



The impact of social capital on the resilience of flood-prone communities: The case study of northern Iran

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ABSTRACT

Climate change-induced disasters, such as floods, are threatening coastal communities, particularly vulnerable communities in developing countries, around the world. While various tools and measures are under examination for building and enhancing resilience capacity in order to improve the preparedness of these communities for future events, social capital has been shown to influence how local communities can be resilient using their social connectedness. The purpose of this study was to investigate the function of social capital in informing and improving the resilience capacity process of coastal communities in northern Iran. This study used a combination of quantitative and qualitative methods and analyzed a number of social capital indicators in the study area in a field survey using questionnaires and techniques of inferential statistics (i.e., Pearson correlation and T-test). For this reason, 376 residents from the towns that sustained the largest human and financial losses were chosen for examination. The results showed that bonding capital has a considerable effect on the community's resilience capacity. Moreover, some social capital criteria, including respect for the rights of the neighbors, existence of public green space, children's playground, and planting trees, are the most important criteria in developing capacities for enhancing resilience among the residents of the community under study. This shows that developing community resilience through social ability and trust will be more successful than doing so by just raising awareness of hazard threats. This study recommends that further efforts be made to increase the capability of both formal and informal communal institutions. The structural adjustments that are necessary, on the other hand, are difficult.

1. Introduction

Climate change (CC) as a global issue has dramatically affected coastal areas and has caused significant damage to these areas in

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terms of infrastructural, economic, and social aspects (Zemigala, 2022; Buchori et al., 2018; Johns et al., 2020; Broto, 2020). Coastal regions are under more pressing CC shocks for their locational characteristics including sea-level rise, sea surface temperatures and coastal erosion, larger extreme waves, and storm surges (Hansen, 2015; Johns et al., 2020). Approximately 23% of the world's population (1.2 billion people) live within a 100 Km radius of the coasts, and estimates show that by 2030, this population will reach 50% (McEwen et al., 2017). Meanwhile, the geographic and demographic characteristics of coastal communities in developing countries are associated with the risk of CC events, especially surface floods and river-based floods (Buchori et al., 2018).

Despite the importance of city/community resilience today, the term resilience is frequently attacked for its vagueness, malleability, and many interpretations (Amirzadeh et al., 2022). According to Meerow et al. (2016), one of the most common definitions of urban resilience is the ability of an urban system and all of its component socio-ecological and socio-technical networks to maintain or quickly return to required functionality in the face of disturbance, to adapt to change, and to transform systems that limit present or future adaptation strategies. In addition, urban resilience, especially adaptation policies, differ in different geographical areas, so that, for example, in some countries of South America and Eastern Europe (Serbia), policies based on migration of people face CC (Yamamoto et al., 2017; Crncević and Lovren, 2018), while in the United States, major policies and programs are focused on increasing physical, economic, and social resiliency (Johns et al., 2020; Walton et al., 2021). In Asian countries, for instance, in Indonesia, regarding the dual tendency of residents to stay and migrate to safer areas, community resilience policies as well as immigrant protection policies are designed simultaneously (Buchori et al., 2018). Although adaptation policies are different in various countries, policies and strategies adopted in the face of CC events must all have one thing in common, which is the need to build local adaptive capacity to withstand these events in terms of CC (Walton et al., 2021; Jensen and Ong, 2020). Even if national, regional, and local policy resources have a big impact on improving local adaptive capacity, indigenous people's social capital is crucial in this regard. This is because of the potential of mobilizing resources to improve the financial stability of local communities (Omolo and Mafongoya, 2019; Rowan and Kwiatkowski, 2020). In actuality, social capital is composed of three elements: interconnected networks of relationships between people and groups (also known as social ties or social participation), levels of trust that underpin these ties, and resources or advantages that can be acquired or transferred as a result of social ties and social participation (Steinmo and Rasmussen, 2018).

The literature review (Qazlbash et al., 2021; Pasquini and Cowling, 2015; Petzold, 2016; Hung et al., 2016 Aldrich et al., 2018; Broto, 2020; Samaddar et al., 2021) shows that assessing community resilience after devastating floods has gained little attention. Although some recent studies (e.g., Kyne and Aldrich, 2020; Aldrich et al., 2018; Petzold, 2016) tried to develop social capital index (SoCI) to assess resilience, they have used public data available and focused mainly on large areas (regional and county). Indeed, examining the function of social capital determinants in the resilience of flood-prone coastal communities has received scant attention in the four corners of the globe. Furthermore, by concentrating on government policies, infrastructure development, and population displacement in the majority of recent literature (e.g., Broto, 2020; Samaddar et al., 2021), social capital and local residents' and communities' contributions to resilience and innovation capacity have been somewhat neglected. Furthermore, planning officials and local and national governments have only given a very small amount of attention to the literature on the role of social characteristics, especially the different kinds of them, in the survival of local communities. In Iran, this issue is very new, and scientific literature on the study of social capital in the resilience of local communities is yet to be developed. To fill this gap in both international and domestic literature, this article seeks to examine the case of the city of Neka which suffers from numerous floods caused by CC. Despite the fact that the city of Neka has suffered from flash floods for years, the urban infrastructure in this city, like many other cities of Iran, is worn out (Pazhuhān, 2023; Esmaili and Taheri, 2022). Moreover, policies for coping with flooding and other natural disasters are generally made after the first stages of a crisis and are forgotten after a while (Pazhuhān, 2023). Another problem is related to the instability of planning in the context of Iran, in which, due to the severity and variety of issues, priorities are constantly postponed and ignored (Mahmoodi Vanolya and Jelokhani-Niaraki, 2021). This study tries to develop the literature on the role of social capital in community resilience in vulnerable communities and to provide the international scientific community with a deeper understanding of what kind of social capital plays a key role in promoting the resilience of local communities at risk of flood in the developing country of Iran. Hence, the main question intended to be answered by this research is as follows: What type of social capital can help increase community resilience in the study area?

2. Theoretical background

2.1. Resilience at the local community level

Resilience at the local community level is focused on what local communities can do for themselves and how they can increase their capacity (Amirzadeh et al., 2023; Patel et al., 2017; Platts-Fowler and Robinson, 2016; Pfefferbaum et al., 2015). Amirzadeh and Barakpour (2021) consider a community a geographical area, such as a neighborhood, exposed to stresses, risks, or shocks threatening the place and its residents' well-being, health, and identity. The concept of local community includes characteristics such as common interests, values, activities, and structures which can be used as a framework for building and enhancing resiliency (Wilson, et al., 2018). Therefore, the closest scale to resilience is local communities, as it has been identified and promoted as a vision as well as a strategy in DRR in recent years (Pfefferbaum et al., 2015; Walton et al., 2021). A resilient community is one that can resist the effects of calamities (i.e., prevent a certain amount of damage) while trying to adapt to climate risks (Scherzer et al., 2019). The ability of a community to effectively deal with stresses and resume regular daily activities is what is meant by the idea of community resilience (Sobhaninia et al., 2023; Aldrich, 2012; Kulig et al., 2013). It is both an end result and a process that is strengthened or constructed by including the neighborhood in the process of discovering and reducing the risks connected with climate-related natural catastrophes

(Pfefferbaum et al., 2015; Chuang et al., 2018; Walton et al., 2021). For many politicians and experts, a resilient society is an ideal notion whose implementation may significantly increase the capacity to return to normal living physically, economically, cognitively, and psychologically. Thus, a resilient community has been introduced as a goal and a strategy for risk management in an environment subject to change and risk (CDC, 2018; Johns et al., 2020; Walton et al., 2021). At the same time, many low-income and developing countries, especially those in Asia, have been experiencing the risks of unusual CC and its devastating consequences for more than a decade (Hoa Sen et al., 2020). In such circumstances, while in many cases the consequences of CC cannot be avoided, building resilience capacity in local communities is recognized as one of the most important coping strategies against CC events (Betzold, 2015; Johns et al., 2020).

2.2. Community resilience and the role of social capital

Theoretically, human agency is assumed to be a key factor in determining how individuals, households, and communities respond to environmental changes (Broto, 2020). The role of civic engagement in changing risk preparedness and adaptation is a key element in local flood risk management (McEwen et al., 2017). Furthermore, by being able to understand, follow, and respond to climate disasters, stakeholders, especially local communities, play a crucial role in the focused decisions and intentional actions and strategic choices are made feasible (Torabi et al., 2018). As resilience and vulnerability coexist and constantly reproduce each other (Sapountzaki, 2014), a resilient local community is the safest community against the consequences of CC (Schwan and Yu, 2018). Living in a resilient community can act as a supportive environment and provide better opportunities for residents to better manage adversity and change (Platts-Fowler and Robinson, 2016; Walton et al., 2021). According to Ungar (2011) “A community’s resilience is its social capital, physical infrastructure, and culturally embedded patterns of interdependence that give it the potential to recover from dramatic change, sustain its adaptability, and support new growth that integrates the lessons learned during a time of crisis”. In between, social capital has been used as a critical factor in community resilience (Aldrich and Meyer, 2015; Martin, 2015; Sharifi and Yamagata, 2016; MacGillivray, 2018; Rowan and Kwiatkowski, 2020; Jensen and Ong, 2020; Tammar et al., 2020; Kyne and Aldrich, 2020; Walton et al., 2021). In the literature, there is much emphasis on the direct and positive effect of social capital on increasing the resilience of local communities against CC. Thus, this concept has been recognized as one of the most constructive factors affecting resilience capacity in vulnerable communities (Bakker et al., 2019; Nieuwenhuis, 2020; Mavromatidi et al., 2018; Johns et al., 2020; Straub et al., 2020).

Many assume that social capital has a role in yielding benefits beyond individuals and at the neighborhood and community levels. They also believe that social capital is a key element of neighborhood-based social organizations that define power through multiple networks, social norms, and trust (Chen et al., 2015; Nieuwenhuis, 2020). Additionally, in times of crisis, social capital networks at the individual and group levels give access to a variety of resources, such as knowledge, assistance, funding, child care, and emotional and psychological support (Aldrich and Meyer, 2015; Nieuwenhuis, 2020). As a result, social capital and resilience have an intimate relationship to enhance quick recovery from CC shocks (Sharifi and Yamagata, 2016). Much of the current literature has been focusing on the resilience of natural systems such as landslide management, open space maintenance, and development control as mechanisms to reduce risk, thereby strengthening the resilience of a local community (Johns et al., 2020). However, promoting the safety and livelihood of local communities by using the social capital available in these communities is key to promoting resilience (Bakker et al., 2019).

2.3. Types of social capital and building resilience in local communities

According to Comfort (2012) and Kyne and Aldrich (2020), there are three theoretical currents of local community resilience from social science perspective, which include collective action, intellectual inquiry process, and Theory of Fields. The first one has historically been a major interest of social theorists in understanding the processes by which local communities learn how to reorganize themselves and manage risk. In the second trend, social networks are seen as organizational (people-centered) forms that have the power to influence top-down outdated policies. The third current, that is Theory of Fields, combines cognitive and sensory elements (empathy and sympathy) in social interaction to demonstrate how the capacity to understand complex topics is affected by a desire to trust information that may be inadequate or produced from an unknown source (Comfort et al., 2012). By using the first current, many researchers (e.g., Mavromatidi et al., 2018; Bakker et al., 2019; Johns et al., 2020; Fraser, 2020; Sobhaninia and Buckman, 2022) consider social capital as the most important driver of local communities in the process of promoting neighborhood resilience. However, Adger (2003) argued that special attention should be paid to the type of social capital for resilience. Furthermore, relationships between individuals within a neighborhood and between that neighborhood and local institutions such as municipalities, governors, NGOs, and private sector activists, are critical for their ability to respond effectively to CC (e.g., Kim and Marcouiller, 2016; MacGillivray, 2018; Johns et al., 2020). According to MacGillivray (2018), social capital develops when the above communications are based on credibility and trust because social communication is vital to information flows and resource distribution. Therefore, strengthening social networking can have a significant impact on the readiness and nature of local communities and the neighborhood’s ability for rehabilitation after a crisis. As the relationship between social capital and resilience is not a clear and direct one, it is very important to know which aspect of social capital is more influential in local communities, is needed, or increases local resilience against CC (Kyne and Aldrich, 2020). Moreover, Johns et al. (2020) argue that not all types of social capital have necessarily positive effects on the capacity for CC resiliency. They argue that social networks that have close relationships with land developers and administrative authorities may take action against attempts to make the voices of marginalized social groups heard. Thus, as shown by Jensen and Ong (2020), only those types of social capital that include poor and marginalized groups can help boost neighborhood resilience. However, although not all types of social capital are considered positive for resilience, social capital generally seems

essential for community sustainability (Ungar, 2011; Johns et al., 2020).

The forms of bridging, linking, and bonding are three types of social capital that seem useful. In times of crisis, residents can use these assets to acquire or produce key public goods (Fraser, 2020; Kyne and Aldrich, 2020). Bonding capital is related to the strong links between “people who see themselves as similar”. This capital is defined by very strong local relationships based on trust, which have the characteristics of relationships such as family, friendship, and neighborhood in homogeneous communities and are equally strong (Kyne and Aldrich, 2020). Bridging capital is weaker and is in fact a link between neighbors who, although having an economic level and political influence, are of different ethnicities and races that live in one or more neighborhoods close to each other (Johns et al., 2020). Linking capital is the weakest type of social capital, which is created through relationships, such as residents’ relationships with mayors, governors, and private sector activists, between city officials and neighborhood residents (Jordan, 2015; Johns et al., 2020). While there are different methods such as quantitative analysis, experimental analysis, and empirical analysis for measuring social capital, researchers do not agree on a single method. Attitudinal (or cognitive), behavioral, and experimental approaches are three of the most commonly accepted methods of measuring social capital (Aldrich and Meyer, 2015). In this study, we will use an attitudinal methodology to measure social capital, given that we want to measure bonding capital in the city of Neka. Fig. 1 articulates a conceptual framework based on what has been reviewed in the theoretical literature.

3. Methodology

3.1. Study area

Neka, a tiny city in Mazandaran Province, is physically divided from the rest of the city by the Nekarood, one of the longest rivers flowing from the Alborz Mountain Range. The city of Neka is located at a height of 45 m above sea level and consists of six traditional neighborhoods. The population figures were 35,260 in 1996 and 60,000 in 2016, as reported by the Statistical Centre of Iran, 2017. The 1999 flood in Neka occurred on the morning of August 5, following unseasonal rains that had started in the city of Neka the day before. More than 80 people were killed as a result, roughly 2000 dwelling units were seriously damaged, and all communication infrastructure along the river was destroyed. Countless trees and thousands of hectares of agricultural and garden land were destroyed, and thousands of livestock died (Ministry of Interior, 2000). Six years later, in November 2006, another flood damaged more than 100 residential units in the city with many injured (Esmaili and Taheri, 2022). In 2019, another flood hit the city, destroying 450 residential units as well as many small production units, thousands of hectares of garden land, and hundreds of hectares of agricultural land, and it caused millions of dollars of damage to infrastructure and communication infrastructure (Mahmoodi Vanolya and Jelokhani-Niaraki, 2021). The damaging consequences of the 1999 floods affected many of the city’s residents, especially in the areas closest to the river. These areas have suffered the most because government promises have not been fulfilled and the residents’ economic problems, exacerbated by the floods, have not been resolved (Fooladian, 2014). Those promises made by the government were mostly providing home appliances for poor families, construction of flood dams on the upper lands of the river, and financial

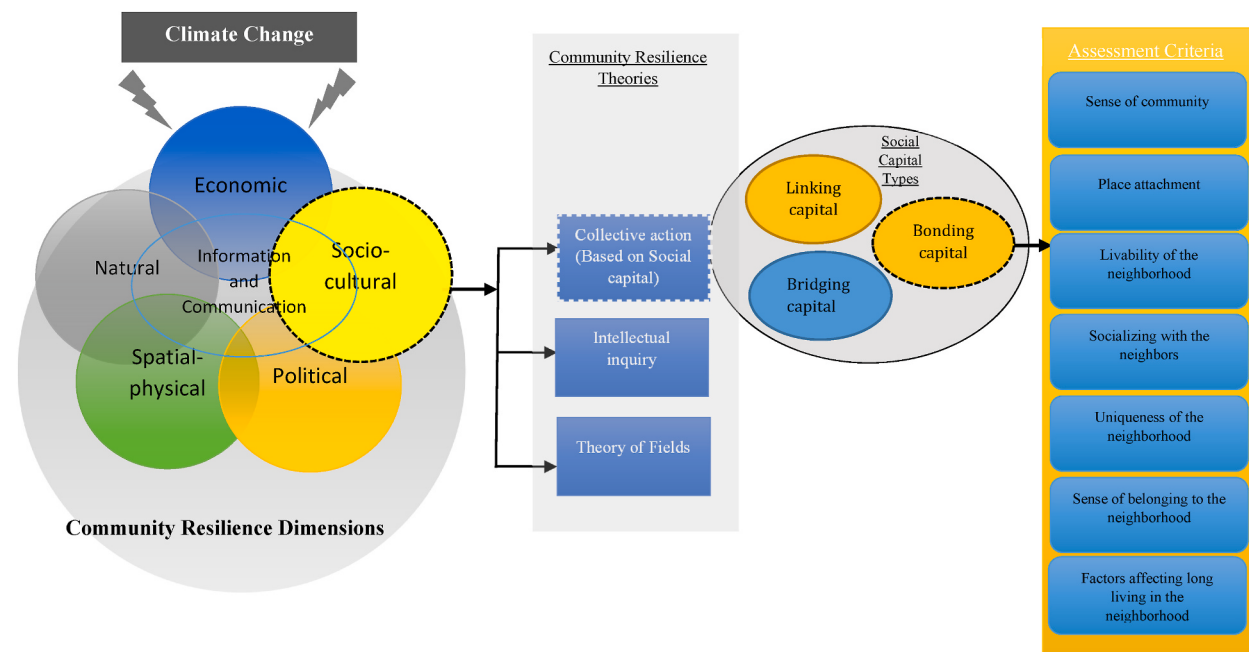


Fig. 1. Conceptual-Operational framework of the research.

Source: Research findings

compensation for damaged houses. The government had also pledged to organize the waste management of the neighborhood and develop green spaces throughout the neighborhood which all have yet to be realized (Fooladian, 2014).

3.2. Methods

Regarding the nature of the present study, the study has utilized a combination of quantitative and qualitative methods to evaluate the social capital criteria in the case study. The main tool of the quantitative method was a questionnaire that was built by the research team based on the literature review and data accessibility in the study area. This study used quantitative tools, primarily descriptive statistics (direct quantification of variables) and inferential statistics (*t*-test technique and Pearson correlation) by using SPSS (version 26) and Likert scale to quantify the results of the field survey. The study also employed quantitative methods to evaluate the affected residents' perceptions of the social capital criteria.

This test, which is performed in SPSS statistical software, compares the observed mean of the desired variable and its expected amount. The average response rate (i.e., score 3) is considered. Therefore, higher results indicate that the studied factor has a positive effect on the social capital of the studied local communities. The Pearson correlation approach, according to Nettleton (2014), provides a range value between 0 and 1, where 0 denotes no connection, 1 denotes the whole positive correlation, and -1 denotes the total negative correlation. According to the interpretation given by Nettleton (2014), a correlation value of 0.9 between two variables would suggest a highly substantial and favorable association between the two. This study used Pearson correlation coefficient since the sample size included more than 30 individuals (376 individuals) and the data distribution was normal. Moreover, the study aimed to

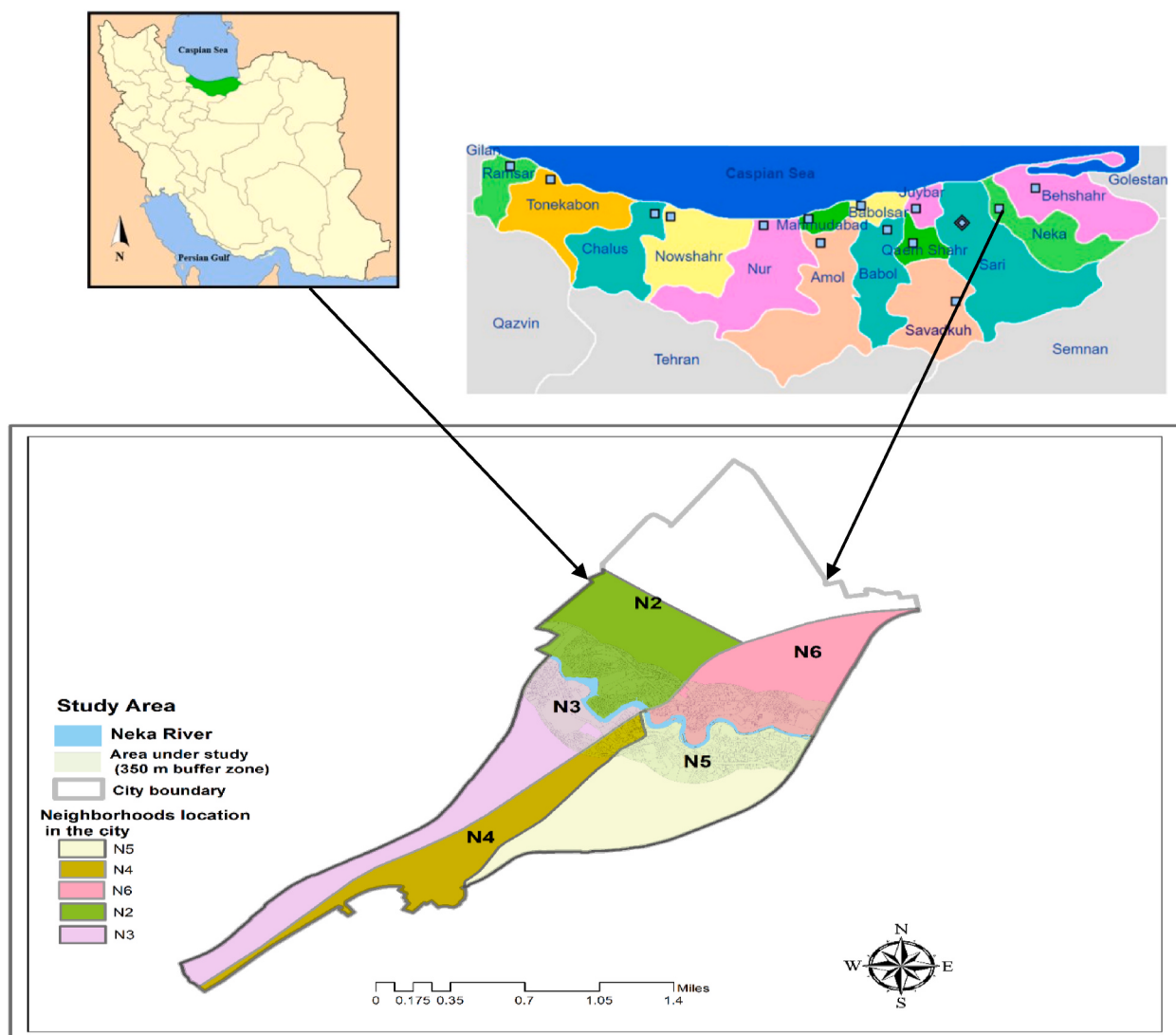


Fig. 2. The location of the study area.

test the intensity of the relationship between criteria to detect the amount of social capital in the study area by measuring that intensity. So as to evaluate the distribution normality of data, skewness and kurtosis tests have been deployed since they do not have and incompatibility of the results (Kim, 2013) particularly for data collected through Likert scale (Keller, 2015; Levin, 2011). The results of the skewness and kurtosis tests showed positive skew values and Std. Errors (lower than 2.1), and the data distribution was normal (Appendix 2; Table 4). In this study, communities' inhabitants, who were subject to the most human and financial losses, were selected for assessing social capital variables. In order to determine the physical boundaries of these communities, the neighborhoods that were most affected by two consecutive floods in 1999 and 2006 were selected. Following a short assessment of the flood-stricken communities, it was discovered that the river was most affected by the flood up to a radius of around 350 m surrounding the river, on average. Hence, the highest number of casualties and complications and the highest amount of neighborhood damage occurred in this area. Thus, a radius of 350 m was determined for the studies. By determining this radius from the river bank to the surrounding area, it became clear that parts of the five neighborhoods of the city, out of six neighborhoods, were directly involved in human and financial losses caused by floods (Fig. 2). In order to determine the sample size, first, the population of the city and then the population inside the neighborhoods affected by the frequent floods were calculated in order to implement the social capital variable evaluation framework in the field. Measuring social capital variables through field surveys for data gathering and evaluating people's perceptions about various criteria have been done by many researchers (e.g., Hung et al., 2016; Buchori et al., 2018; Larimian and Sadeghi, 2021; Parker, 2020; Rowan and Kwiatkowski, 2020; Johns et al., 2020; Tammar et al., 2020; Hoa Sen et al., 2020; Walton et al., 2021).

In the current study, the evaluation scale of the residents' views was classified according to Likert and was categorized into five score items ranging from 1 (total dissent) to 5 (total consent). In-person interviews were done in 2019; in this year, the population of communities, which experienced the flood, in a radius of 350 m was 18,500. All of this population in five adjacent neighborhoods that were affected by the floods is considered a local community.

The sample size was determined using Cochran's method, and 376 neighborhood residents who were 18 years of age or older (45.4% women and 54.6% men) were chosen for an interview and asked to respond to individual questions. The response rate was 94% (355 answer sheets were prepared for analysis and 21 answer sheets were rejected due to irrelevant or incomplete answers). The age group between 35 and 60 years was the most prevalent (70%) in the sample, followed by age classes of 60–65 years (25%), 18–30 years (4%), and 65+ years (1%). The questionnaire consists of a broad range of questions matching up to 137 questions. They were categorized into seven aspects including the sense of community, factors affecting the increase of place attachment, factors affecting the livability of the neighborhood, factors affecting the increase of socializing with the neighbors, factors affecting the unique identity of the neighborhood for the residents, factors affecting the sense of belonging to the neighborhood, and the desire to continue living in the design neighborhood. Before the questionnaire was finally delivered to the respondents, every single component was evaluated. In order to assess the reliability of the questionnaire, respondents were chosen at random and given 30 questionnaires. To improve the questionnaire's reliability and validity, key items were identified, and irrelevant ones were changed (or eliminated). Data collected via surveys were analyzed using spreadsheets. Cronbach's alpha values were used to evaluate each question's reliability, and an alpha >0.8 reliability standard was set for all of them. The data were then graphically presented and analyzed using graphic charts. To score and weigh the responses made by respondents, we used a three-step quantifications method as follows:

- 1) First, we multiplied all the Likert scores given to each question by the number of people who gave those scores to calculate the score of each response. For instance: $54 \text{ (respondents)} \times 5 \text{ (score)} + 90 \times 4 + 107 \times 3 + 74 \times 2 + 51 \times 1/5 = 1296/5 = 259.2$ (total score of each question).

Table 1

The selected social capital assessment criteria for the study area.

Criteria	Variables	Justification
A) Sense of membership in the community	1. Sense of belonging to the community	Panday et al. (2021); Johns et al. (2020); Rowan and Kwiatkowski (2020); Tammar et al., 2020; Bakker et al. (2019); Crncević and Lovren (2018); Hung et al. (2016); Martin (2015); Wickes et al., 2015; Aldrich (2012); Adger (2003)
	2. Factors affecting the sense of belonging to the neighborhood	Panday et al. (2021); Rowan and Kwiatkowski (2020); Tammar et al., 2020; Johns et al. (2020); Jordan (2015); Crncević and Lovren (2018); Bakker et al. (2019); Martin (2015); Wickes et al., 2015; Aldrich (2012); Adger (2003)
B) Sense of belonging and impact on the neighborhood	1. Willingness to continue living in the neighborhood	Panday et al. (2021); Rowan and Kwiatkowski (2020); Tammar et al., 2020; Johns et al. (2020); Jordan (2015); Bakker et al. (2019); Martin (2015); Aldrich (2012); Adger (2003)
	2. Factors affecting the increase in the sense of belonging to the place	Nieuwenhuis (2020); Fraser (2020); Jordan (2015); Bakker et al. (2019); McEwen et al. (2017); Aldrich (2012); Adger (2003)
	3. Factors affecting the desire of residents to increase their presence in the neighborhood	Panday et al. (2021); Nieuwenhuis (2020); Omolo and Mafongoya (2019); Crncević and Lovren (2018); Bakker et al. (2019); McEwen et al. (2017); Wickes et al., 2015; Aldrich and Meyer (2015)
C) Common feelings toward the neighborhood	1. Individuality and identity of the neighborhood for residents	Nieuwenhuis (2020); Fraser (2020); Tammar et al., 2020; Omolo and Mafongoya (2019); Bakker et al. (2019); McEwen et al. (2017); Jordan (2015); Aldrich and Meyer (2015); Wickes et al., 2015
	2. Increasing social interactions	Panday et al. (2021); Tammar et al., 2020; Omolo and Mafongoya (2019); Bakker et al. (2019); Fraser (2020); Jordan (2015); Aldrich and Meyer (2015); Martin (2015); Wickes et al., 2015; Aldrich (2012); Adger (2003)

- 2) Then, to compute relative weight, we divided each score by the number of the final sample size. For instance: 1296 (total score of each question)/355 (final sample size) = 3.65 (relative weight).
- 3) Then, we divided the single score of each question by the sum of all questions' scores to compute the average weight of each response.

3.2.1. Defining social capital variables for the study area

After reviewing related literature and theories, particularly three types of social capitals, and regarding the conceptual and operational framework of the research, seven variables in three main categories can be defined based on the previous studies and the degree by which the respondents are familiar with the research subject (simplifying the variables for the respondents). We justify the proper assessing variables in Table 1 by using the most relevant studies in the concurrent relevant literature.

Based on the justified variables in Table 1, we detailed each variable via some questions so that they were able to cover all aspects of the assessment variables. Therefore, a researcher-oriented questionnaire consisting of 137 questions was designed, which covers a wide range of aspects for the seven selected assessment variables (Appendix A), and then, we quantify the questions through the Likert tool. The results of the quantifications of each variable are shown in Figs. 3–9 in the next section.

4. Results

4.1. Analyzing the results of descriptive statistics

The results of the classification, scoring, and weighting of the answers given to the questions, as well as 137 questions based on seven variables, are shown in Figs. 3–9. These results will be analyzed in the rest of this section.

The results of quantifying the scores given to the questions about measuring the sense of community from the perspective of Neka residents show that the amount of respect for the neighbor's rights with a relative weight of 4.5 and the average weight of 0.0653 has the highest score. Following that, being recognized by other neighbors (familiarity), with a relative weight of 4.3 and an average weight of 0.0607, has the highest score and is ranked second. In addition, the sense of belonging to the neighborhood and the great familiarity among neighbors with relative weights of 4.3 and 3.9 and average weights of 0.0605 and 0.0569 are ranked third and fifth, respectively (Fig. 3).

Then, the importance of living in the neighborhood, with a relative weight of 4.02 and an average weight of 0.05800, is ranked fourth. This criterion that belongs to the criterion of common emotional bond shows a relatively huge impact on the community. In general, the first four priorities for the residents of Neka are dedicated to factors that show a strong sense of social belonging among residents. The variables related to the neighbors' familiarity, the neighborhoods getting closer to each other in difficult and critical situations, the residents' desire to live in the neighborhood for a long time, the feeling of being a neighbor, and the feeling of belonging

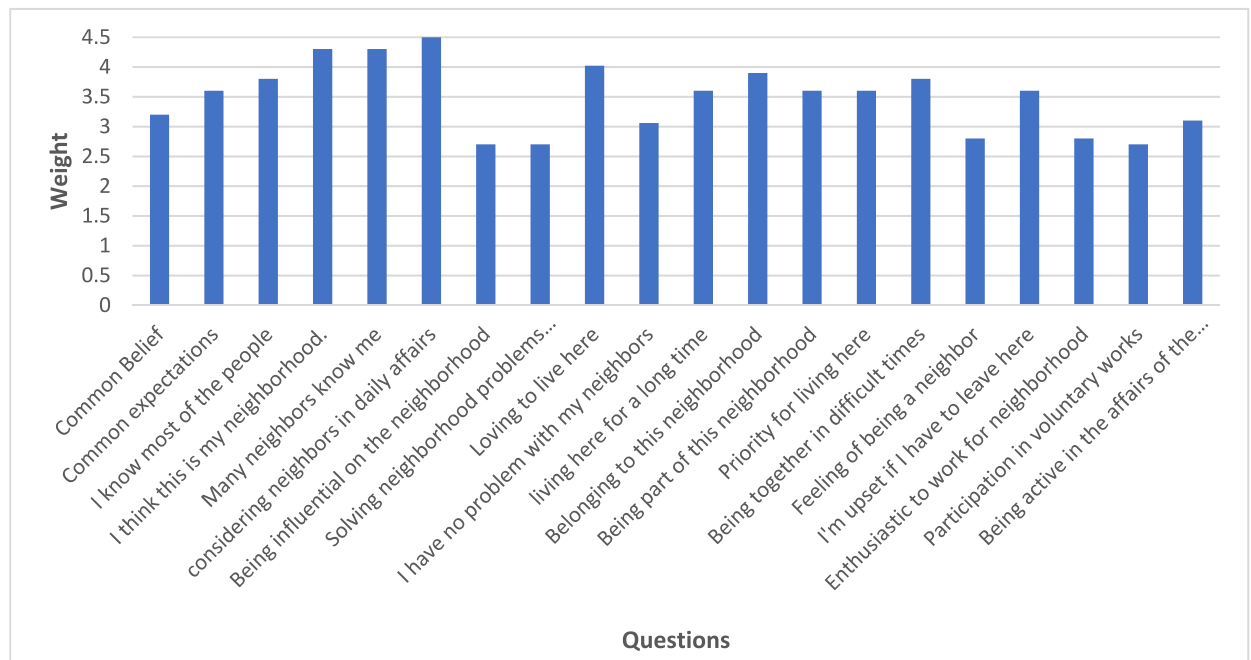


Fig. 3. Results of quantification of variables related to the sense of belonging to the community.

Source: Research findings

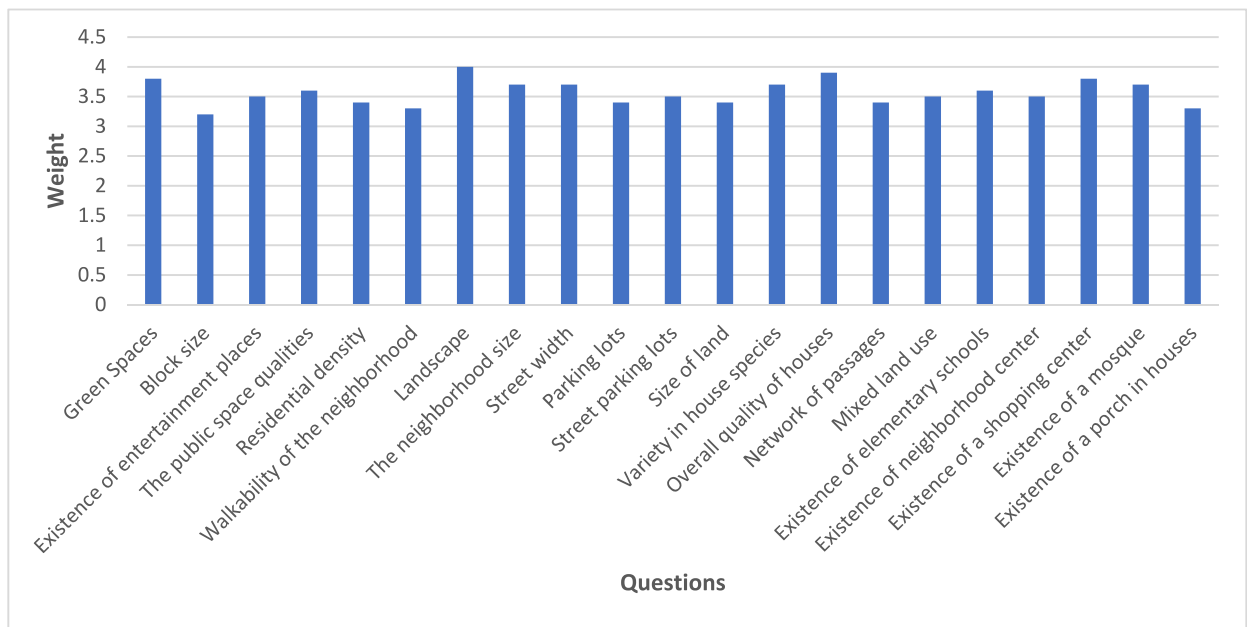


Fig. 4. Quantification results of variables related to the sense of belonging to the neighborhood.
Source: Research findings

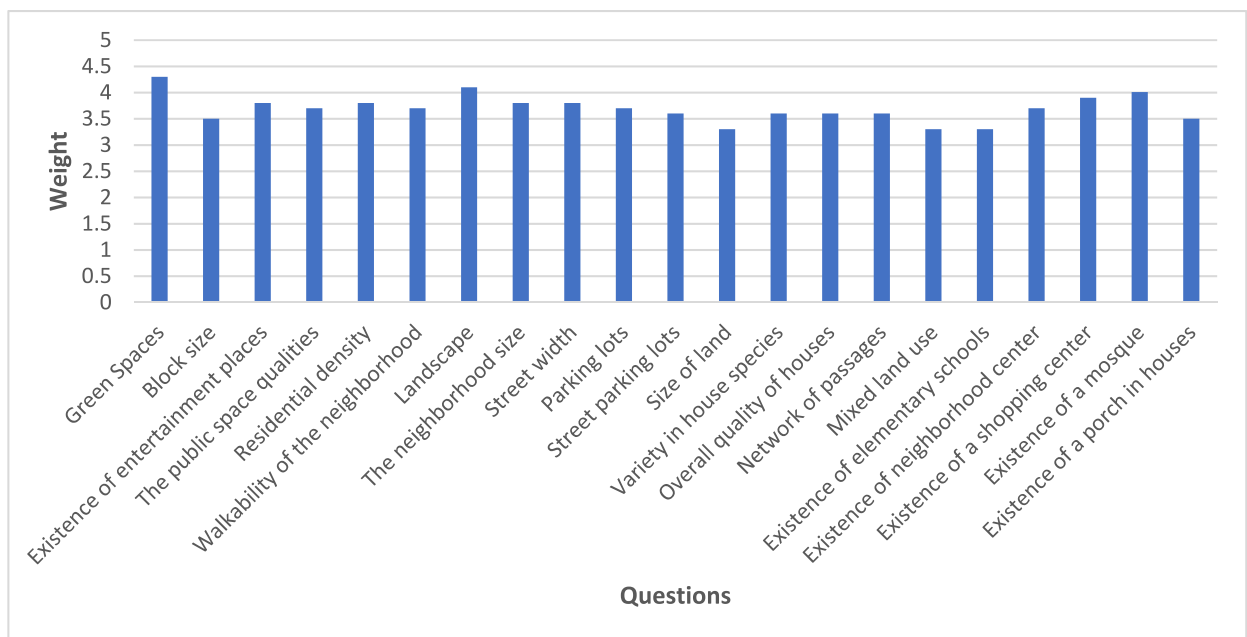


Fig. 5. Quantification results of variables related to the elements affecting the desire of residents to increase their presence in the neighborhood
Source: Research findings.

to the neighborhood with average weights of 0.0542, 0.0534, 0.0524, 0.0569, and 0.0519, respectively, are the sixth to tenth priorities of table. In contrast, ranking the lowest, factors related to shared beliefs, shared expectations, neighborhood activism, consensus, influence, and group work rank between tenth and nineteenth. At the same time, people gave the lowest score to the degree of influence on the daily affairs of their neighborhood. The second part of the questionnaire is related to measuring the effect of selected variables on the sense of belonging, the results of which are shown in Fig. 4.

The results show that the factors of tree planting and landscaping, overall quality of housing, and the existence of a shopping center, with relative weights of 4, 3.9, and 3.8 and average weights of 0.0529, 0.0525, and 0.0522, respectively, have had the most impact on

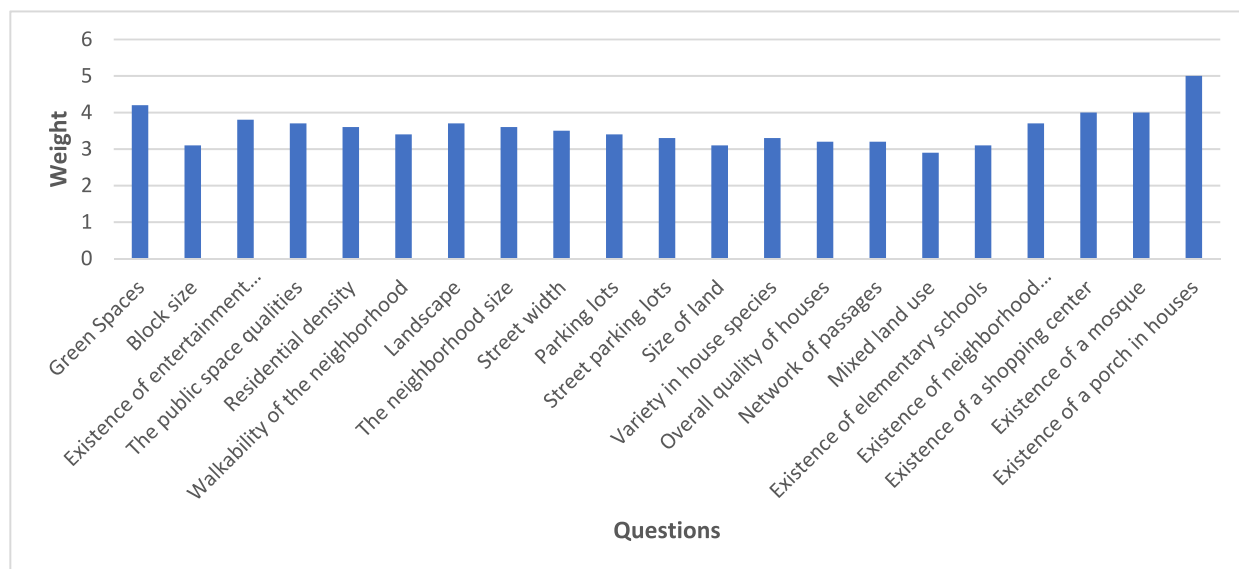


Fig. 6. Results of quantification of variables related to the elements affecting the social relations of the residents
Source: Research findings.

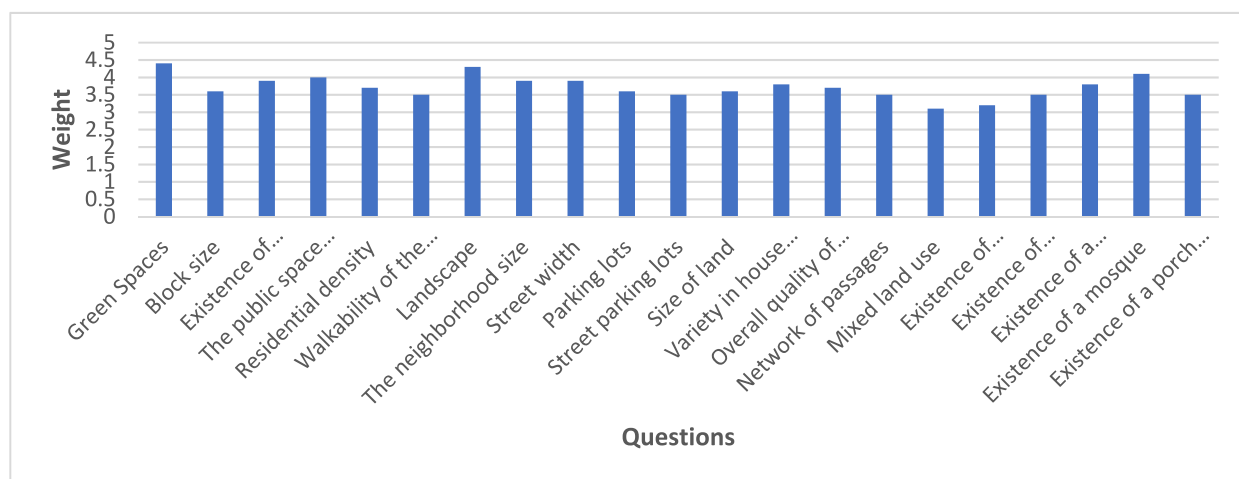


Fig. 7. Results of quantification of variables related to factors affecting the identity of the neighborhood for the residents
Source: Research findings.

construction, thereby strengthening the sense of belonging in the residents while allocating the first three priorities to themselves. The factors of public green space, neighborhood size, and street width with relative weights of 3.8, 3.8, and 3.7 and average weights of 0.0501, 0.0503, and 0.0496, respectively, have been assigned the third to sixth priorities. Accordingly, residents evaluated the existence of public land uses, the size of the neighborhood, and the width of the road network as the factors that have the greatest impacts on the sense of belonging. Moreover, factors such as the general layout of the neighborhood, diversity in types of houses, the existence of mixed land use, and the existence of a mosque with relative weights of 3.7, 3.7, 3.6, and 3.6 and average weights of 0.0501, 0.0508, 0.0484, and 0.0472, respectively, are ranked sixth to tenth.

In contrast, factors such as the availability of facilities and public entertainment venues, the network of roads within the neighborhood, the existence of the neighborhood center, and the general layout of the neighborhood have lower scores than those mentioned above about the sense of belonging. The same situation goes for factors of parking lots, street parking lots, the size of plots, and the presence of a porch visible from the street. Thus, it seems that from the residents' point of view, traffic issues and related facilities, along with the availability of some centers such as entertainment and neighborhood centers, are not very important in creating a sense of belonging, compared to factors such as neighborhood landscape and open and green spaces.

The third part of the survey is related to measuring the elements affecting the residents' desire to walk in the neighborhood, the results of which are shown in Fig. 5.

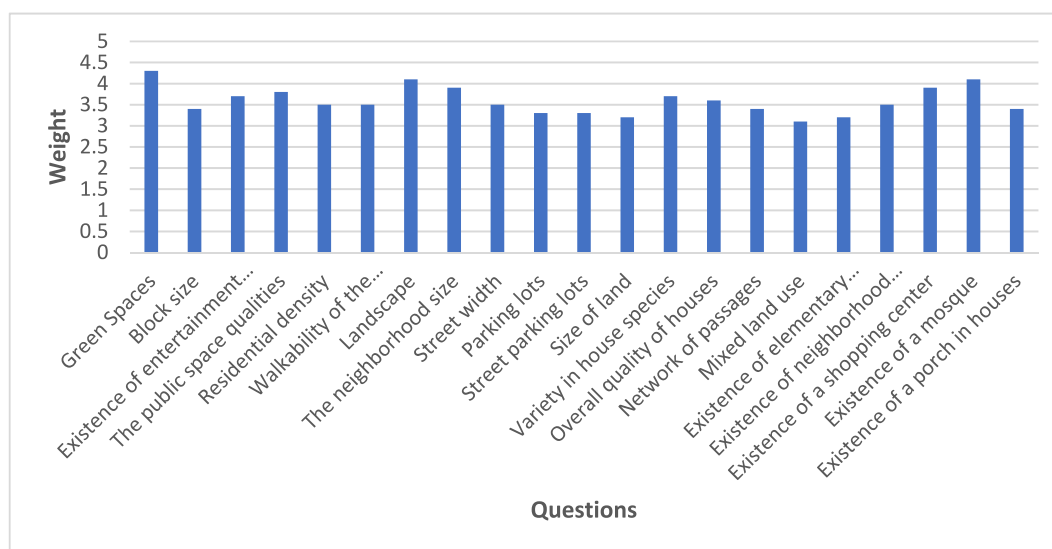


Fig. 8. Results of quantification of variables related to the factors affecting the sense of belonging to the neighborhood
Source: Research findings.

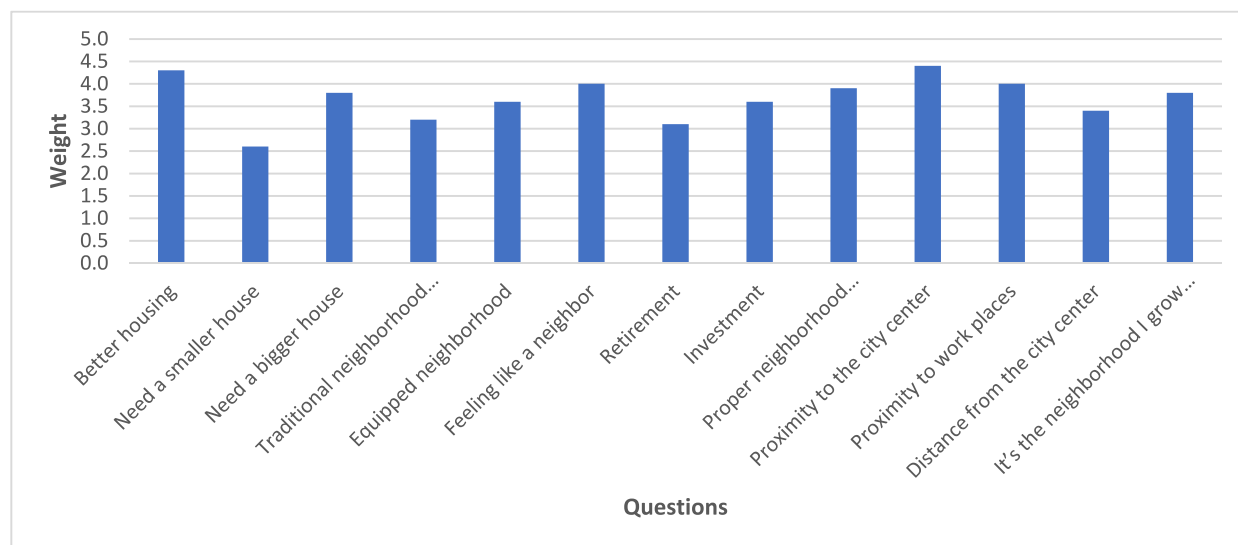


Fig. 9. Results of quantification of variables related to the elements affecting the desire to continue living in the neighborhood
Source: Research findings.

Regarding the above figure, the existence of public green space, the existence of children's playgrounds, planting trees along the streets, and the availability of mosques, with relative weights and average weights of 4.3, 4.1, and 4.01 and 0.0560, 0.0520, and 0.0518, respectively, have been the first three priorities, respectively. Thus, the existence of public land uses and green and open spaces can be the most important factors affecting the presence in the neighborhood. Moreover, the availability of shopping centers, neighborhood size, and street width, with average weights of 0.0506, 0.0495, and 0.0493, are the next priorities in this regard. With the exception of shopping centers, which have always been an effective factor for walking for citizens, the other two factors (neighborhood size and street width) do not seem to have a considerable impact on increasing residents' presence in the neighborhoods; however, both of them scored highly in this poll, with an average weight of 3.8 (weights of 0.0506 and 0.0495, respectively). Although mixed land use usually functions as an incentive to walk and make daily purchases, it scored the lowest (relative weight of 3.3 and average weight of 0.0425), and it is the last priority in this regard. Factors such as street parking, diversity of housing types, and the availability of a primary school in the neighborhood are among the next priorities with low scores.

The fourth part of the survey is related to measuring the factors affecting the social relationships of neighbors, the results of which are shown in Fig. 4. The results in this field show that the elements of the visibility of the porch from the street, public green space,

children's playgrounds, and mosques, with relative weights of 5, 4.2, and 4 and the average weights of 0.0667, 0.0566, and 0.0537, respectively, are ranked as the highest priorities in terms of having effects on more communication among residents. The elements of the availability of public green space, the availability of children's playgrounds, and the presence of a mosque are the most important in terms of having a greater impact on the social relations of the neighborhood. Furthermore, the elements of the existence of shopping centers, the existence of facilities and public spaces for social gatherings and entertainment, and planting trees along the streets, with relative weights of 4, 3.8, and 3.7, respectively, and the average weights of 0.0530, 0.0502, and 0.0500, are ranked as fourth to sixth priorities.

The fifth section of the survey measures the factors affecting the uniqueness of the neighborhood (Fig. 5). Accordingly, the three factors including the availability of public green space, the existence of children's playgrounds and planting trees, and the existence of mosques, with relative weights of 4.4, 4.3, and 4.1, respectively (with average weights of 0.0565, 0.0545, and 0.0523, respectively), are the most effective unique elements of the neighborhood.

The sixth part of the survey (Fig. 6), interestingly, similar to the fifth section, shows that public green space, children's playgrounds, and planting trees along the streets and mosques, with relative weights of 4.3, 4.1, and 4.1, respectively, and average weights of 0.0564, 0.0546, and 0.0543, are the most effective elements affecting the sense of belonging to the neighborhood.

The last part is related to surveying the elements affecting the desire to continue living in the neighborhood (Fig. 7).

As regards Fig. 7, the results show that the factors of proximity to the city center, better housing, and proximity to the workplace, with relative weights of 4.4, 4.3, and 4 (average weights of 0.0914, 0.0906, and 0.0840, respectively), have the highest scores and thus have the highest motivation for living in the neighborhood. In contrast, the traditional design of the neighborhood, retirement, and the need for a smaller house, with average weights of 0.0674, 0.0656, and 0.0538, respectively, have had the least impact on the desire to stay and live in the neighborhood.

4.2. Analyzing the results through inferential statistics

To perform inferential analyses in order to measure the social capital variables in the study area, all seven variables were classified into three criteria (sense of membership in the community, sense of belonging and impact on the neighborhood, and common feelings towards the neighborhood) as mentioned in the research method.

In doing so, the one-sample T-test technique and Pearson correlation test have been used and the results are given in Tables 2 and 3.

4.3. General interpretation of the test results

Sense of membership in the community criteria: The results of the analysis based on the one-sample T-test confirm the strong sense of membership in the community. According to Table 2 and regarding the results (mean = 4.05, sig = 0, and mean difference = 1.05), the score of citizens' sense of membership in the community (4.05) is higher than the expected sense of membership (average degree of membership is 3). The damaging consequences of the floods for the residents can be seen as a main root because of such strong sensation.

Sense of belonging and its impact on the neighborhood criteria: Findings obtained from a one-way T-test for this variable indicate that the average of the degree of belonging to the neighborhoods and the impact of citizens on them is 3.35 (T statistic is 3.45, df = 54, and sig = 0.001). Therefore, the amount of this factor in the neighborhood has more favorable conditions than the average amount (mean difference = 0.35). The confidence level of these results is 95% (Table 2).

Common feelings towards the neighborhood criteria: The significance level of the test shows the value of 0.006 (sig = 0.006), and considering that this value is less than 0.005 and that the mean difference result is 0.346, it articulates that the general situation of common feelings towards the neighborhood is favorable. The respondents have assigned a score (mean) of 3.346 to this factor (T = 2.854). This result indicates that there is no significant difference between the observed T, the mean, and their favorable conditions. Based on what has been mentioned, the hypothesis of the relative desirability of the factor of common feelings towards the studied neighborhood is proved with 95% confidence. Moreover, in order to investigate the correlation between the measured criteria, the relationship between these criteria was measured through Pearson test, the results of which are shown in Table 3.

A Correlation between the criteria of sense of membership in the community (A) and sense of belonging and its impact on the neighborhood (B)

Table 2

General results of one-sample T-test on the criteria of sense of membership in the community (A), sense of belonging and impact on the neighborhood (B), and common feelings towards the neighborhood (C).

Criteria	N	Mean	Std. Deviation	Std. Error Mean	Test Value: 3				95% Confidence Interval of the Difference	
					T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
A	130	4.0500	.90318	.12179	8.622	125	.000	1.05000	.8058	1.2942
B	130	3.3455	.73379	.09894	3.491	100	.001	.34545	.1471	.5438
C	95	3.3462	.87452	.12127	2.854	130	.006	.34615	.1027	.5896

Table 3

The results of the Pearson correlation test between all three criteria (A, B, and C).

Criteria	Mean	Std. Deviation	N
A	4.05	0.91	170
B	3.35	0.74	175
Correlations		A	B
A	Pearson Correlation	1	0.455**
	Sig. (2-tailed)		.001
	N	189	166
B	Pearson Correlation	0.455**	1
	Sig. (2-tailed)	.001	
	N	179	176
	Mean	Std. Deviation	N
A	4.05	0.91	180
C	3.35	0.88	175
Correlations		A	C
A	Pearson Correlation	1	0.654**
	Sig. (2-tailed)		.00
	N	77	101
C	Pearson Correlation	0.654**	1
	Sig. (2-tailed)	.00	
	N	75	84
	Mean	Std. Deviation	N
C	3.35	0.88	190
B	3.34	0.74	165
Correlations		C	B
C	Pearson Correlation	1	0.604**
	Sig. (2-tailed)		.00
	N	78	77
B	Pearson Correlation	0.604**	1
	Sig. (2-tailed)	.00	
	N	75	73

**Correlation is significant at the 0.01 level (2-tailed).

The results of the Pearson correlation test indicate a significant and direct relationship between the two criteria of membership and belonging (sig = 0.001 and Pearson correlation = 0.455) (Table 3).

B. Correlation between the sense of membership in the community and common feelings towards the neighborhood

The results of the Pearson correlation test indicate a significant and direct relationship between the two criteria of membership in the community and common feelings towards the neighborhood (sig = 0 and Pearson correlation = 0.654) (Table 3).

C. Correlation between the criteria of common feelings towards the neighborhood and sense of belonging and its impact on the neighborhood

The results of Pearson correlation test indicate a significant and direct relationship between the criterion of *common feelings towards the neighborhood and sense of belonging and its impact on the neighborhood* among the residents (sig = 0 and Pearson correlation = 0.604) (Table 3).

5. Discussion

The findings of this study suggest that social capital is one of the major components affecting the resilience of local communities, especially communities vulnerable to CC socially and economically. Bridging, linking, and bonding forms are three types of social capital that can be used by local communities for recovery in times of crisis. As the most important social capital affecting resilience, bonding capital was studied in Neka City which has been subject to catastrophic floods. In order to identify the most important factors affecting bonding capital in flood-prone communities in Neka City, seven criteria, including 1) sense of community, 2) attachment to place, 3) livability of the neighborhood, 4) socializing with the neighbors, 5), sense of belonging to the neighborhood, and 6) desire to continue living in the neighborhood, have been assessed through quantitative methods.

As regards the sense of community, while the criteria of respect to neighbors received the highest score, individuals gave the lowest score in terms of their impact on neighborhood events. Based on the results, it can be concluded that despite a relatively strong sense of community resulting from social supervision among residents, for some reasons, common beliefs and goals and general agreement for doing an activity among them are not warmly welcomed. As a result, the sense of neighborhood and respect for neighbors as drivers for friendly social interaction between neighbors has a more prominent role in the sense of community. It is worth noting that this aspect does not necessarily cover all the features of a local community, and it may only confirm part of Bakker et al.'s view about the sense of community (Bakker et al., 2019). This is because the sense of community refers to a "sense of belonging" and a "shared emotional

connection". Therefore, at least in terms of shared emotional connection, it can be argued that, given that the questions measuring this relationship were among the last priorities of the residents, this relationship was weak among the residents, while the sense of belonging was ranked as one of the top priorities by the residents (Fig. 3).

Based on the results of the study on measuring the impact of various factors on the sense of belonging, factors of planting trees and landscaping had the greatest impact on creating and strengthening the sense of belonging among the residents. However, factors such as the existence of facilities and social interactions spaces and infrastructures related to transportation and entertainment have been scored lower in terms of influencing the sense of belonging.

In addition, regarding the third criterion, the desire of residents to increase their presence in the neighborhood, the existence of public land uses, and green spaces were the most important factors affecting the presence of residents in the neighborhood public spaces. However, the existence of mixed land uses, which are usually considered as an incentive to walk and make daily purchases, with the lowest score, had the last priority in this regard. Therefore, it can be inferred that the presence of trees and green landscapes and open and public spaces play an important role in promoting the sense of belonging among residents and the presence of people in public spaces. However, the role of open spaces in reducing floods' damaging consequences and the role of ecosystem services in reducing carbon monoxide and therefore resilience to CC should not be overlooked (McPhearson et al., 2014).

Concerning the fourth criterion, the elements influencing socialization with neighborhood residents; the elements of porch visibility from the street; and then the public green space, children's playgrounds, and the mosques, respectively, have assumed the greatest priority. Accordingly, semi-open spaces such as balconies and terraces are considered to be a proper alternative to inaccessible public spaces such as streets, town squares, parks, churches, mosques, and cafes during pandemics (Banai, 2020). Besides, regarding the fifth criterion, the factors affecting the identity of the neighborhood, public green space, children's playgrounds, planting trees along the streets, and availability of a mosque received the highest scores.

Regarding the sixth criterion, which is having a sense of neighborliness, these cases were also considered as the most important factors affecting having a sense of neighborliness. As a result, it is possible to conclude that these factors have a significant effect on the three criteria evaluated by the selected factors for more residents' relationships with one another, identity and uniqueness of the neighborhood, and sense of community.

In terms of the seventh criterion, the factors affecting the tendency to stay and live in the neighborhood including proximity to the city center, better housing, and proximity to the workplace obtained the highest scores and therefore played the most important role in longevity in the studied local communities. According to the results obtained in all seven aspects of the survey, it can be argued that the three factors of public green space, children's playgrounds, and planting trees along the streets have the greatest impact on the parameters of sense of belonging, neighborhood identity, more relationship of the residents, and desire to walk in the neighborhood.

At the same time, the results of the one-sample T-test for the criteria of membership, influence, and common feelings were also examined. The results indicated a high degree of feeling of membership in the studied local communities. In addition, the number of social capital variables in local communities was more favorable than the average amount. Therefore, inhabitants feel that they were effective in local communities. Regarding the factor of common feelings in the neighborhood, the test results indicated favorable conditions and were close to the ideal of the studied local communities. In general, the results of the tests showed the desired level of the above three factors. The results of Pearson test also showed a significant and direct relationship between the sense of community membership and the sense of belonging and impact on the neighborhood. Moreover, based on the results, there was a significant and direct relationship between the criteria of community membership and common feelings towards the neighborhood. In addition, the existence of a significant and direct relationship between the criteria of impact on the neighborhood and common feelings was confirmed accordingly. Therefore, it can be concluded that the bonding social capital is one of the major factors contributing to the resilience of local communities in Neka City.

Compared with Straub et al.'s (2020) study which focused on the disaster preparedness phase of the disaster management cycle, the scope of the present study was limited to the recovery phase. In addition, although Wickes et al. (2015) showed that social capital in a post-crisis environment had a limited effect on reducing problems, the result of the present study shows the great impact of social capital on making communities more tied together. Bakker et al. (2019) also, in a study focusing on the three types of social capital, concluded that there is no straightforward relationship between social capital and the resilience of local communities, since even though the three types of social capital exist in the local community, the residents may not have the required agency to mobilize social capital. However, the present study emphasizes the key role of social capital in the resilience of local communities. In addition, the results of this study confirm the research results offered by Panday et al. (2021) who focused on the performance of post-earthquake bonding, bridging, and linking social capitals in three local communities in Nepal and showing how each form of social capital becomes more important at different stages of recovery. Finally, the results of the present study showed that bonding capital can have a very significant effect on increasing the resilience of local communities. As in the case of Neka, this has helped residents to return to normality and to be more prepared for the next CC events.

One of the major limitations of this study was the lack of previous studies on social capital in coastal communities. In particular, coastal communities in Iran have no background in the international literature on this issue. The main reason behind this gap would be the devastating effects of drought on most cities and local communities in Iran in recent decades. Thus, the majority of studies and policies have focused on drought and its adverse effects on cities. As a result, other CC events, such as floods in coastal areas, have been overlooked. Another limitation of the study was the lack of reliable data, which led to the limitation of the study scope and the size of the sample. In addition, the lack of participation of local organizations and institutions in filling out the questionnaires was another limitation that affected this research. As a result, the questionnaire respondents were limited to the residents of the local communities.

The most important implication of the present study is considering the crucial role of social capital in improving the community's resilience. The presented framework in this study provides scholars, urban designers, planners, and policymakers with a clear picture

of the components of bonding social capital. It also helps them make well-informed decisions regarding improving the resilience of local communities, especially those located in flood-prone coastal regions. Moreover, the presented framework and the quantitative method used in this study can inspire the evaluation of different forms of social capital in other communities at risk of climatic disasters. Furthermore, in order to improve the bonding social capital in local communities, the presented measures, particularly the criteria with the highest scores, can be adopted by urban designers, planners, and policymakers. Adopting such measures would also facilitate resilience building in local communities.

6. Conclusion and recommendations

The present study aimed to investigate the function of social capital in informing and improving the process of coastal communities' resilience capacity. In order to achieve the goal of the study, this research analyzed a number of social capital criteria by conducting a field survey using questionnaires and inferential statistics techniques in Neka City, Iran. The findings revealed that bonding capital, as the most powerful kind of social capital, plays a critical role in improving community resilience capacity in the case studies. Moreover, the most important criteria in developing capacities to enhance community resilience included respect for the rights of the neighbors, availability of public green space, availability of children's playgrounds, planting trees, and availability of a porch.

6.1. Policy implications and recommendations

This study emphasizes that in order to increase bonding social capital, which is considered to be one of the main components of community resilience, it is essential to build public spaces where people can have more social interaction with each other. Moreover, urban designers, planners, and decision-makers should consider developing more green spaces, such as parks, as well as planting trees along the streets and rivers. In addition, the provision of semi-open spaces in housing, such as balconies and terraces, overlooking the public spaces should be considered in the architectural design of houses. Adopting such measures would also encourage the improvement of resilience in local communities.

This study addressed two critical gaps in the literature: First, it shed light on the role of a particular type of social capital in the resilience of flood-prone local communities. Second, it provided evidence from a developing country that is subject to severe CC risks, especially floods. The results of this study would clarify some of the ambiguities related to the assessment methods and factors affecting bonding capital in vulnerable neighborhoods. In this study, a framework and a quantitative method were utilized to identify which criteria of bonding social capital plays a more crucial role in strengthening the resilience of flood-prone coastal communities. The framework and method can be effective in operationalizing the assessment of different types of social capital in other studies. The presented measures, especially the criteria with the highest scores, can also be used in designing and planning programs in other communities around the world.

The present study suggests that since the type and content of social capital are effective in the process of building community resilience, especially in less privileged and deprived neighborhoods, it is essential that future studies focus on identifying the nature of existing social capital at the community level. Moreover, future studies should focus more closely on the role of different types of social capital in the resilience of local communities at each stage in different post-disaster stages. Ultimately, this study calls for the urgent need for further studies on the role of marginalized social groups, such as residents of informal settlements, the disabled, the elderly, women and children, and NGOs in building social capital and community resilience.

Credit author statement

Mousa Pazhuhan (Panahandeh Khah) and Melika Amirzadeh performed the study and developed the main text. Rando Värnik, Marcin Pietrzykowski, David Lopez-Carr and Hossein Azadi provided instructions, comments for the research design and approaches and enrich the paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix 1

Questionnaire of variables related to the sense of belonging to the community; Please weigh the importance of the below factors on the sense of belonging to the community (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Common Belief (People in this neighborhood believe the same things I believe)	179	0.0453	3.2
Common expectations (My neighbors and I have common expectations from this neighborhood)	202	0.0511	3.6
I know most of the people in this neighborhood	214	0.0542	3.8
I think this is my neighborhood	239	0.0605	4.3
Many neighbors know me	240	0.0607	4.3
Considering neighbors in daily affairs (When I do something, I consider my neighbors)	258	0.0653	4.5
Being influential on the neighborhood (I have influence or influence on what is happening in this neighborhood)	157	0.0397	2.7
Solving neighborhood problems together (Residents of the neighborhood can solve the problems of the neighborhood themselves)	166	0.0420	2.7
Loving to live here (It is very important for me to live in this neighborhood)	229	0.0580	4.02
I have no problem with my neighbors	165	0.0418	3.06
living here for a long time (I would like to live in this neighborhood for a long time)	207	0.0524	3.6
Belonging to this neighborhood (I feel I belong to this neighborhood)	225	0.0569	3.9
Being part of this neighborhood (I feel I am an important part of this neighborhood)	205	0.0519	3.6
Priority for living here (In this neighborhood, the feeling of being a neighbor is high among the residents)	204	0.0516	3.6
Being together in difficult times (The residents of this neighborhood are getting closer to each other in difficult and critical situations)	211	0.0534	3.8
Feeling of being a neighbor (The feeling of being a neighbor is more now than ever)	155	0.0392	2.8
I'm upset if I have to leave here	207	0.0524	3.6
Enthusiastic to work for neighborhood (working in group is favorite in this neighborhood)	158	0.0400	2.8
Participation in voluntary works (I participate in voluntary work on this neighborhood)	157	0.0397	2.7
Being active in the affairs of the neighborhood (The people of this neighborhood are active in the affairs of the neighborhood)	173	0.0438	3.1

Questionnaire of variables related to the sense of belonging to the neighborhood; Please weigh the importance of the below factors on the sense of belonging to the neighborhood(1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Green Spaces	211	0.0501	3.8
Block size	172	0.0408	3.2
Existence of entertainment places	194	0.0461	3.5
The public space qualities	204	0.0484	3.6
Residential density	191	0.0453	3.4
Walkability of the neighborhood	191	0.0453	3.3
Landscape	223	0.0529	4
The neighborhood size	209	0.0496	3.7
Street width	212	0.0503	3.7
Parking lots	197	0.0468	3.4
Street parking lots	194	0.0461	3.5
Size of land	190	0.0451	3.4
Variety in house species	211	0.0501	3.7
Overall quality of houses	221	0.0525	3.9
Network of passages	194	0.0461	3.4
Mixed land use	193	0.0458	3.5
Existence of elementary schools	199	0.0472	3.6
Existence of neighborhood center	190	0.0451	3.5
Existence of a shopping center	220	0.0522	3.8
Existence of a mosque	214	0.0508	3.7
Existence of a porch in houses	184	0.0437	3.3

Questionnaire of variables related to the elements affecting the desire of residents to increasing presence in the neighborhood; Please weigh the importance of the below factors on the desire of residents to increasing presence in the neighborhood (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Green Spaces	248	0.0560	4.3
Block size	201	0.0454	3.5
Existence of entertainment places	215	0.0486	3.8
The public space qualities	212	0.0479	3.7
Residential density	216	0.0488	3.8
Walkability of the neighborhood	214	0.0484	3.7

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Question	Score	Average weights	Relative weight
Landscape	230	0.0520	4.1
The neighborhood size	219	0.0495	3.8
Street width	218	0.0493	3.8
Parking lots	214	0.0484	3.7
Street parking lots	207	0.0468	3.6
Size of land	189	0.0427	3.3
Variety in house species	207	0.0468	3.6
Overall quality of houses	198	0.0447	3.6
Network of passages	205	0.0463	3.6
Mixed land use	188	0.0425	3.3
Existence of elementary schools	189	0.0427	3.3
Existence of neighborhood center	203	0.0459	3.7
Existence of a shopping center	224	0.0506	3.9
Existence of a mosque	229	0.0518	4.01
Existence of a porch in houses	199	0.0450	3.5

Questionnaire of variables related to the elements affecting the social relations of the residents; Please weigh the importance of the below factors on the social relations of the residents (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Green Spaces	241	0.0566	4.2
Block size	179	0.0420	3.1
Existence of entertainment places	214	0.0502	3.8
The public space qualities	209	0.0490	3.7
Residential density	205	0.0481	3.6
Walkability of the neighborhood	192	0.0451	3.4
Landscape	213	0.0500	3.7
The neighborhood size	207	0.0486	3.6
Street width	199	0.0467	3.5
Parking lots	192	0.0451	3.4
Street parking lots	188	0.0441	3.3
Size of land	176	0.0413	3.1
Variety in house species	187	0.0439	3.3
Overall quality of houses	182	0.0427	3.2
Network of passages	184	0.0432	3.2
Mixed land use	163	0.0383	2.9
Existence of elementary schools	179	0.0420	3.1
Existence of neighborhood center	212	0.0498	3.7
Existence of a shopping center	226	0.0530	4.0
Existence of a mosque	229	0.0537	4.0
Existence of a porch in houses	284	0.0667	5.0

Questionnaire of variables related to the elements affecting the identity of the neighborhood for the residents; Please weigh the importance of the below factors on the identity of the neighborhood for the residents (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Green Spaces	252	0.0565	4.4
Block size	208	0.0466	3.6
Existence of entertainment places	224	0.0502	3.9
The public space qualities	228	0.0511	4.0
Residential density	211	0.0473	3.7
Walkability of the neighborhood	202	0.0453	3.5
Landscape	243	0.0545	4.3
The neighborhood size	223	0.0500	3.9
Street width	224	0.0502	3.9
Parking lots	206	0.0462	3.6
Street parking lots	201	0.0451	3.5
Size of land	204	0.0458	3.6
Variety in house species	215	0.0482	3.8
Overall quality of houses	209	0.0469	3.7
Network of passages	198	0.0444	3.5
Mixed land use	179	0.0401	3.1
Existence of elementary schools	185	0.0415	3.2

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Question	Score	Average weights	Relative weight
Existence of neighborhood center	198	0.0444	3.5
Existence of a shopping center	217	0.0487	3.8
Existence of a mosque	233	0.0523	4.1
Existence of a porch in houses	199	0.0446	3.5

Questionnaire of variables related to the elements affecting the sense of belonging in the neighborhood; Please weigh the importance of the below factors on the sense of belonging in the neighborhood (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Green Spaces	243	0.0564	4.3
Block size	192	0.0446	3.4
Existence of entertainment places	213	0.0495	3.7
The public space qualities	217	0.0504	3.8
Residential density	200	0.0464	3.5
Walkability of the neighborhood	202	0.0469	3.5
Landscape	235	0.0546	4.1
The neighborhood size	221	0.0513	3.9
Street width	202	0.0469	3.5
Parking lots	190	0.0441	3.3
Street parking lots	187	0.0434	3.3
Size of land	185	0.0430	3.2
Variety in house species	211	0.0490	3.7
Overall quality of houses	206	0.0478	3.6
Network of passages	191	0.0444	3.4
Mixed land use	178	0.0413	3.1
Existence of elementary schools	181	0.0420	3.2
Existence of neighborhood center	202	0.0469	3.5
Existence of a shopping center	220	0.0511	3.9
Existence of a mosque	234	0.0543	4.1
Existence of a porch in houses	196	0.0455	3.4

Questionnaire of variables related to the elements affecting on the desire to continue living in the neighborhood; Please weigh the importance of the below factors on the desire to continue living in the neighborhood (1: the least impact and 5: the most impact).

Question	Score	Average weights	Relative weight
Better housing	246	0.0906	4.3
Need a smaller house	146	0.0538	2.6
Need a bigger house	214	0.0789	3.8
Traditional neighborhood design	183	0.0674	3.2
Equipped neighborhood	207	0.0763	3.6
Feeling like a neighbor	226	0.0833	4.0
Retirement	178	0.0656	3.1
Investment	205	0.0755	3.6
Proper neighborhood infrastructure	220	0.0811	3.9
Proximity to the city center	248	0.0914	4.4
Proximity to work places	228	0.0840	4.0
Distance from the city center	195	0.0718	3.4

Appendix 2

Table 4

The results of Skewness and kurtosis tests (normal distribution assessment)

Descriptive Statistics						
	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Sense of membership	130	2.70	-.906	.316	-1.223	.623
Sense of belonging and impact	130	2.44	.254	.316	-2.000	.623
Common feelings	95	2.44	-.660	.316	-.484	.623

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