world. It is located at a longitude and latitude of 51.4215 °E and 35.6944°N, respectively. (Figure 1).
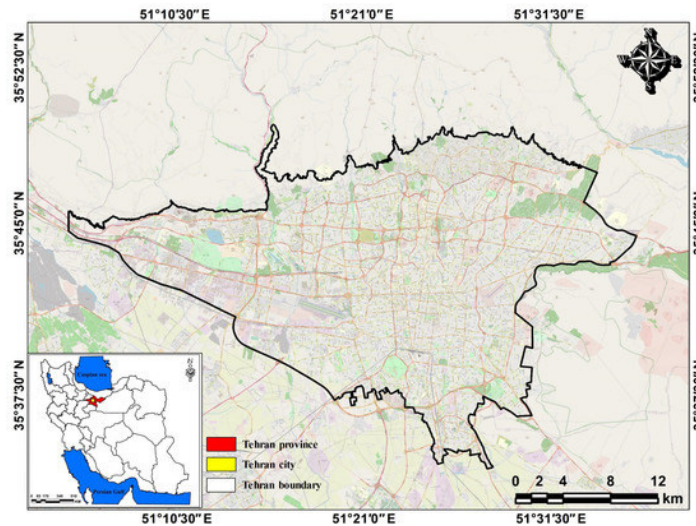

Figure 1. Geographical location of the study area.

The metropolis of Tehran is divided into 22 municipal districts(Figure 2).
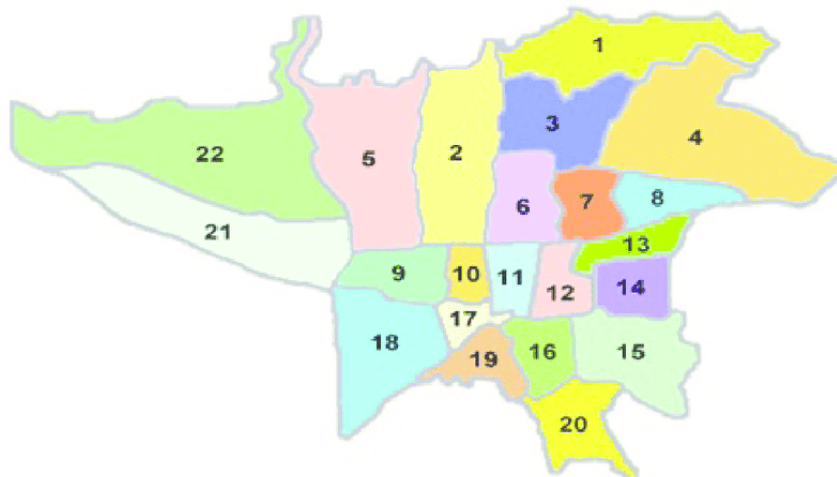

Figure 2. Tehran district map

In 2021, 4,688,144 members of the Tehran population were men, and 4,742,481 people were women. Moreover, 8.4% of the population are 65 years old and older. The average household size is 3 members in Tehran; 15.8% of households are female-headed families. Statistics show that 94.8% of the population living in Tehran are literate, and 5.1% are illiterate. Moreover, more than one-third of the population has academic education; 49.6% are owners of their residential units, while 41.8% are tenants.

3. Results

Social capital is a variable studied in this paper. Social capital was examined within bonding and bridging themes. Moreover, the theoretical approach of this study indicates that bonding and bridging social capital can influence those indicators that enhance endurance and resilience during natural disasters. The mean value of bonding and bridging social capital equalled 4.7 and 3.35 out of 10, respectively. Regardless of the comparison between these two mean values, the important point is the weakness of bridging social capital and its values, which is lower than its average at the 0-10 scale. The weakness of bridging social capital is measured by mean, median (med) and distribution indexes. The med value of data equals to 2.87, indicating that half of the respondents had values less than this rate. Moreover, 35.9% of respondents in bonding social capital and 72.9% of respondents in bridging social capital were at a low level, while 14.5% and 2.5% of individuals in the population were at the upper level of distribution (Tables 3 and 4).

Table 3. Ranks and statistics of bonding social capital among different districts of Tehran

District	Number of respondents	Ranks					Statistics		
		Very low	Low	Somewhat	High	Very high	Mean	Med	SD
1	173	5.7	27.9	55.4	10.9	0.1	4.46	4.41	1.31
2	183	2.3	32.9	48.9	15.2	0.7	4.51	4.29	1.49
3	79	9.3	36.9	43.5	9.1	1.2	3.96	4	1.61
4	190	8.8	35.7	42.1	11.4	2	4.26	4.15	1.65
5	176	8.4	28.2	47.3	15.3	0.8	4.47	4.41	1.61
6	48	6.6	20.2	56.4	13.2	3.7	4.74	4.75	1.7
7	73	7.1	21.3	51.3	16	4.3	4.83	4.93	1.8
8	76	4.1	25.5	50.6	19	0.7	4.66	4.72	1.6
9	28	7.5	6.9	78	9.6	-2	4.74	4.87	1.45
10	42	5	30.1	52	6.4	6.5	4.64	4.56	1.69
11	80	5.3	29.1	50.8	14.7	0.2	4.51	4.75	1.55
12	59	8.9	28	45.9	16.8	0.5	4.42	4.64	1.65
13	49	4.3	26.8	59.1	9.1	0.7	4.21	4.23	1.48
14	105	2	27.8	60.3	8	1.9	4.46	4.41	1.19
15	139	4.5	28.6	50.9	13.6	2.4	4.58	4.75	1.55
16	21	5	25.3	49.2	19.6	0.8	4.65	4.81	1.7
17	18	46.6	43.1	5.8	4.3	0.1	4.49	4.26	1.5
18	31	3.4	18.8	60.4	14.5	2.9	4.8	4.53	1.58
19	49	8.6	23.8	55.2	5.5	6.9	4.52	4.23	1.75
20	41	5.1	30.8	48.2	11	4.9	4.36	4.47	1.76
21	20	15.8	38.8	36.4	9	0	3.96	3.85	1.53
22	31	3.4	28.2	57	11.3	0.2	4.49	4.35	1.29
total	1611	5.9	29	50.6	12.8	1.7	4.47	4.47	1.57

In the next step, the scores of all social capital components were converted to into ranking scores according to table 2. In terms of the district, the highest mean value of bonding social capital was seen in District 7 (Table 3), while the lowest mean value occurred in District 3. According to the results of district classification based on lingual tags, bonding social capital is low in four districts (3, 21, 13, 4). However, the rest of the 22 districts (20, 12, 1, 14, 17, 22, 11, 19, 15, 10, 16, 8, 6, 9, 18, and 7) had moderate bonding social capital.

Row	Bonding social capital	District
Table 4. Comparison of bonding social capital in different districts of Tehran		
1	Low bonding social capital	3، 21 ،13 ، 4
2	Somewhat bonding social capital	20، 12، 1 ، 14،17، 22، 11 ، 19 ، 15 ، 10، 16، 8، 6 ، 9 ، 18 ، 7

In terms of the district, the highest mean value of bridging social capital was seen in District 22, while District 9 had the lowest mean value of bridging social capital.

Table 5. Ranks and statistics of binding social capital among different districts of Tehran

District	Number of respondents	Ranks					Statistics		
		Very low	Low	Somewhat	High	Very high	Mean	Med	SD
1	173	22.7	53.4	20.5	3.2	0	3.06	3.03	1.43
2	183	24.1	52.9	18.6	4.1	0	3.05	2.99	1.45
3	79	26.4	50.4	23.2	0	0	2.9	2.77	1.35
4	190	25.2	48.7	23.8	2.3	0.8	3.05	3.03	1.47
5	176	23	49.6	24.4	3	0	3	2.79	1.49
6	48	21.2	52	22	4	0	3.2	3.08	1.67
7	73	28.8	39.5	29.2	2.5	0.2	3.19	3.1	1.61
8	76	25.8	45.9	24.6	4.2	0.6	3.2	2.99	1.49
9	28	29.7	58.7	11.4	0	0.1	2.55	2.65	1.25
10	42	22.7	50.3	23.8	2.6	0.1	3.16	2.91	1.61
11	80	29.4	42.3	25.8	2.6	0	3.01	2.7	1.44
12	59	30	54.3	11.8	3.8	0	2.84	2.59	1.39
13	49	28.8	43.6	26.7	0.9	0.1	2.87	2.81	1.35
14	105	23	56.2	19.4	1.4	0.3	2.99	2.83	1.28
15	139	26.3	48.9	20.7	4	1.6	3.12	3.07	1.49
16	21	33.9	49.6	16.2	0	0.1	2.63	2.68	1.4
17	18	21.4	61.9	13.6	1.5	0.1	2.96	2.83	1.29
18	31	21.9	59.4	17.4	1.4	0.2	2.95	2.79	1.3
19	49	33.3	53.6	11	2.7	0.5	2.76	2.79	1.38
20	41	25.3	49.5	24.1	1.9	0.1	2.92	2.65	1.42
21	20	17	54.7	28.7	0	0.5	3.25	3.07	1.35
22	31	8.5	43.2	44.2	4	0	3.73	3.75	1.26
total	1611	22.3	50.6	24.1	2.5	0	3.01	2.87	1.44

The results of district classification based on the lingual tags indicate that four districts (9, 16, 19, 12) have very low bridging social capital, while the remaining 22 districts (including districts 13, 3, 20, 12, 1, 14, 17, 22, 11, 19, 15, 10, 16, 8, 6, 9, 18, 7) have low bridging social capital.

Table 6. Comparison of binding social capital in different districts of Tehran

Row	binding social capital	District
1	Low-binding social capital	9,16,19,12
2	Somewhat binding social capital	13,3,20,12,1,14,17,22,11,19,15,10,16,8,6,9,18,7

One-way analysis of variance (ANOVA) was used to compare social capital variables based on each district. According to this test shown in Table 7, the bonding social capital variable is significant at the confidence level of 95%, while this matter is not significant for bridging social capital.

Table 7. OneWay ANOVA Test bonding and bridging social capital in different districts

indicators		Sum of Squares	df	Mean Square	F	Sig.
bonding social capital	within	1.0123	2	0.507	1.187	0.325
	Between	90.025	227	0.632		
	total	91.102	229			
bridging social capital	within		227			
	Between	4.458	229	2.236	7.163	0.001
	total	73.256	227	0.315		

5. Conclusions

This study aims to investigate the social source rate, which has a direct influence on society's productivity when facing natural disasters. Preparedness for natural disasters just points to financial methods, such as having enough water and food for three days. This study has presented two important aspects of social infrastructures and resilience during natural disasters. First, relying on theoretical foundations and conducted studies, this paper emphasizes that bonding and bridging social capital influences society's resilience during natural disasters. It means that urban managers and policymakers in the natural disasters field must be sensitive to and aware of the available personal and collective networks and enhance the "soft" capital required for reducing communities' vulnerability to the risk of disasters and increasing their flexibility. At the national level, this situation emphasizes revising disaster management, particularly in developing countries where concentration on "hard" infrastructures eliminates the role of social capital in overcoming natural disasters.

Second, the results indicate that bonding and bridging social capital have a critical status in some districts of Tehran. According to the results, the mean values of bonding and bridging social capital equal 4.47 and 3.01, respectively. Regardless of the comparison between these two mean values, the critical point is weak bridging social capital. In this lieu, four districts have very low bridging social capital, and the rest of the districts have low bridging social capital. The bonding social capital has a slightly better position. In this case, five districts have low bonding social capital, while other districts have moderate levels of bonding social capital. The social capital status of these districts that are affected by urban decay, such as Districts 12 and 13 of Tehran, is a warning alarm for disaster management in this city. According to the results and assessments of this study, physical preparedness for natural disasters is important but close relationships with neighbors and experience of cooperation with local non-governmental associations may be more substantial for supporting vulnerable communities during natural disasters. Moreover, we must know that social capital, like other forms of capital, may be increased or decreased. Hence, as a person or nation, we should increase social cohesion and deepen trust in our society. Some policies and plans must be

adopted to increase trust and deepen networks. Therefore, the networks of available relationships and social activities can be used as a space for raising issues related to natural disasters and resilient measures. On the other hand, one can create new networks and activities that specifically concentrate on the earthquake. However, the main point is that these kinds of interventions must maximize social interactions. A promising intervention method to increase social capital in a society is the so-called social currency or time banks (Lietaer, 2004). Time bank is a technique for service exchange in which time is used instead of money. The underlying principle is that we can help each other and need others' collaboration. In a time bank, individuals can assign their time to help others or use others' collaboration. Similar to a bank, the spent time is recorded and kept for individuals to be used for collaboration. In a time bank, people operate with each other and use others' collaboration then the time spent for this collaboration is recorded. Each person then can use these time credits to receive collaboration from other individuals in the group. Time Bank believes that all individuals have collaboration solutions and can do some work in society which are not measurable based on money. This method can improve trust, cooperation, and collaboration in the local society. According to a study conducted on social currency in a city in Japan, social currency plans in society would increase public trust. This case indicates that governments can design some plans for increasing social capital (Richey, 2007, p. 69).

The second solution for increasing social cohesion and trust is holding focus group meetings and social events. This approach includes some social activities, such as holding plant and flower or local foods exhibitions, holding ceremonies in neighbourhood blocks or attending regular meetings in the neighbourhood, or social voluntary projects, such as coaching plans with children's activities, such as local sports leagues and after-school plans. Some issues, such as environment or school choice, are discussed in such gatherings (Aldrich, 2010).

Some global experiences are available in this case. For instance, in San Francisco, urban management created an empowerment network to gather neighbors to get knowledge of required plans and measures, teaching them how to make themselves prepared and how to show response to natural disasters (http://www.empowersf.org). In Seattle, emergency managers and neighborhood departments have created social emergency centers to provide the local community with information about natural disasters and to teach them preparedness (http://seattleemergencyhubs.org).In. The local state has considered a fund for social events that can increase social trust and cohesion Aldrich and Meyer, 2015*)*

Architecture spaces in which socialization is increased can be another strategy for governments to increase the social capital of the community and improve its resilience. The reason is that social interaction can occur in places where residents can meet each other and spend even a short time with each other. An author called these meeting areas "third place" because these are not residential, private, or workspace places where a specific activity is done (Oldenburg, 1999). Coffee shops, bookstores, cafes, beauty salons, public spaces, and libraries serve as third places to produce and renovate the social capital. After the Tohoku Disaster in Japan, many non-governmental organizations (NGOs) tried to create some spaces where displaced residents could hang out (http://www.ibasho.org). Higher flexibility and resilience are achieved in future crises through attempts to create communication among residents of neighborhoods and communities.

Funding

References

Abunyewah, M., Erdiaw-Kwasie, M. O., Okyere, S. A., Thayaparan, G., Byrne, M., Lassa, J., Zander, K. K., Fatemi, M. N.,& Maund, K. (2023) Influence of personal and collective social capital on flood preparedness and community resilience: Evidence from Old Fadama, Ghana, International Journal of Disaster Risk Reduction,Volume 94. https://doi.org/10.1016/j.ijdrr.2023.103790

Aldrich, D. P. (2010). Fixing recovery, social capital in post-crisis resilience. Journal of Homeland Security, 6, 1-10.

Aldrich, D. P. (2012a). Building resilience: Social capital in post-disaster recovery. Chicago, IL: University of Chicago Press.

Allen M. (2013) Deconstructing 'Resilience' in the aftermath of disasters in Australia, The Senshu Soc Capital Rev 4, https://www.senshu-u.ac.jp/scapital/pdf/04matthew,sscr4.pdf.

Bourdieu, P. (1986) 'The forms of capital'. In J.G. Richardson (ed.) Handbook of Theory for the Sociology of Education. Greenwood, Westport, CT. pp. 241–258.

Coleman, J.S. (1988) "Social Capital in the Creation of Human Capital". The American Journal of Sociology, No. 94, p 95-120. http://econ2.econ.iastate.edu/classes/crp274/swenson/CRP566/Readings/Coleman_Social%20Capital%20in%20the%20Creation%20of%20Human%20Capital.pdf

Cutter, S.L., Barnes L., Berry M., Burton C, Evans E., Tate E., & Webb J.)2008(. "Community and Regional Resilience: Perspectives from Hazards Disasters, and Emergency Management." CARRI Research Report 1. Oak Ridge: Community and Regional Resilience Institute.

Dukiya, J. J., & Benjamine, O. (2021). Building resilience through local and international partnerships, Nigeria experiences. *International Journal of Disaster Risk Management*, *3*(2), 11-24.

Dynes, R. (2005) Community Social Capital as the Primary Basis of Resilience. University of Delaware Disaster Research Center Preliminary Paper. https://udspace.udel.edu/bitstream/handle/19716/1621/PP%20344.pdf?sequence=1.

Dynes, R. (2006). Social capital: Dealing with community emergencies. Homeland Security Affairs, 2(2), 1-26.

Elliott, J., Haney, T., & Sams-Abiodun, P. (2010). Limits to social capital: Comparing network assistance in two New Orleans neighbours devastated by Hurricane Katrina. Sociological Quarterly, 51, 624-648. https://www.researchgate.net/profile/James-Elliott-6/publication/47402528_Limits_To_Social_Capital_Comparing_Network_Assistance_in_Two_New_Orleans_Neighborhoods_Devastated_by_Hurricane_Katrina/links/5f3e7861299bf13404d3db15/Limits-To-Social-Capital-Comparing-Network-Assistance-in-Two-New-Orleans-Neighborhoods-Devastated-by-Hurricane-Katrina.pdf?_sg%5B0%5D=started_experiment_milestone&origin=journalDetail&_rtd=e30%3D

Garrison, M. B., & Sasser, D. D. (2009). Families and disasters: Making meaning out of adversity. *Lifespan perspectives on natural disasters: Coping with Katrina, Rita, and other storms*, 113-130.

Geys, B., & Murdoch, Z. (2010). Measuring the 'bridging versus 'bonding'nature of social networks: A proposal for integrating existing measures. *Sociology*, *44*(3), 523-540.

Hausman, A., Hanlon, A., & Seals, B. (2007). Social capital as a mediating factor in emergency preparedness and concerns about terrorism. Journal of Community Psychology, 35, 1073-1083. doi:10.1002/jcop.20203

Hawkins, R., & Maurer, K. (2010). Bonding, bridging and linking: How social capital operated in New Orleans following Hurricane Katrina. British Journal of Social Work, 40, 1777-1793. doi:10.1093/bjsw/bcp087

Heller, K., Alexander, D. B., Gatz, M., Knight, B. G., & Rose, T. (2005). Social and personal factors as predictors of earthquake preparation: The role of support provision, network discussion, negative affect, age, and education. Journal of Applied Social Psychology, 35(2), 399-422.

Hurlbert, J., Haines, V., & Beggs, J. (2000). Core networks and tie activation: What kinds of routine networks allocated resources in nonroutine situations? American Sociological Review, 65, 598-618.

James, H. (2012). Social capital, resilience and transformation among vulnerable groups in the Burmese delta after Cyclone Nargis. *ARC Discovery Project on" Demographic Consequences of Asian Disasters: Family Dynamics, Social Capital and Migration Patterns'(p. na). na: The Australian National University*.

JICA - Japan International Cooperation Agency; (2000) Greater Tehran Seismic Zoning Project. Crisis Management Organization, Tehran

Kawachi, I., Kim, D., Coutts, A., & Subramanian, S. V. (2004). Commentary: Reconciling the three accounts of social capital. *International journal of epidemiology*, *33*(4), 682-690.

Kilduff, M., Tsai, W., & Hanke, R.(2006) A Paradigm Too Far? A Dynamic Stability Reconsideration of the Social Network Research Program. The Academy of Management Review, 31(4): 1031-1048.Feb; 60(2): 116–122.

Kim, D., Subramanian, V., & Kawachi, I. (2006) Bonding versus bridging social capital and their associations with self-rated health: a multilevel analysis of 40 US communities, J Epidemiol Community Health. 60(2): 116–122.

Koh, H. & Cadigan, R. (2008). Disaster Preparedness and Social Capital. In: Kawachi, I., Subramanian, S., Kim, D. (eds) Social Capital and Health. Springer, New York.

Kwok A., Doyle E., Becker J, Johnston D. & Paton D. (2016). What is 'social resilience'? Perspectives of disaster researchers, emergency management practitioners, and policymakers in New Zealand. International Journal of Disaster Risk Reduction, 19, 197-211.

Kyne, D., & Aldrich, D. P. (2020). Capturing bonding, bridging, and linking social capital through publicly available data. *Risk, Hazards & Crisis in Public Policy*, *11*(1), 61-86.

Lietaer, B. (2004) Complementary currencies in Japan today: History, originality and relevance. International Journal of Community Currency Research, 8, 1-23.

Mano, R., A, K., & Rapaport, C. (2019). Earthquake preparedness: A Social Media Fit perspective to accessing and disseminating earthquake information. *International Journal of Disaster Risk Management, 1*(2), 19-31.

Municipality of Tehran (2016). Atlas of Urban Quality of Life in Tehran Metropolis, Tehran, Shirkat Pardazish va Barnamah'rizi Shahr.

Nakagawa, Y., & Shaw, R. (2004). Social capital: A missing link to disaster recovery. International Journal of Mass Emergencies and Disasters, 22, 5-34.

Norris, F., Friedman, M., Watson, P., Byrne, C., Diaz, E. & Kaniasty, K. (2002).60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. Psychiatry, 65, 207-239.

Oldenburg, R. (1999). The great good place: Cafes, coffee shops, bookstores, bars, hair salons, and other hangouts at the heart of a community (3rd ed.). Washington, DC: Marlowe.

Panday, S., Rushton, S., Karki, J., Balen, J., & Barnes, A. (2021). The role of social capital in disaster resilience in remote communities after the 2015 Nepal earthquake. *International Journal of Disaster Risk Reduction*, *55*, 102112.

Peacock, W., Brody, S., Seitz, W., Merrell, W., Vedlitz, A., Zahran, S., & Sticknew, R. (2010). Advancing the resilience of coastal localities: Developing, implementing, and sustaining the use of coastal resilience indicators. Washington, DC: Coastal Services Center and National Oceanic and Atmospheric Administration.

Poortinga, W. (2012) Community resilience and health: The role of bonding, bridging, and linking aspects of social capital, Health & Place,Volume 18, Issue 2,286-295

Poteyeva M, Denver M, Barsky L, & Aguirre B.(2007) Search and Rescue Activities in Disasters. In: Rodríguez H, Quarantelli EL, Dynes RR, editors. Handbook of Disaster Research. New York: Springer; pp. 200–216.

Richey, S. (2007). Manufacturing trust: Community currencies and the creation of social capital. Political Behavior, 29, 69-88.

Sherrieb, K., Norris, F. H., & Galea, S. (2010). Measuring Capacities for Community Resilience. Social Indicators Research, 99, 227-247.

Small, M. (2010). Unanticipated gains: Origins of network inequality in everyday life. New York, NY: Oxford University Press.

Szreter, S., & Woolcock, M. (2004). Health by association? Social capital, social theory, and the political economy of public health. International Journal of Epidemiology

Tehran Municipality (2019) Tehran Atlas, Tehran.

Tse, C., Wei, J., & Wang, Y. (2013). Social capital and disaster recovery: Evidence from Sichuan earthquake in 2008. Washington, DC: Center for Global Development.

Van S., Knorringa I., & Knorringa P. (2007) "Unpacking Social Capital in Economic Development: How Social Relations Matter." Review of Social Economy,65(1):107–35.

Villalonga, O. , & Ichiro K. (2015). The measurement of social capital, Gaceta Sanitaria, 29 (1), 62-64

Widén-Wulff, G.& et al. (2008). Information Behaviour Meets Social Capital: A Conceptual Model. Journal of Information Science 34(3): 346–55.