Critical point on housing construction, resilience and family subjective welfare after disaster: Notes from the Lombok, Indonesia, earthquake sequence of July-August 2018

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\textbf{ABSTRACT}

Families in earthquake-prone areas are vulnerable, the earthquake affecting their quality of life. Earthquakes also disrupt the distribution of welfare, even the fulfillment of basic family needs. In this study, we analyze the critical points of earthquake relief for housing construction assistance following earthquake sequence in Lombok, Indonesia, including the changes and the influence of resilience, i.e., economic, social, and psychological, towards the subjective well-being of the family following the Lombok earthquake sequence of July-August 2018. Using primary data collection in Lombok through a family survey questionnaire at 6 months after the earthquake, we found that there was a sharp increase in poverty and a sharp decrease of income in the first month after the disaster, which returned gradually through to the sixth month. The same pattern occurs in family resilience in terms of economic, social, and psychological aspects. We also found that changes in family security, i.e., economic, social and psychological, have a negative effect on their subjective well-being. This study highlights three critical points in rebuilding disaster victims’ houses following $M_w$ 6.4-6.9 Lombok earthquake sequence of July–August 2018. First, the decision regarding the absence of temporary shelter. Second, the statement that housing assistance funds may be used for small family businesses. Third, the validity of the damaged housing data and the choice of house type.

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The United Nations Office for Disaster Risk Reduction (UNISDR) defines a disaster as a serious disruption to the functioning of a society that is suffering from losses and feels an impact on human, material, economic or environmental aspects which exceeds the ability of the affected community to use its own resources (UNISDR, 2009). Disasters are strongly related to disruption of life, damage and loss, adversity and deterioration, as well as a reduction in the welfare felt by both direct and indirect victims (Thornley et al. 2015; Prayag et al. 2020). As one of the causes of poverty, disasters related to earthquakes and subsequent disasters, such as tsunamis and landslides, have pushed 26 million people into poverty every year. They have also burdened the global economy by more than half a trillion dollars (World Bank 2016).

The impact of an earthquake includes physical and non-physical damage (Lindell and Prater 2003). Physical impacts include casualties such as death and injury, property damage, or both. Non-physical effects can be in the form of psychological disorders, stress and depression. Earthquakes disrupt life, cause damage, loss, and a deterioration in the quality of life, as well as a decrease in the welfare experienced by the victims. The magnitude of disruption to family welfare depends on the amount of...

Figure 1. Tectonic setting of this study. Red focal mechanisms are related to the 28 July 2018 $M_w$ 6.4, 5 August 2018 $M_w$ 6.9, and 19 August 2018 $M_w$ 6.9 Lombok earthquakes. The Lombok North fault is located in the western part of Lombok island, while the Sumbawa North fault is in the eastern part. Inset shows the global map, with red patches indicate the location of this study and the gray patches denote the topography.
damage to assets owned by them and the stability of family income. Some of the assets cannot be replaced and their loss can cause a reduction in consumption. The process of adaptation and post-earthquake recovery is also significantly related to how people access physical, social and cultural needs (Epstein et al. 2018).

During recent years, Indonesia has experienced an increasing number of earthquake occurrences, reaching up to more than 1000 events. These earthquakes have occurred along the subduction zone, crustal faults or sites of volcanic activity in Indonesia (Pratama et al. 2017; Gunawan et al. 2018; Gunawan et al. 2019; Gunawan and Widiyantoro 2019). One of the recent destructive earthquakes was the 28 July 2018 Mw 6.4, 5 August 2018 Mw 6.9, and 19 August 2018 Mw 6.9 Lombok earthquakes (Salman et al. 2020; Figure 1). Previous studies suggested that families in earthquake-prone areas are vulnerable and earthquakes affected the quality life of families and individuals (Sunarti 2019). Earthquakes also interfere with the achievement of welfare, even the fulfillment of basic family needs (Caruso and Miller 2015). Earthquake sequence in Lombok of July-August 2018 caused substantial damage and casualties. Northern Lombok was the worst affected region, with the largest number of victims: as many as 469 people died, 906 people were injured and 126,812 people were displaced. In addition to the 44,014 heavily damaged houses, a further 1,758 and 4,081 were categorized as moderately and slightly damaged, respectively.

To understand the resilience and family subjective welfare following the Lombok earthquake sequence of July-August 2018, this study has investigated the detailed mechanisms for handling earthquakes in relation to the smoothness and ease with which surviving families recovered and obtained the distributed welfare. We have also explored the critical point of the speed of rebuilding houses, analyzed the changes in resilience and subjective well-being of the disaster victims, and analyzed the effect of family resilience on the subjective well-being of the families of survivors.

2. Method

This study used a cross-sectional design, that is a single study conducted at a specific point in time, as opposed to the longitudinal study (Agresti and Finlay 1997). Primary data collection was carried out in the sixth month after the earthquake through a family survey questionnaire. Additional data concerning the first and fourth month after the disaster were collected retrospectively. We used interviews in the main data collection, where enumerators were adequately coached and selected from scholars who also understood local languages to avoid misinterpretation of the information collected. By using enumerators who also understood local languages, errors in data collection which come from miscommunication or misinterpretation of data and information will be minimized.

The study was carried out in Lombok, Indonesia (Figure 1). As samples, this research involved 60 families of earthquake victims which selected from 150 earthquake victims whose houses had been damaged and who lived in an ICS (Integrated Community Service) housing organized by the ACT (Quick Response). They were chosen purposively by considering the diversity of their livelihoods. ICS-ACT is a
service provided by a non-governmental organization; it builds temporary shelters on vacant fields surrounding buildings severely damaged due to earthquakes.

ICS-ACT also assisted in humanitarian needs and psychosocial recovery for up to the fourth month after the earthquake: that was, until December 2018. The data and information collected through interviews by enumerators who had been previously trained, using a family survey questionnaire which include the characteristics of the family; the stages and timing of the disaster handling and assistance in the recovery of housing construction; their resilience, i.e., the economic, social, psychological; and the subjective well-being of the family at the first, fourth and sixth month after the disaster. The research instruments were modifications of the instruments of family resilience and family welfare, characterized by good content validity and adequate reliability of 0.6 to 0.82 (Sunarti et al. 2018).

The estimated value of damage to each house was reached by multiplying the area of the house and the price per meter squared of building a similar house. The data and information obtained were subject to a descriptive analysis and inference through a correlation test and influence test. The SEM (structural equation modeling) test using PLS (partial least square) was conducted to analyze the influence of family characteristics, economic resilience, social resilience, and psychological resilience on subjective well-being.

### 3. Results and discussion

#### 3.1. Earthquake refugees, housing and post-earthquake management

The results of the calculation of damage and losses due to the earthquake in northern Lombok amounted to almost 10 trillion IDR (Indonesian Rupiah), which is equivalent to ~680 million USD (United States Dollar). The biggest impact was experienced by the settlement sector at 72.43% and then followed by the social sector at 13.32%. The data concerning the family characteristics of earthquake victims, categorized into age of wife, level of wife’s education, level of husband’s education, family dependents, and changes in residence since the disaster, are shown in Table 1. These results show the diversity of family characteristics, ranging from those who did not go to school to those with a degree, as well as the diversity of residence changes, from those who had lived in the ICS-ACT to those who had moved five times.

The results of the sequential handling of earthquake victims in Lombok recorded in the mass media are presented in Figure 2. The assessment of damage and losses as part of a post-earthquake needs assessment and as a basis for determining the amount of post-earthquake recovery funds need that is rehabilitation and

| No | Characteristics                          | Min. | Max. | Average | Unit |
|----|-----------------------------------------|------|------|---------|------|
| 1  | Wife’s age                              | 24   | 64   | 37.21   | Year |
| 2  | Wife’s education                        | 0    | 16   | 6.70    | Year |
| 3  | Husband’s education                     | 0    | 16   | 8.70    | Year |
| 4  | Family dependents                       | 2    | 7    | 4.00    | Year |
| 5  | Change of residence since disaster      | 1    | 5    | 2.00    | Times|
reconstruction, took place before the issuance of Presidential Instruction No. 5 of 2018, issued on 23 August 2018.

Comparing the speed of the handling of different earthquakes that occurred in Indonesia at different times, places and contexts is very challenging. The contributing factors include the differences in the magnitude of the disaster and the damage it causes, the field conditions, the extent of the dispersal of victims, the ease and affordability of access to the victims, the institutional capacity for regional disaster management, among other factors. The results of the analysis of the order and duration of disaster management suggest there is a critical point that determines the speed of rebuilding damaged houses, which is described as follows.

First, the President’s informal statement that the government will not build temporary shelters but will soon build permanent shelters is somehow different from the handling of earthquakes in other parts of Indonesia. This policy is different from the guidelines for implementing disaster management which mentioned in the regulation of the Indonesian National Board for Disaster Management no. 3 year 2018 article 18. In the case of Lombok, the government decided to build a simple instant healthy concept house (RISHA), but this was rejected by some residents. In fact, the data
collection on damaged houses needed to determine the amount of funds required for rehabilitation and reconstruction does take time. It also takes time to prepare for the disbursement and use of housing development assistance funds through the formation of Community Groups (POKMAS). POKMAS is a group of earthquake victims who are united by area of residence, to facilitate the management of assistance to rebuild houses damaged after the earthquake. With no temporary shelters available, the surviving families were living in the refugee camps. Meanwhile, the process of disbursing aid funds was felt to be very slow. As a result, the community held demonstrations from September 2018 to January 2019, demanding that the government immediately realize funds for the construction of permanent houses.

Second, the President of the Republic of Indonesia made a statement in front of the disaster victims, which was published in the newspapers, to the effect that damaged housing assistance funds from the government may be used for businesses if there was still money left over. The statement made the victims of damaged housing want aid funds disbursed individually because if not, they feared it would be used for businesses, even though the rules did not allow that. As a result, the mechanism of housing construction and the distribution of funds based on POKMAS was hampered, even delayed. Up to the sixth month after the earthquakes, there were still families who had not yet formed a POKMAS. Funds given by the government would be disbursed through a POKMAS account, according to the stages of the house construction work. At each stage of the disbursement of funds, POKMAS needed to include reports and evidence of the appropriate use of previous funds and plans for the use of funds to be received at a later stage.

Third, the data validity and choice of house type were determined by the government. The difference in the number of damaged houses and their categories, i.e., heavily, moderately, or slightly damaged, and between those that had been assessed by the assessment team and the results of verification in the field also prolonged the assistance process in housing construction. As a result, housing development assistance used ready-made funds, namely funds for emergency response handling, whereas, according to the rules, the construction of damaged houses should have used the post-earthquake funds, i.e., money for the reconstruction rehabilitation phases. As a result, the emergency response period was extended several times (from 25 August 2018 to the latest extension, up to 12 April 2019). This happened because if the emergency response funds, which already included the housing construction assistance funds, were not used during this period, then the disbursement of funds for housing would cease, as would ongoing home construction.

Finally, the choice of housing types determined by the government had to change due to the community’s rejection of the original type of houses proposed, ones that the people considered were less friendly and lacked understanding of the psychology of the earthquake victims, who were afraid of being hit by the buildings should there be further earthquakes. At the same time, the addition of houses using wood as a raw material was considered an opportunity for illegal logging. To avoid this, the type of wood to be used in the construction had to be checked and receive a pass from an authorized official. This extended the housing development assistance process.
3.2. Impact of housing conditions

Surviving families whose houses were damaged underwent various changes when moving residence. These changes were related to aspects of worship, marital relations, children, neighbors, extended family, children’s education, health, business/work, costs of work, and additional costs (Table 2). Four out of ten families stated that after the earthquake they stopped or changed jobs because of fear. As many as 48.3% of families stated that living in the ICS caused them to become more diligent in conducting routine prayers because of fear after the earthquake and that the location of the shelters was close to places of worship. Unfortunately, a limited water supply disturbed the convenience of worshipping at the ICS’s mini mosque, called the mushola.

When facing adverse life events, people tend to increase worship after a disaster by adhering to their religion through prayer and rationalizing the event through religion. Regarding timing, individuals reacted immediately to the earthquakes by strengthening their beliefs (Bentzen 2015). The increase in worship is related to the belief system, which is one of the key components of the resilience process. Likewise, religiosity is related to the psychological well-being of disaster victims (Walsh 2006).

In comparison with staying at home before the disaster, some of the changes felt by families living in the ICS are as follows. First, families felt closer to family members because the rooms were joined to those of other family members; however, this also caused quarrels. Families were more concerned about the children and felt quick to worry about them, especially as they would more often play outside because of the limited space in the shelter. People would gather and chat with their neighbors more often, and would find themselves meeting new and different neighbors. People paid more attention to each other and they received visits not only by other family members but also by the wider community.

Then, the children became more diligent about going to school, having previously been away from school because they were still afraid of aftershocks, their new schools were farther away, and their parents fell into arrears in the education fees due to family financial limitations. As they are closer to the PUSKESMAS (Public Health Service Center), families got free treatment. This was especially important since children or family members often become sick. A small number of families did increase their income because they had managed to open a small shop, called a warung, in the refugee area. For most families, their income decreased due to a change in employment or them quitting work because of fear of leaving the family alone after the earthquake. Third, for families who lived far from work, transportation and gasoline costs

Table 2. Impact of residence changes for surviving families.

| No | Impact criteria                  | %  |
|----|----------------------------------|----|
| 1  | Routine worship                  | 48.3|
| 2  | Marital relationship             | 18.3|
| 3  | Relationship with children       | 18.3|
| 4  | Relationship with neighbors      | 21.7|
| 5  | Relationship with extended family| 20.0|
| 6  | Child’s education                | 28.3|
| 7  | Health                           | 26.7|
| 8  | Business/work                    | 41.7|
| 9  | Costs to work increased          | 8.3 |
| 10 | Other additional costs           | 20.0|
increased. Conversely, household costs increased, with greater expenditure for food, children’s needs, health, the construction of houses and purchase of home furnishings, and contributions to joint activities. This led many families to take out loans. Up to six months after the disaster, 91.7% of families were still unable to reoccupy their homes, with only 8.3% of families taking up partial occupation. Nearly 71.6% of families said they did not know when their houses could be occupied again and they could move from a shelter. The rest roughly estimated that their houses could be occupied anywhere between a month to ten months into the future. The data shows that the houses occupied were categorized as 86.7% self-owned, 3.3% rented and 10% shared occupation with relatives. The average house area was 40 square meters. The level of damage to homes was 80% severe, 10% moderate, and 10% light. Families obtained damage values varying from IDR 22,500,000 (~1,500 USD) to IDR 375,000,000 (~25,500 USD), with an average damage value of IDR 102,083,333 (~6,950 USD). This value did not include the need to replace damaged furniture.

Figure 3. (a) Changes in family income and capita income before and after the 2018 Lombok earthquake. (b) Change in poverty of earthquake survivors. The dashed line indicates the time of the 2018 Lombok earthquake.
3.3. Resilience related to family economic conditions

For post-earthquake conditions, we found surviving families’ experiences changed with the decrease in their economic security. There was a decrease in family income and per capita income per month, between the first, fourth and sixth month after the earthquake. Some families had no income in the first and fourth months after the disaster, so all of their needs were met by assistance from outside parties. The changes in family income before and after the earthquake are shown in Figure 3a.

Before the earthquake, the number of families categorized as poor was 50%, similar to those categorized as wealthy, according to the data as recorded by Statistics Indonesia in 2018. At the first month, the number of poor families increased from 50% to 86.7% due to loss of work or not working because of fear. In the fourth month after the earthquake, the number of poor families fell to 66.7% because families had begun to venture back to work and to look for new livelihoods. In the sixth month after the earthquake, the number of poor families decreased to 53.3%, still slightly higher than before the disaster (Figure 3b).

Poor people in developing countries affected by disasters increasingly suffer because they do not have sufficient access to markets and insurance and, if they have, their informal risk-coping strategies are broken (Skoufias 2003). In developing countries, poorer people also suffer more from natural disasters because they do not have sufficient access to credit markets nor disaster insurance. In addition, when all the members of a group are affected, their informal risk-coping strategies break down.

Changes in the indicators of family economic resilience are presented in Table 3. The assessment was carried out on 10 indicators of economic resilience at three comparable times. These were the first month after the disaster compared to before the disaster, the fourth month compared to the first month, and the sixth month compared to the fourth month. The data shows that there are two groups of indicators of family economic resilience. The first is group of indicators are those that are easier to obtain through assistance from various parties, such as food, clothing, access to health, and access to education. There is a percentage of families who even state that they can meet these basic needs the same as or better than before the disaster. The second group of indicators include income, savings, assets, and shelter which remain

Table 3. Change in family economic resilience in three post-earthquake time comparisons: (A) First month compared to before the disaster; (B) Fourth month compared to the first month, (C) Sixth month compared to the fourth month.

| No | Indicators               | (A) | (B) | (C) |
|----|--------------------------|-----|-----|-----|
|    |                          | −1  | 0   | 1   | −1  | 0   | 1   | −1  | 0   | 1   |
| 1  | Family income            | 63.3% | 33.4% | 3.3% | 13.3% | 43.4% | 43.3% | 8.3% | 65.1% | 26.6% |
| 2  | Savings                  | 53.5% | 39.8% | 6.7% | 26.7% | 56.6% | 16.7% | 26.7% | 51.6% | 21.7% |
| 3  | Assets                   | 46.7% | 51.6% | 1.7% | 11.7% | 81.6% | 6.7% | 6.7% | 80.0% | 13.3% |
| 4  | Debt                     | 21.7% | 73.3% | 5.0% | 15.0% | 75.0% | 10.0% | 10.0% | 73.3% | 16.7% |
| 5  | Accounts Receivable      | 8.3% | 88.4% | 3.3% | 6.7% | 93.3% | 0.0% | 5.0% | 93.3% | 1.7% |
| 6  | Food consumed            | 36.7% | 38.3% | 25.0% | 8.3% | 41.7% | 50.0% | 21.7% | 41.6% | 36.7% |
| 7  | Clothes                  | 43.3% | 35.0% | 21.7% | 11.7% | 40.0% | 48.3% | 13.3% | 58.4% | 28.3% |
| 8  | Health access            | 25.0% | 43.3% | 31.7% | 8.3% | 51.7% | 40.0% | 10.0% | 56.7% | 33.3% |
| 9  | Access to children’s education | 55.0% | 38.3% | 6.7% | 11.7% | 45.0% | 43.3% | 3.3% | 55.0% | 41.7% |
| 10 | Residence                | 78.3% | 16.7% | 5.0% | 16.7% | 28.3% | 55.0% | 5.0% | 58.3% | 36.7% |

(note: −1 = decrease; 0 = equal; 1 = increase)
more or less the same as before the disaster, but are more difficult to increase. This result suggests that the middle and lower classes are more vulnerable in environmental, social and economic terms (Brouwer et al. 2007). In terms of the environment, the lower middle class generally lives in disaster-prone areas with low-quality building materials so that they are more vulnerable to wind, floods and earthquake shocks (Fothergill and Peek 2004). From an economic perspective, the middle to lower classes generally do not have savings or insurance that can help them survive in post-earthquake crisis situations (Hallegatte et al. 2016).

3.4. Resilience related to family social conditions

Table 4 shows the changes and the variety of ways in which families showed their social resilience indicators in the three post-earthquake time comparisons. There was an increase, a similarity, and a decrease in terms of providing assistance in terms of money, labor and goods, prioritizing the public interest, and receiving assistance in terms of money, materials, and social support. Various actions regarding social security were related to various socio-economic conditions, the need to recover dependent on the range of damage and losses suffered, and the diverse needs of each family of earthquake victims.

A sizable percentage of families claimed they experienced an increase in caring and giving priority to the public interest, and an increase in donating and providing assistance to those in need. There tends to be an increase in the altruistic nature of people in disaster-affected communities. A study of Japanese earthquake victims found that many more Japanese people have become more altruistic since the earthquake, even in the most affected areas. One possible interpretation of these results is that an increase in altruism due to the earthquake spurred people to give to charity which, in turn, increased their happiness (Ishino et al. 2012).

3.5. Resilience related to family psychology

The average score of 10 indicators of resilience on family psychology in the sixth month after the earthquake is presented in Figure 4a. The data shows two groups of indicators of resilience on family psychology, along with their scores. The first, negative indicators have a high score. They are perceived sadness (9.05), perceived slump
(8.40), anxiety (8.75), fear (9), uncertainty (8.23), and helplessness (8.13). The second set of positive indicators have low levels. They are security (3.43), comfort of life (3.13), future expectations (3.50), and confident the conditions will improve (3.43).
The data in Figure 4b shows that, when comparing with previous levels, at the fourth month compared to the first month and the sixth month compared to the fourth month after the disaster, there was a significant decrease in sadness, deterioration, anxiety, fear, and uncertainty felt by the families. At the sixth month, less than 6.7% still felt an increase in helplessness and 3.3% felt an increase in uncertainty of those who felt an increase in the psychological resilience indicator. Conversely, there...
was a high increase in terms of security, life comfort, future expectations, and feeling confident that conditions would improve. The increase was related to the condition whereby the victim returned to working as before.

Getting people back to work can increase their sense of perceived control and so make a positive contribution to psychosocial recovery (Hobfoll et al. 2007). The value of employment adds to the need for organizational resilience, meaning business continuity planning can have important social and economic implications for psychosocial recovery (Mooney et al. 2011). A comparison of the changes in psychological resilience indicators at the fourth month compared to the first month and the sixth month compared to the fourth month is presented in Figure 4b.

3.6. Subjective Well-Being at the sixth month post-earthquake

The subjective welfare of earthquake surviving families was measured by the level of their satisfaction with their basic needs being met, the disaster management, and the role of the disaster management stakeholder institutions. The subjective welfare indicator scores are presented in Figure 4c. In the sixth month after the earthquake, the highest satisfaction score was for the temporary living environment and donor institutions that provided assistance (67%), while the lowest was with the government (50%) and for the material or assets that were owned (49.4%). The satisfaction scores for other welfare indicators were in the range of 50% to 67%. The results of the analysis of changes in subjective well-being show that all the families expressed lower satisfaction for all indicators of family well-being, at the first month and at the fourth month post-earthquake.

The results of the elaboration of the order of priority needs at six months after the earthquake showed differences in needs felt by the wife and by the husband. The three main order of needs felt by the wife were food (58.5%), clothing (30%), and health (25%), while the husbands were more focused on work (40%), home (33.3%), and living expenses (26.7%). Husbands needed work, a home, and living expenses more, while wives paid greater attention to meeting basic needs in the form of food and clothing. The husband was more concerned with the survival of the family by him working and finding the living expenses, based on his role as the head of the family and being the breadwinner (instrumental function), while the wife prioritised based on fulfilling the role of being a housewife and implementing expressive functions.

3.7. Factors affecting the subjective well-being of the surviving families

The results of the SEM analysis using PLS showed that there was an influence on the changes in family security, i.e., economic, social, and psychological, and family characteristics concerning subjective well-being in the sixth month after the earthquake, as presented in Figure 5. The indicators of each variable that met the analysis requirements are:

- Subjective well-being that meets the test requirements, including satisfaction with income (SW1); number of clothes owned (SW2); meeting the educational needs of children (SW3); residential facilities (SW4); and living environment (SW5)
- Family characteristics, including marital status, number of dependents, income per capita
- Economic resilience, including debt (ER1), access to health (ER2), access to children’s education (ER3)
- Social resilience, including prioritizing the public interest (SR1), providing goods to those in need (SR2), contributing money (SR3) and contributing energy (SR4) for common needs, receiving material assistance (SR5), and receiving social support (SR6)
- Psychological resilience, including anxiety (PR1), uncertainty (PR2), helplessness (PR3)

The PLS model produced an adjusted R square of 0.489, which shows the family subjective well-being in the sixth month after the earthquake was affected by 48.9% of the changes in family resilience, i.e., economic, social, psychological, and family characteristics. Thus, the other 51.1% was influenced by other factors, confirming the complexity of the factors that affect satisfaction. The coefficient values of the direct effect of characteristics and family resilience on subjective family welfare are presented in Table 5. These results show that family characteristics have an equivalent effect on family economic resilience, while social resilience and psychological resilience each bear half of the effect of economic resilience on the subjective well-being of the family.

The fewer family dependents, the greater the income per capita, the higher the subjective well-being: the greater the improvement of family resilience, the lower the subjective welfare. This shows that the improvement of family resilience in the sixth month after the disaster is still far from satisfying expectations and situations. In fact, with the end of humanitarian assistance from donor agencies bringing new concerns to families when fulfilling family functions, especially in meeting their basic needs. For a comparison, victims of the 2004 $Mw$ 9.2 Sumatra-Andaman earthquake include families who have not been able to carry out their family functions optimally a year and a half after the disaster. The situation is made worse if the disaster also causes damage to the assets that are the victims’ source of livelihood. In addition, middle to low-income families generally have low education and skill levels so that alternative livelihood strategies available to them are very limited (Hallegatte et al. 2016; SAMHSA 2017). It should also be noted that the recovery of victims in the aftermath of a disaster is significantly related to how people access physical, social and cultural needs (Epstein et al. 2018).

Table 5. Direct effects of decomposition of the features of family resilience in terms of subjective family welfare.

| Path of direct effect | Path coefficient | T statistic | P value |
|----------------------|------------------|------------|--------|
| Family characteristic effect on subjective wellbeing | 0.424 | 3.432 | 0.001 |
| Economic resilience effect on subjective wellbeing | −0.409 | 3.957 | 0.000 |
| Social resilience effect on subjective wellbeing | −0.223 | 1.977 | 0.049 |
| Psychological resilience effect on subjective wellbeing | −0.294 | 2.474 | 0.014 |
The latent variables studied accounted for almost 50% of subjective well-being, so the latent variables were influential and should receive attention as an important factor in subjective family well-being. The results of this study suggest that welfare is an output of family security. The subjective well-being of the family as satisfaction with the fulfillment of basic needs and family development needs is the result of the family’s ability to manage resources and problems or family pressures, carry out their functions and fulfill their duties. The findings of this study provide recommendations for disaster management stakeholders to be alert to the effectiveness and speed of assistance in rebuilding damaged houses, and to invest in building family resilience. Officials must not make changes to rules suddenly, given their impact on the effectiveness and acceleration of the recovery of the welfare of disaster victims.

4. Conclusion

We have explored the critical point of the speed of rebuilding houses, analyzed the changes in resilience and subjective well-being of the disaster victims, and analyzed the effect of family resilience on the subjective well-being of the families of survivors following the Lombok earthquake sequence of July-August 2018. We found that the critical points concerning the rebuilding of damaged houses are related to changes in the policy on eliminating temporary shelters, the government statement that housing assistance funds could be used for business purposes, and the difference in the numbers of damaged houses gathered from the post-earthquake needs assessment and the results of verification. We found a sharp decrease in family and per capita income between before the disaster and one month after the earthquake, which then further decreased. Even in the sixth month after the earthquake, family income had not returned to pre-earthquake levels. Likewise, with poverty, there was a sharp increase between before the disaster and the first month after the earthquake. Poverty then increased by 36.7%, before falling back, so that in the sixth month after the earthquake it had returned close to levels before the earthquake. We also found that in the sixth month after the earthquake, there was an average score of more than 75% satisfaction on all items of family welfare except satisfaction with income, assets owned, and the role of government. The highest satisfaction score was on the neighborhood and family external environment at the ICS, and the lowest satisfaction score was on the material/assets owned. Finally, the PLS results show that family characteristics have a positive effect on the subjective well-being of families, while physical-economic, social and psychological resilience have a negative effect on well-being. The model helps to explain the 48.9% of subjective well-being of families. The PLS results mean that, although there was an improvement in family resilience in the span up to the sixth month after the disaster, it did not given satisfaction to the family. Increased hopes for a better life, despite improvements in family resilience, this did not dispel dissatisfaction with family fulfillment.

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**Data availability statement**

Data available on request from the authors.

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