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Assessing Vulnerability and Social Capital for Disaster Mitigation and Recovery in Palu City, Indonesia

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ABSTRACT

Located in an area crossed by active faults, Palu City has a high vulnerability to natural disasters. In 2018, this city was hit by a tsunami that caused thousands of casualties and hundreds of damaged urban facilities and infrastructure. By this incident, it is crucial to carry out disaster mitigation to reduce risks in the future. This research aims to assess the level of vulnerability and social capital possessed by the people of Palu City and how it relates to creating a resilient city. The method used was quantitative, by collecting questionnaires on 268 samples distributed throughout the research area using cluster sampling techniques and analyzing data using the Social Vulnerability Index (SoVI) and the Social Capital Index. The results showed that the average level of vulnerability of Palu City to disasters is relatively high, with the most vulnerable variable being gender in the female population (0.075. Furthermore, the people of Palu City have good social capital values, especially for their solidarity values (82%), including their trust in neighbors/residents and willingness to help relatives. Thus, the level of vulnerability can be seen as a form of disaster risk reduction effort and social capital as a recovery effort. These indicators will support city resilience through mitigation strategies. Inclusiveness and participation must be prioritized in formulating policies and post-disaster management programs.

1. INTRODUCTION

As a country in the Pacific Ring of Fire region and a confluence of three tectonic plates (Eurasia, Pacific, and Indo-Australian), Indonesia has a high threat of natural disasters, mainly geological disasters. Indonesia has faced various geological disasters in less than ten years, especially earthquakes and even tsunamis. There are 351 types of disasters, with 5,047 deaths caused by these natural disasters [1]. Even in 2018, there was a tsunami disaster on the coast of Banten and Palu City only four months later, which caused 4,688 people to die, 672,490 houses were destroyed, and even 683 victims have not been found to date [1]. Compared to Banten, Palu faced a more complex disaster because apart from the tsunami and earthquake, Palu also faced a liquefaction disaster.

The city of Palu was hit by an earthquake of 7.4 with a depth of 10 km, making this disaster the epicenter on land with the most enormous magnitude ever recorded [2]. The location of Palu City, which is passed by the Palu-Koro fault, a cluster of earthquake disaster activity, is relatively high, with a length of 200 km, and has a difference in movement between the north and south [3-5]. The disaster then caused underwater landslides that triggered a tsunami at several points on the coast of Palu City. Apart from the tsunami, liquefaction also hit the area where water-saturated sand becomes liquid when shaken vigorously. This phenomenon causes the soil to lose a lot of strength or stiffness over time; when it lasts long enough, it can cause many failures, deaths, and significant financial losses [6, 7].

The disaster that occurred in 2018 in Palu City also caused 4,340 fatalities, with hundreds of basic facilities destroyed, such as 256 schools, 327 places of worship, 362 offices, and seven broken bridges [8]. This needs to include basic infrastructure such as clean water, electricity, sanitation, and even roads for connectivity. Even community activities had to stop for several months because of the impact of the disaster [9]. In the Petobo and Balaroa areas, thousands of houses were washed away, and roads were split due to the liquefaction disaster. Meanwhile, on the coast, thousands of houses were swept away by the tsunami waves with run-ups and puddles of about 4 meters [10]. This condition shows that the impact of the disaster faced by the people of Palu City is very high and complicated. Therefore, this study tries to see how social aspects are considered in the disaster risks faced in Palu City.

Assessment of community vulnerability and ability to recover after a disaster is an important aspect that should be assessed in disaster mitigation. This assessment can be part of the impact reduction and recovery of infrastructure damage caused by disasters [11]. In addition, in achieving sustainability, it is necessary to look at the vulnerability and security of the community as well as the social capital they have to recover after a disaster [12]. The terminology of community vulnerability is usually related to socio-economic,

both to see adaptability and social capital [13].

In recent years, community vulnerability assessment has become a solution for disaster risk reduction [14]. Community vulnerability explains how the impact of a disaster will be felt more severely by individuals and communities already facing several weaknesses, such as children, the aged, people with low incomes, and disabilities [15]. Socio-economic status dramatically influences community vulnerability due to discrimination or racism, for example, differences in ethnicity and ethnicity [16]. In fact, regarding gender, women have a higher vulnerability in dealing with disasters [17]. Therefore, disaster risk reduction is usually in line with reducing physical, social, economic, and environmental vulnerability [18].

This study tries to assess the level of vulnerability of the community in Palu City from the experience of the 2018 disaster by looking at age, gender, disability, education, income, number of family members and heads of families, including population density and housing conditions [13, 19, 20]. This assessment is then called the SoVI or Social Vulnerability Index; the selection of this assessment is to see not only individuals and groups affected by natural disasters in Palu City. Community vulnerability assessment at the community and regional scale aims to find weak aspects of disaster management and the relationship between individuals and their social networks to increase disaster prevention and mitigation capabilities [19].

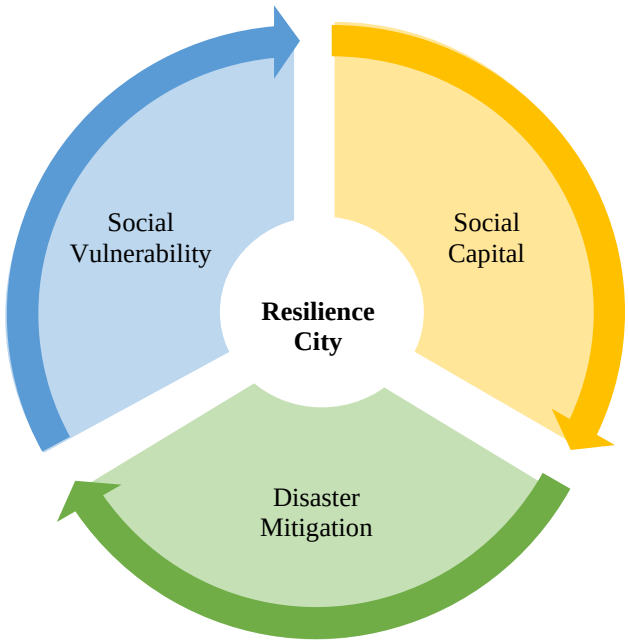

Figure 1. The relationship between social vulnerability and social capital in creating city resilience

In addition to assessing social vulnerability, this study also examines the social capital owned by the people of Palu City as a form of disaster mitigation. Social capital can be used as an assessment tool by examining how social interactions exist to form beneficial values for their lives [21]. These interactions then shape the culture of the community, which eventually becomes local wisdom. Having local wisdom instilled for a long time can impact long-term recovery and even reduce the tsunami risk [22, 23]. Several previous studies have explained that there are at least three main aspects in assessing social capital, namely trust, norms, and networks [21, 24, 25] so that solid social capital can encourage collective action [24].

This research figures out how vulnerable the people of Palu City are and the social capital they have to become a disaster mitigation planning tool (Figure 1) in the future, with the focus of this research being the tsunami disaster. Many studies have assessed community vulnerability in disaster-prone areas such as Palu City. However, not many have looked at the social capital side, which can be of exceptional value for carrying out mitigation according to the characteristics of the community. Knowing the level of community vulnerability and how much social capital they have hoped that it can create a resilient city that can withstand the disasters that will be faced. This is because resilience or disaster resilience is essential in understanding vulnerability in urban areas [26].

Thus, this research aims to assess the level of community vulnerability and the social capital they have as an effort to mitigate disasters in Palu City. This assessment is expected to contribute to increasing community resilience and a basis for formulating policy strategies for disaster mitigation. Based on this, the proposed research hypothesis assesses the relationship between community vulnerability and social capital capable of disaster mitigation efforts to achieve a resilient and sustainable city.

2. METHODOLOGY

2.1 Study area

This research was conducted on the coast of Palu City, Central Sulawesi Province, especially in areas affected by the 2018 tsunami (Figure 2). Administratively, Palu City has six sub-districts, with a total area of 395.06 km2. This city is a coastal city located around the equator, precisely in the plain area of the Palu Valley and Palu Bay, astronomically located between 0º.36" - 0º.56" South Latitude and 119º.45" - 121º.1" East Longitude. This position means that Palu City is bypassed by the Palu-Koro fault, making this city very vulnerable to natural disasters. As a coastal city, community activities are always related to the sea; even in spatial patterns, community activity centers focus on coastal areas. The administrative area of Palu City is divided into eight sub-districts and 46 sub-districts, with 6 of these sub-districts being in the coastal area, namely West Palu. Ulujadi, East Palu, Mantikulore, North Palu, and Taweli.

With flat to wavy topography with several valley areas, the highest point of Palu City is 1600 meters above sea level. Palu City is dominated by heights ranging from 0-200 meters above sea level with an area of 17450.4 Ha or 48.2% of the area of Palu City. In the coastal area of Palu City, the topography averages a height of 0-200 meters above sea level, which is an area of 10,469 hectares, so this area becomes the people's choice location to live.

Since 2000-2020, Palu City has continued to experience territorial expansion, especially in coastal areas, including built-up areas [9]. Palu City's growth also occurred in coastal areas where development continues towards the sea. Hence, the tsunami disaster 2018 caused many casualties and damaged the city's infrastructure. It was recorded that there was a decrease in the population growth rate after the 2019 tsunami disaster, namely 1.19%, compared to the population growth rate in 2017, namely 1.23% [27]. as well as 43 units of health facilities and 386 units of education facilities which were heavily damaged [1]. Therefore, it is crucial to assess the

level of community vulnerability and the social capital they have to overcome disasters and accelerate recovery in the future.

2.2 Data collection and analysis

Data were collected using questionnaires and field observation techniques carried out in December 2020 – January 2021 to answer the research objectives. Due to the significant nature of the research area, the population used in this research is limited. In this case, the boundaries are seen through administrative boundaries; here are the research sample criteria:

1. Village areas that are on the coast and have a direct impact on the tsunami disaster And
2. Respondents who are heads of families affected by the tsunami disaster

Thus, six sub-districts and 18 sub-districts are the research cluster samples, with a total population of 29,152 heads of families. For sample calculations, use the Issac and Michel formula [28].

$$S = \frac{\lambda^2 \text{ N.P.Q}}{d^2(N-1)+x^2.P.Q} \quad (1)$$

In calculating the sample size, the error tolerance limit (P) used is 0.5, while for the bias value (d) between the sample average and the population average, it is 0.05, and for the degrees of freedom and error (λ2) it is 10% or 2,706. The calculation results found that 268 samples were used in assessing the level of community resilience and social capital possessed in efforts to mitigate the tsunami disaster in Palu City.

The limitations of this research include that this research was conducted cross-sectionally because the researchers considered time and cost efficiency. Apart from that, the assessment of social capital was a qualitative method, so the researchers did not dig deeper into the norms and beliefs of respondents in independent disaster management efforts. Then, although this research provides insight into tsunami disaster mitigation efforts, it is essential to remember that the findings obtained have limitations in terms of generalization, which is limited to the Palu City area and cannot be applied directly to other areas.

2.2.1 Social vulnerability index

Eight indicators are needed to assess community vulnerability (Table 1) [19, 20]. In this analysis, they will calculate the ratio value of each variable. Three categories are used to determine the vulnerability category: high, medium, and low. In weighting social vulnerability in Palu, each variable has a different weight. The purpose of this weighting is to find out the class of social vulnerability.

The SoVI value for Palu is calculated in stages for each variable and research area. The procedures are (a) determining the average value, (b) determining the standard deviation (SD) value, (c) calculating the positive and negative index values, and (d) calculating the vulnerability value. Lastly, area mapping will be carried out, namely, which areas have community vulnerability ranging from low to high vulnerability (Table 2).

2.2.2 Social capital

Social capital can be seen using three parameters, namely trust, norms, and networks. This assessment uses primary data from the results of the questionnaire.

1. In analyzing social capital for trust, the attitudes of the people who participated in the tsunami disaster mitigation efforts on the coast of Palu City will be analyzed.
2. For the norm variable, certain norms will be analyzed or applied in the lives of coastal communities to show that these norms affect tsunami disaster mitigation.
3. Assessment of network variables, used to determine the relationship between the community and the community, as well as the community and the government, so that cooperation is formed to mitigate the tsunami disaster in Palu City.

The results obtained will be digitized so that an overlay analysis can be carried out to determine the distribution of social capital in Palu. This aims to make it easier to see social capital in each region in Palu City.

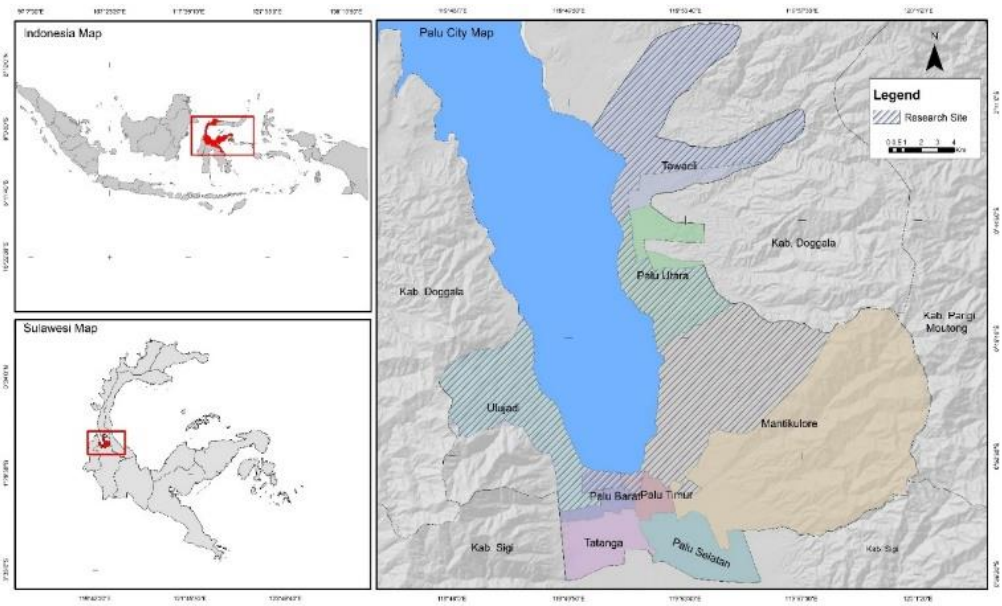

Figure 2. Research location

Table 1. Community resilience indicators

Variable		Operational Presentation	Weight	Sources
Age	X_1	≤5 years older ≤65 years older	0,1	BPS, 2020
Gender	X_2	Female population	0,15	BPS, 2020
Income	X_3	Low income <500.000 IDR	0,1	Primer, 2021
Education	X_4	Elementary school graduation	0,15	Primer, 2021
Householder	X_5	Female-headed household	0,1	Primer, 2021
Family size	X_6	Family more than 4 component	0,1	Primer, 2021
Disability	X_7	Disabled family members	0,1	BPS, 2020
Housing	X_8	Non-permanent building	0,05	Primer, 2021
Population density	X_9	Density level of each sub-district area	0,2	BPS, 2020

Table 2. Community vulnerability indicators

Variable		Operational Presentation
Social Trust	X_1	Trust neighbors/residents
	X_2	Trust residents in other areas
	X_3	Trust in local government
	X_4	Confident in the tsunami disaster information
	X_5	Trust government policies
Social Norm	X_6	Has a value of solidarity between citizens
	X_7	Comply with rules/policies
	X_8	Understand that there is a tsunami disaster
	X_9	Understand the importance of mitigation efforts
	X_{10}	Understand the importance of spatial planning efforts
Social Networks	X_{11}	Network Always participate if there is an activity
	X_{12}	Have many relatives
	X_{13}	Willing to help relatives

3. RESULT AND DISCUSSION

In order to achieve disaster mitigation that can create a resilient city of Palu, a separate assessment is first carried out between the level of community vulnerability and its social capital. This assessment aims to describe in detail the level of community vulnerability in each research area and provide greater clarity in mapping the level of vulnerability. The same thing is also done in assessing social capital. After knowing the value of each indicator, an in-depth elaboration of the mitigation efforts to achieve the resilience of Palu City to disasters is carried out.

3.1 Community vulnerability assessment in the face of the tsunami disaster

Based on the analysis of the level of vulnerability of the people of Palu City, it was found that the variable most vulnerable to disaster events was gender (X2), with a vulnerability index value of 0.075. The high level of vulnerability of the female community is due to their ability to evacuate, taking into account various considerations, especially the safety of their children and husbands. This is in line with research conducted in Aceh during the 2004 tsunami disaster; women tended to prioritize the safety of other family members and lacked the knowledge to protect themselves [17].

The results of this analysis are also in line with research conducted in Japan when the 2011 tsunami hit it; women were a vulnerable group when a disaster occurred at that time, especially with their condition as a marginalized group, especially with differences in social strata [27]. Apart from the gender variable, in Table 3, it can be seen that several other variables fall into the medium category, namely age (X1), disability (X7), income (X3), education (X4), housing conditions (X8), and population density (X9). The medium category also shows the level of vulnerability that needs to be the primary concern in tsunami disaster mitigation. This is because the community's socio-economic conditions significantly influence preventive mitigation efforts [20].

From the analysis of each community vulnerability variable, a vulnerability analysis was carried out for each sub-district in Palu City to find out which areas have a high vulnerability to disasters. It is easier to provide information to identify communities most likely to experience negative impacts from the disaster they face [13]. Figure 3 shows the results of a community vulnerability assessment that each sub-district in the coastal area of Palu has a different level of community vulnerability. However, it is only included in the low class for some research areas. This shows that the vulnerability level of the people of Palu City is in the medium-high category.

West Palu and East Palu sub-districts have the highest level of social vulnerability compared to the other four regions (Figure 3). This is because, in the SoVI calculations, the highest weight is density, and these two areas have a very high-density level because they are in the center of Palu City. Within the RTRW, West Palu and East Palu are areas for city service center systems and sub-center systems. The two regions have various land uses for settlements, trade, service centers, transportation, government, etc.

Then, the other four areas with a medium vulnerable classification are the sub-districts of Mantikulore, North Palu, Tawaeli, and Ulujadi; the area has a low density and a broader and more diverse area of physical characteristics compared to West Palu and East Palu. In addition, the four sub-districts are only included in the environmental center in the RTRW. Therefore, it is necessary to do an even distribution of places where people live so that they are not focused on just one area. From the study results, areas that can still be developed for settlement development are in the Mantikulore and Tawaeli sub-districts.

Based on several previous studies, it was found that the high impact caused by the disaster in 2018 was felt not only physically but also socio-economically, such as farmers whose land was heavily damaged so that it had an impact on their lives [28, 29]. The level of damage and other impacts caused by the tsunami disaster between Palu City regions also differed. It is because there is a correlation between potential risk and community resilience [11].

Community vulnerability assessment can be part of disaster risk reduction, especially for socio-economic aspects. In addition, it can help develop disaster emergency plans according to the characteristics of regional vulnerability [19]. Involving local communities in disaster mitigation strategies is vital because it can help reduce disaster risk and support achieving a resilient city to disasters.

Table 3. The level of community vulnerability to the tsunami disaster

Index	Mean	S.Dev	Min	Max	Vi	Weight	SoVI	Vulnerability Status
Age (X_1)	0.46	0.03	0.42	0.50	0.56	0.1	0.056	Medium
Gender (X_2)	101.30	2.40	97.70	104.90	0.50	0.15	0.075	High
Income (X_3)	0.18	0.03	0.13	0.21	0.68	0.05	0.034	Medium
Education (X_4)	0.28	0.06	0.21	0.38	0.41	0.15	0.062	High
Householder (X_5)	0.20	0.07	0.06	0.26	0.68	0.1	0.068	Medium
Family size (X_6)	0.28	0.07	0.28	0.45	0.01	0.1	0.001	Low
Disability (X_7)	87	31	50	135	0.44	0.1	0.044	Medium
Housing (X_8)	0.36	0.22	0.04	0.62	0.55	0.05	0.027	Medium
Population density (X_9)	2277.19	2592.68	371.11	5618.42	0.36	0.2	0.073	Medium

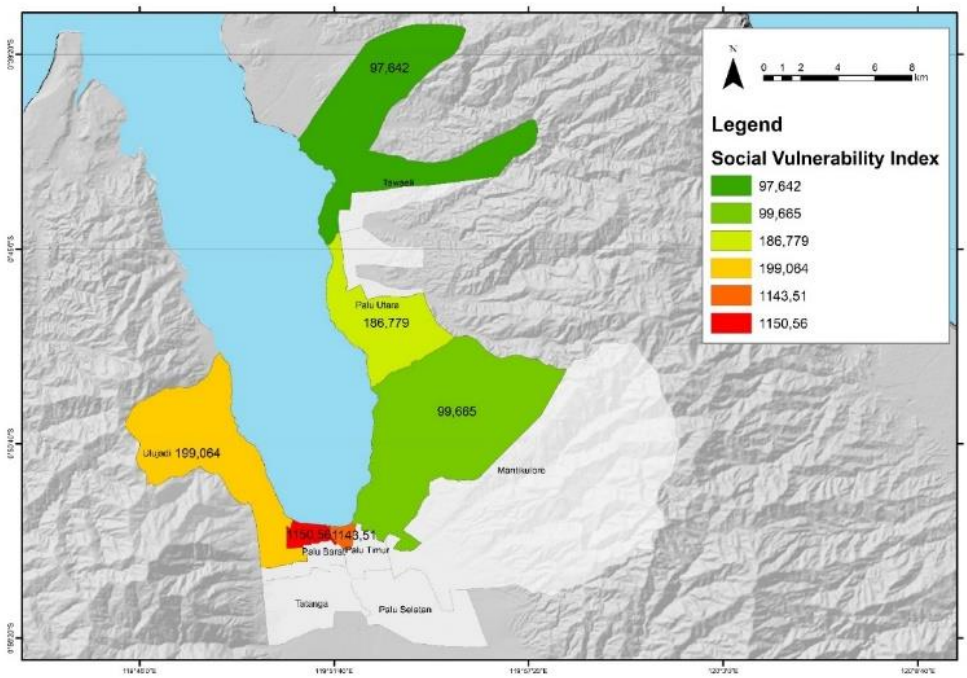

Figure 3. Vulnerability levels of Palu City communities by region

3.2 Social capital as the ability to recover after the tsunami disaster

The assessment of social capital is carried out to see the ability possessed by the people of Palu City to recover from the disasters they face. Several previous studies explained that the assessment of social capital as a set of social resources needs to be assessed because it is synonymous with recovery efforts; this aspect can also influence policies to return to normal conditions or to a standard of living closest to before the disaster occurred [30-32]. The assessment results show that the three critical factors of social capital owned by the people of Palu City are good. The trust factor, especially the people who believe in the tsunami information provided by the government, has a low score of 68% (Table 4). This is because the government revoked the tsunami warning during the tsunami disaster in 2018. Therefore, the community admits doubts about the tsunami disaster information.

Low trust in disaster information can affect the level of community resilience. This shows a skeptical attitude towards the government, even though the government's role and support are part of social capital to accelerate the post-disaster recovery process [16, 33]. However, the public trusts the local government and government policies moderately. It shows that the community still trusts government officials, although they do not fully have hope when faced with a disaster. This aligns with research conducted by Kurnia and Pandjaitan [34] that a high level of public trust in the government can make it challenging to achieve community resilience because they feel the government is responsible for their survival after the tsunami. In addition, high dependence on government officials can affect recovery, especially in self-financing [31]. Therefore, people must be independent with their local wisdom.

In the research, Mikulecký et al. [23] explain that in an emergency, when a disaster occurs, one cannot wait for the government to provide the necessary resources but must act independently, demonstrating effectiveness among all members of the community. This is in line with the results of the assessment of social capital in Palu City; the values of solidarity between communities as a whole are in the high category, such as trusting fellow community members, having high solidarity values, and having the willingness to help fellow community members (Table 4). Community relations can be essential in managing disaster risk and harm [35].

The calculation of the social capital factor owned by the people of Palu City was mapped to make it easier to see the ability to recover independently after a disaster based on their social capital. Research conducted by Marín et al. [30] suggests that it is essential to assess social capital geographically because it will show the level of geographic isolation or areas that are difficult to reach in the recovery process, especially meeting post-disaster needs.

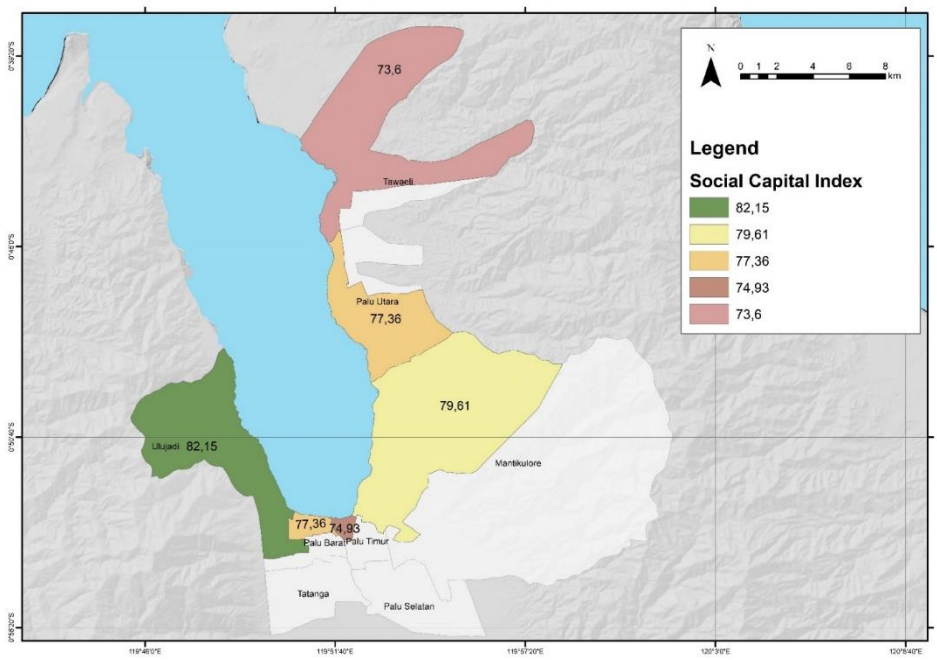

Figure 4. Social capital index in Palu City

Table 4. Assessment of the social capital factors of the people of Palu City

Variable			Index	Social Capital
Social Trust	X_1	Trust neighbors/residents	79%	High
	X_2	Trust residents in other areas	77%	Medium
	X_3	Trust in local government	75%	Medium
	X_4	Confident in the tsunami disaster information	68%	Low
	X_5	Trust government policies	76%	Medium
Social Norm	X_6	Has a value of solidarity between citizens	82%	High
	X_7	Comply with rules/policies	78%	Low
	X_8	Understand that there is a tsunami disaster	80%	High
	X_9	Understand the importance of mitigation efforts	81%	High
	X_{10}	Understand the importance of spatial planning efforts	77%	Medium
Social Networks	X_{11}	Network Always participate if there is an activity	77%	Medium
	X_{12}	Have many relatives	78%	Medium
	X_{13}	Willing to help relatives	80%	High

Based on the analysis results, the Ulujadi sub-district has outstanding social capital values from the six regions in Palu City (Figure 4). This is because the Ulujadi sub-district is in a suburban area with solid socio-cultural values. The community's trust in their neighbors is still powerful, and the value of respect for regional leaders such as the head of the village head and village officials is also high. The popularity of leaders does indeed participate in influencing preparedness and encouraging collective community action [10, 17]; even the relationship of trust between the community and leadership is one of the factors that most determine people's perceptions in the post-disaster recovery process [13].

In addition, the research results also show that the people in Ulujadi also have strong values of solidarity among themselves and their openness to activities related to the environment, including disasters. Therefore, the community in Ulujadi has a better social capital value than the other five sub-districts. Strong inter-community relationships are first responders that can save many lives when a disaster occurs [18]. Therefore, the social capital owned by the people of Palu City, if supported by policies from the government, will make it easier in the recovery process when faced with a disaster. The level of trust, norms that are owned, and social networks that have been built must be maintained and supported by the government to create community resilience.

3.3 Disaster mitigation strategies to realize the resilience of Palu City

In creating a disaster-resilient city, the social aspects of society are fundamental to consider. The analysis of the resilience in facing disasters shows that their resilience is quite good. However, West Palu and East Palu sub-districts must be a priority when a disaster occurs because they have a high level of vulnerability. The main factor in the high vulnerability of society in the city of Palu is population density. Therefore, it is necessary to equalize the distribution of places where people live so that they are not focused on just one area. From the study results, areas that can still be developed for residential development are Mantikulore and Tawaeli sub-districts.

Apart from that, for social capital, it is known that the coastal communities of the city of Palu have good social values. The main factor in the high level of community social

capital in facing disasters is the high community trust in the government and neighbors in the surrounding environment. Therefore, to mitigate the tsunami disaster in Palu, the government needs to take a more intensive approach to the community, especially in socializing disasters in Palu. Thus, community resilience in terms of vulnerability and social capital level must be a reference in disaster mitigation-based spatial planning in Palu City. Strategies that can be implemented include equalizing the distribution of residential areas in areas that can be developed and involving the community in every policy, especially in the preparation of spatial plans. Post-disaster development must prioritize the principle of inclusiveness following the main requirements regarding disaster policy and financing. The ESMF explains that the World Bank prioritizes inclusion aspects, especially for vulnerable communities. Therefore, as an area with a high potential for disaster and a high level of community vulnerability, the Palu city government's programs, both in development and planning actions, must prioritize community participation.

Overall, the analysis of community resilience found that the people of Palu City have a high level of vulnerability to disasters. However, on the other hand, there is potential that can be developed through community social capital, which, on average, is good at dealing with disasters. Therefore, the mitigation strategy must be implemented to integrate the programs and plans for the redevelopment of the city of Palu and prioritize the participation aspect in them. The following are three strategies that can be carried out based on the results of the analysis:

1. Prioritize the issue of inclusivity in the preparation of spatial plans;
2. Pay attention to vulnerable groups such as women, people with disabilities, as well as children, and elderly citizens;
3. Involving the community in spatial planning and post-disaster city development efforts;

According to a research by Sajjad and Chan [36], in their research on coastal area management in China, they explain that coastal area sustainability can be achieved if a community is created resilient to disasters. To achieve disaster resilience, knowing the existing disaster risk is necessary. With a resilient community, a city can achieve a level of resilience in facing disasters, and to create a resilient society, it is necessary to look at the social capital they possess. Suharti & Darusman [24], in their research regarding the strength of social capital in Sinjai, explained that with substantial social capital, it would be easy to encourage people to achieve common goals.

A report related to monitoring the provision of permanent housing explained that participatory principles must be the basis and reference in the redevelopment of the city of Palu [37]. Community participation in disaster mitigation efforts is vital, especially in increasing the city's resilience in facing the coast. Based on several previous studies, it was found that the high impact caused by the disaster in 2018 was felt not only physically but also socio-economically, such as farmers whose land was severely damaged, which had an impact on their lives [28, 29]. Based on the results of this research, the community's vulnerability and the social capital possessed by the people of Palu City can be used as a reference for the future development of Palu. Community resilience assessments can identify communities with sufficient resources (assets, knowledge, skills, resources, plans, and governance) for adaptation and development and communities needing assistance to develop them.

4. CONCLUSIONS

Assessment of the level of community vulnerability in Palu City using SoVI can provide an overview of future mitigation policies. Gender, with a population dominated by women, is a vulnerable variable when a disaster occurs, with an index value of 0.075. The lack of knowledge for independent mitigation prioritizing family safety is a factor that causes women to be vulnerable when faced with a tsunami. Apart from that, only one variable has low vulnerability, namely the number of family members, and the other variables are in the medium category. The areas with the highest level of vulnerability are West Palu and East Palu, which is in line with the impact of the disaster risk faced by these two regions during the previous tsunami disaster. Even

Based on the analysis results, the social capital level in Palu City is, on average, in good condition. Only one area has an excellent capital index, namely Ulujadi District, 82.15, with a community with a good level of trust, norms, and networks among communities. Its position on the outskirts of the city center creates a culture of people who still enjoy helping each other. Compared with East Palu, as an area in the city center, the social capital index is the lowest among other areas affected by the tsunami disaster. The results of the social capital assessment carried out quantitatively and spatially, aim to see areas with low levels of social capital so that they can become priorities when a tsunami occurs. Low social capital in a community will impact the recovery process for a long time.

As an area highly prone to disasters, assessing community vulnerability, including social capital, is essential to carry out as a form of mitigation effort in Palu City because it can increase community resilience and create a disaster-tolerant city. Vulnerability can be used as an illustration for city planning efforts and disaster mitigation strategies by looking at which areas need to be prioritized when a disaster occurs because people are vulnerable when faced with a disaster. Then, social capital as a form of preparedness and recovery process can be used as a reference in post-disaster strategies. Good social capital conditions show that people in the area can recover well without depending more on other parties outside the community.

Assessing community vulnerability and social capital levels can support mitigation strategy efforts, especially in reducing high disaster risks in Palu City. Community vulnerability can illustrate reducing the risks and impacts during a disaster, and social capital can be used as a post-disaster recovery. Suppose these two things are given further attention in programs and policies. In that case, they can support achieving a resilient Palu City, especially in the preparation of preventive mitigation and efforts for post-disaster preparedness and recovery. This research focuses on social conditions carried out quantitatively, so there will be further research that assesses in depth the social conditions of the people of Palu City, including economic conditions and physical aspects, to achieve more comprehensive city resilience.

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