

## Research article

# Tsunami Resettlement Program and Survivor Satisfaction Fifteen Years After the 2004 Tsunami in Aceh, Indonesia

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Fifteen years after the Aceh tsunami, the housing for the tsunami survivors has undergone material changes and shifts in ownership. This study analyzed the survivors' satisfaction with the housing aid and examined the decision-making mechanisms that occurred during the rehabilitation-reconstruction period for housing construction in the relocation and non-relocation areas. This study used qualitative-descriptive methods. Interviews and focus group discussions were used to collect the data and respondents were selected by purposive sampling. The findings indicated that the decision-making in the relocation and non-relocation areas for housing reconstruction was partially top-down. There were four aspects of this decision-making: (1) choice of location; (2) quality and materials of the house; (3) house construction; and (4) supervision of house construction. However, the survivors in both the relocation and non-relocation areas were only involved in the house construction and supervision of house construction elements. The survivors' satisfaction criteria differed between those in the relocation vs. non-relocation areas. The satisfaction of survivors in the relocation areas was based on the distance and quality of the houses and access to public facilities. For the non-relocation area survivors, house quality was the only significant factor.

**Keywords:** life satisfaction, survivors' satisfaction, housing, relocation, decision-making

## 1. Introduction

The 2004 Indian Ocean tsunami caused for about 1 million people in Aceh to resettle their houses temporarily and, some, permanently. About 100,000 unit of houses were then reconstructed for the tsunami survivors [1]. There were two scenarios for the resettlement programs, one was to relocate the houses at different places (presumably safer from its original locations) and another one was to construct the houses at the same places where they were before the tsunami [2]. Two main approaches were introduced at the earlier phase of the recovery process. The first approach was to include survivor voices during the reconstruction of the houses (bottom-up approach) and the second approach was without fully considering the survivors' demands on the

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houses. Regardless of the approaches and the scenarios of the resettlement programs, the efforts have eventually successful to reconstruct almost all planned houses at the end of the official recovery process in 2009 coordinated by Aceh-Nias Rehabilitation and Reconstruction Agency (BRR Aceh-Nias) [3].

The housing and the settlements for disaster victims became one of the important problems during the rehabilitation and reconstruction period [4]. As one of the primary needs, the problem requires immediate real action for the victims. On the other hand, decision makers address the challenges of land availability, disaster mitigation needs, and donor settlement during the rehabilitation and reconstruction period [3]. The two sides above have been the background for the rehabilitation and reconstruction of housing after the 2004 Aceh tsunami.

Allocating the post-disaster housing is also one of the government's tasks as mandated in Law No. 24 of 2007, regarding to Disaster Management [5]. The government is one of the main and responsible organizers for the implementation of post-disaster reconstruction activities, including the housing sector. Therefore, the reconstruction of post-disaster housing for Aceh tsunami survivors is one of the large-scale reconstructions and must be rushed at that time. This is also one of the backgrounds for the formation of the Aceh-Nias Rehabilitation and Reconstruction Agency (BRR Aceh-Nias) which has a mandate to build a better Aceh [6].

BRR Aceh-Nias, with the concept of Build Back Better (BBB), aims to construct the areas affected by the 2004 tsunami, especially in the housing sector [3]. The shelters built at the original location (non-relocation) and the new location (relocation) become a reference to build the house for the disaster survivors [7]. In this case, the procurement of livable houses for the survivors was considered to be one of the indicators of BRR's success in the BBB concept. After 16 years of the Aceh tsunami, BBB's goals, especially in the housing sector, is supposed to be been seen and achieved. The level of satisfaction of disaster survivors in the housing sector can be one of the indicators to achieve the goal and to see how far the survivors are able to know what they want.

The 2004 Indian Ocean tsunami (IOT) has just entered its 15 years in 2019 [8]. A long-term tsunami disaster recovery is rare and long-term record of the process are not widely available. During the decision-making process of the house reconstruction, large uncertainties were arisen. Some of them were due to lack of solid information regarding land ownership, family identification, and lack of leadership. Nonetheless, a decision should be made as demands for immediate housing of survivors were apparently high. This forced some insufficient and lack of participation during the process. After one

decade and a half, the situation of the houses changed. Some of them have sold the house to other people. Some were abandoned and the other ones are rented.

This is in line with the results of the preliminary observations the researchers conducted in February 2019 in four villages include Neuheun and Labuy, as the relocation areas, and Mulia and Lamdingin, as the non-relocation areas. There are only a few aid houses that are intended for survivors in both relocation and non-relocation areas. Most of the relief houses suffered extensive damage and some were decided to be rebuilt. In addition, there are several houses that are not inhabited and most of the houses are rented out by their owners. This phenomenon occurs in both relocation and non-relocation areas. According to several people who live in this area, this condition is triggered by several factors such as the dissatisfaction with the condition of the house, the location, and the economic factors.

This fact leads the researcher to find out how the survivors are satisfied with the housing conditions they live in and what survivors' reasons to prefer selling, renting or abandoning the aid house. Thus, the main objective of this study is to analyze the survivors' satisfaction in both relocation and non-relocation areas with respect to the houses they occupy after 16 years of the tsunami. In addition, during this post-tsunami period, the comparison between the survivors' satisfaction in the relocation and non-relocation areas is still rarely studied. Besides, knowing how the decision-making process for the housing reconstruction process is also the reason why this research is conducted. The decision-making process needs to be taken into account to see whether the decisions made during that period affect the satisfaction of tsunami survivors with the houses built after 16 years of the tsunami. The results of this study will be insightful for enriching scientific literature studies related to the aid-housing satisfaction, decision-making during the rehabilitation and reconstruction of housing, and post-disaster recovery for relocation and non-relocation survivors in the housing sector.

Based on the background described, it formulates the research problems include how the decision-making mechanism for housing during the rehabilitation and reconstruction period is and how the differences in the satisfaction of tsunami survivors with the condition of the houses built during rehabilitation and reconstruction after 16 years of the tsunami.

One's ability to compare and assess their current situation with the state they consider an ideal standard can be defined as life satisfaction, based on cognitive assessment [9]. According to the quality-of-life approach, life satisfaction also refers to a subjective evaluation of how many needs, goals, and objectives, and the values we have been

fulfilled in life. Thus, the perceived gap between what we have and what we want is a determinant of a person's level of life satisfaction or dissatisfaction [10]. This sums up that life satisfaction is defined as an individual's cognitive ability to assess and compare their current situation with the ideal and expected standard by the individual.

The level of satisfaction with housing can generally be acknowledged by the individual's response to the house they live in [11]. Individual satisfaction with the house occupied is influenced by the quality of the house both in terms of material and infrastructure and facilities [11]. In addition, it is known that in some cases, satisfaction with houses can also be influenced by decision making on housing reconstruction. The housing that does not involve community participation tends to be disliked and causes community dissatisfaction [12,13,14].

The least factor that promotes people's satisfaction with the house they live in is 'well designed and well built' house [12]. In particular, 'well designed and well built' refer to the good quality of the house materials such as steel reinforcement, zinc roof sheets, wood for door frames, window frames, window panels, acceptable cement mixture, best-quality bricks, good quality roof trusses, good columns and proper finishing [12,15].

Water and sanitation facilities as part of the house is often considered important as an indicator of satisfaction with housing [12,15]. The housing is also expected to have a bathroom, which is a basic comfort especially for women who are vulnerable to experience sexual harassment if the kind of bathroom is a shared-use one or a public bath [12]. In addition, the housing environment must be able to provide the vocation of skills development to improve the quality of local community livelihoods and to involve the community in the reconstruction process in purpose of living enhancement [12].

Decision-making is the theory that explains an individual's ability to evaluate the gains/losses and benefits of various actions taken and to choose the best alternative regarding to the logical and rational considerations [16]. During the reconstruction period, decision making is needed to facilitate achieving goals to be achieved. The decision-making process needs to be carried out with in-depth integrated management in order to avoid and reduce the impact of losses that will be obtained [17]. In addition, it is essential to conceive the factors involved in decision making in order to find out to what extent these factors affect the decision making and the satisfaction of the individuals involved in it [18]. The decision-making generally has 3 types namely; top-down decision making, bottom-up decision making and combination decision making.

## 2. Method

## 2.1. Types of Research

This study uses descriptive qualitative method. This research method aims to provide an overview and conclusion of a phenomenon with an informative presentation to produce various and meaningful conclusion. The phenomenon identified in this study is obtained from the assessment of each party regarding to its relationship with the related instrument. The phenomena are then classified until the concept of interrelatedness is compiled into the research [19].

## 2.2. Study Area

This research takes place in two areas. The first area is the non-relocation area, located in Banda Aceh City Regency and the second area is in Aceh Besar Regency, which becomes the relocation area. Mulia and Lamingin are selected to be the non-relocation area (Figure 1). These two villages are adjacent to each other and are both located in Kuta Alam District [20]. Meanwhile, in the relocation area (Figure 2), the research is carried out in Labuy and Neuhun which are in Aceh Besar district and are located in adjoining sub-districts, namely Mesjid Raya District and Baitussalam District [21].

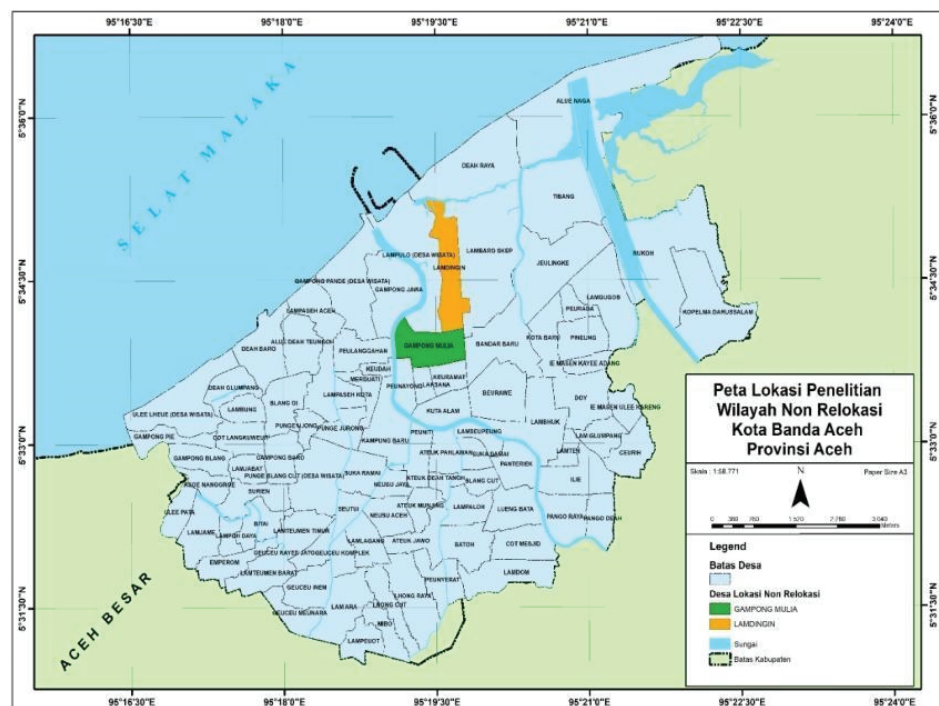


Figure 1: Map of Location's Research Non Relocation Area.

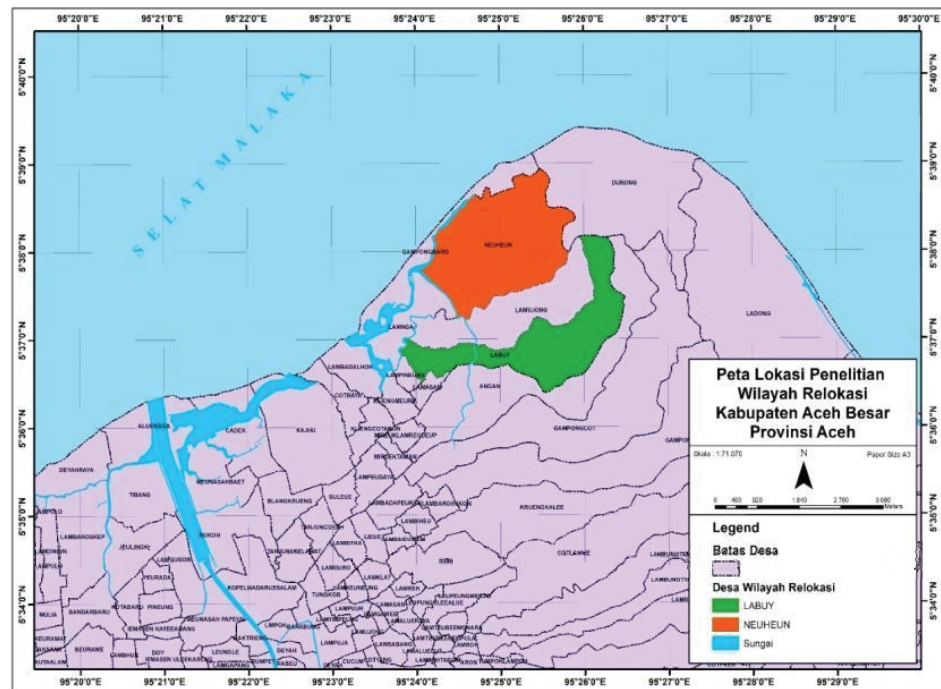


Figure 2: Map of Location Research Relocation Area.

### 2.3. Data Collection

In this study, there are two sources of data include primary data and secondary data. Primary data are obtained from the observations, direct interviews, and Focus Group Discussions (FGD). While secondary data is obtained through reference books, journals, and other sources related to research. Then, the interview and FGD data that relate to the research problems are collected. The questions asked in the interview are divided into two parts. The first one is the informant description and the second one is list of questions about the house condition the informant live in. While in the FGD there are two main questions that will be discussed together. In-depth interviews and FGD are used in this study in order to enrich the data. This method is also considered very appropriate to explore deeper information without making the informant feel awkward and careless in answering the questions as the atmosphere created is also more relaxed either with or without using an interview guide [22]. The data of interviews, FGD, and related journals are then analyzed by using the data reduction and categorization. Next, triangulation method is used to validate the data.

The interview data is acquired from 10 research informants, which are selected by using purposive sampling technique. These informants are chosen based on four specific criteria. First, the informant is 36 years old or above. Second, the informant is the tsunami survivor. Third, the informant notices the decision-making process during

the reconstruction period. Last, the informant settles in one of the villages where the study is conducted. The number of informants in this study is considered sufficient as the information obtained is saturated.

There are four indicators of decision-making used in this study, they are site selection, quality and house materials, house construction, and house construction supervision in order to find out how and to what extent the community are involved.

To find out the survivors' satisfaction with the housing when the house was first received and after 16 years of the tsunami, an assessment is done for 10 houses in each location. The aspects assessed include the general condition of housing, facilities and infrastructure such as the type of house, quality and materials, drainage channels, access to public services, electricity, PDAM water supply, bathrooms, and safe zones. From these 10 houses, the result is summarized into a table by displaying the general conditions in each house. Then this house condition is categorized into good and bad condition. This category is determined by comparing the results from the total number of houses assessed. 50% is the standard rate that determine both category (good or bad) of the house condition. Presuming that the house condition is 50% good or more, the house is categorized good. On the other hand, the house is categorized bad if its condition is less than 50%. The general results are then compared with the survivors' house in the relocation area and the non-relocation area. Also, the researcher compares the survivors' satisfaction with the housing after the tsunami and after 16 years of the tsunami. In this study, there are several research instruments used, namely interviews and documentation. We employed structural in-depth interviews over 10 key informants for each of the surveyed resettlement location. We analyzed the data using qualitative analysis method by triangulating responses from the informants, comparing our observations, and reviewing related documents on resettlement programs.

### 3. Result and Discussion

#### 3.1. Decision-making Mechanisms During Housing Reconstruction

In this research, the decision-making mechanism during the reconstruction period in the relocation and non-relocation areas is both a top-down approach where the approach is carried out from top to bottom. This method of decision-making is intended to minimize the time and efficiency of the reconstruction period so that it can be completed in a shorter time. Even though they are both top-down, it turns out that in the decision-making process, there is community involvement in several parts. This involvement

causes decision-making not to be completely top-down. According to the survivors, during the reconstruction period, the option is not given to the community either to vote or voice their wishes and opinions regarding the reconstruction process. However, in practice, there are several villages in both relocation and non-relocation areas that involve the community in monitoring the reconstruction process and work that has been designed by the government and related stakeholders (see Table 1).

The top-down decision-making during the reconstruction period is considered inappropriate by the survivors in the relocation houses (Neuhun and Labuy). The government's decision to relocate without asking the opinion of the survivors is something that should not be done since there is the discrepancy between the government decision and the survivors' needs. Hence, the inhabited or sold house is considered reasonable. There should be community involvement in the entire decision-making cycle regarding the housing reconstruction. This involvement can be undertaken by selecting the caretaker in a community to be involved in the deliberation or announcement. This caretaker is expected to be the successor of news feeder into a community. The survivors consider that their involvement can live up their satisfaction with the housing and build the trust to the government. In addition, the results obtained are also maximized with the involvement of the community in the decision-making mechanism [23,14]. In contrast, during the reconstruction period, the survivors in the non-relocation areas (Mulia and Lamdingin) state that the government should be the quick decision maker. The survivors argued that, during the post-tsunami period, the atmosphere and conditions were still inconvenient. Thus, involving the community would only slow down the reconstruction process. Although the decision is top-down, the survivors in the reconstruction process are also involved in the process of supervising and monitoring the house construction. The survivors consider this as an embodiment of government concern and deliberation with the survivors. This involvement also causes the satisfaction of the people in the relocation area with the housing they occupy. Here, the partly-top-down decision-making mechanisms are considered the right thing to carry out.

Source :

### **3.2. The Satisfaction of Relocation and Non-Relocation Survivors with the Housing Occupied after 16 Years of the Tsunami**

The satisfaction of survivors in relocation and non-relocation area is found to be different. To the survivors in the relocation areas, the factors such as the distance, quality of houses and access to public facilities are the main reasons of their satisfaction with



TABLE 1: The Mechanism for the Survivors Involvement in Decision-Making Related to the Reconstruction of Assisted Housing in Relocation and Non-relocation Areas.

| No | Name of village | Relocation/ non-relocation | Decision-making Mechanism   |                             |                           |                                |          |      |
|----|-----------------|----------------------------|-----------------------------|-----------------------------|---------------------------|--------------------------------|----------|------|
|    |                 |                            | Location selection          | Quality and house materials | House constructions       | House construction supervision | Top down |      |
|    |                 |                            |                             |                             |                           |                                | Partly   | Full |
| 1  | Mulia           | Non-Relocation             | The community is uninvolved | The community is uninvolved | The community is involved | The community is uninvolved    | 25%      | -    |
| 2  | Lamdingin       | Non-Relocation             | The community is uninvolved | The community is uninvolved | The community is involved | The community is involved      | 50%      | -    |
| 3  | Neuhun          | Relocation                 | The community is uninvolved | The community is uninvolved | The community is involved | The community is involved      | 50%      | -    |
| 4  | Labuy           | Relocation                 | The community is uninvolved | The community is uninvolved | The community is involved | The community is uninvolved    | 25%      | -    |

the housing they live in. Meanwhile, the house quality is the only factor that becomes a significant reason for the survivor’ satisfaction in the non-relocation areas.

The difference in survivor satisfaction after 15 years of the tsunami can be summarized in Table 2 and Table 3 by comparing the satisfaction when the survivors first received the aid housing. This satisfaction is seen through the several factors such as the type of the house, the house materials quality, and the drainage channels in the housing complex, and the access services to public facilities (schools, hospitals, places of worship, markets, and health facilities). Another factor includes electricity, PDAM water lines, toilets and bathrooms, the locations in safe zones (safe and comfortable) also boost up survivors’ satisfaction with the housing they occupy.

### 3.2.1. The Satisfaction of Relocation and Non-Relocation Survivors towards Housing Conditions after Tsunami

In this study, the satisfaction of tsunami survivors in the four villages on the housing conditions after the tsunami can be seen from several factors such as type of houses, drainage system, and public facilities, and utilities (tab-water, electricity, and toilet). We compiled the results in the following parts.

In general, the type of aid housing provided to survivors is type 36 which basically has 2 bedrooms, 1 room for the kitchen area, and 1 bathroom. This house is reasonably feasible for the survivors to live in. In each of relocation or non-relocation area, the houses given and received by the survivors are in livable conditions. The survivors are satisfied with the housing assistance and regard it as a blessing and greatest motivation to continue living a normal life. The quality and materials of the houses provided in each region are different as it depends on the house donor. However, both people in the relocation and non-relocation areas are satisfied with the materials received.

In each settlement, drainage canals are usually built as a place for water disposal both from the flow of rainwater and the household waste. In addition, drainage canals are useful for avoiding an unclean environment due to the influence of stagnant water which can cause disease.

The drainage canal built in Lamdingin (non-relocated area) functions well and makes the community satisfied because the household waste is disposed properly and optimally. Conversely, the survivors in Mulia (non-relocated area) assert their dissatisfaction due to the absence of the drainage canal construction. Thus, the household waste is still limited to utilize the groundwater absorption, which is generally located behind the house. In addition, the houses are often almost submerged in water every time the rainy season comes since the soil is no longer able to absorb the excessive water and no canal to circulate it to other places.

The survivors in the relocation area (Neuheun and Labuy) tend to be satisfied with the drainage canal. The canal is well-functioned and very helpful to dispose water to a larger place. Accordingly, the village is less flooded in the rainy season. In addition, the drainage in this area serves as a waterway if at any time the flood comes.

Access to public services is a supporting facility that is usually built in a residential area such as roads, also other facilities in terms of medical, educational, religious, and shopping. After tsunami occurred, numerous facilities were damaged or destroyed until nothing remained. On account of this, during the rehabilitation and reconstruction, the government rebuilt the facilities in both non-relocation and relocation areas.

In the non-relocation areas (Lamdingin and Mulia), the facilities are available in each area/village except the market. For the market access, people usually shop at the Peunayong market. The survivors in the relocation area are satisfied with the facilities rebuilt by the government in such a fast time.

In contrast, the survivors in non-relocation areas are dissatisfied with the public facilities built by the government for various reasons, include:

1. The housing is far from the city center and the road access is still rudimental. The distance from housing to the highway is  $\pm 3$  KM.
2. A small number of school facilities are distant from the housing. In 2005, there were 2 elementary schools (SD) built in the Neuheun area and only 1 school was operating. Meanwhile the buildings of Junior High School (SMP) and Senior High School (SMA) are used by the schools that were not affected by the tsunami. The survivors had to travel  $\pm 4$  KM from the housing. This causes difficulties for the survivors since people still did not have their own vehicles at that moment.
3. The medical facility built at that time was a public health center which was close to the housing location. However, the survivors preferred to go to the hospitals even though the distance is far because of insufficient equipment and staff in the public health center. According to survivors, this action is taken to avoid delays in handling medical services.
4. The market built is located between Neuhun and Labuy. The sellers and buyer's capacity are sufficient and in accordance with the number of survivors and communities in the area. However, the market was not used because of the long-distance and the unstable economy of the community. At that time, many survivors relied on the peddlers or small stores located in housing complexes to fulfill their daily needs.

After the rehabilitation and reconstruction, the electricity in Aceh became stable as before. This brings satisfaction for both of the relocation and non-relocation survivors. Furthermore, water was something to be grateful for the survivors in the non-relocation area. Even though most of the wells have been submerged with the tsunami, the clean water supply can still be used with the help of the PDAM. However, for the survivors in the relocation area, the need for clean water is constrained. To get the water, people had to use queue number and wait for a long time. 2 jerrican of water are supplied for 1 family. The survivors complain that they need PDAM to facilitate their daily water intake.

The survivors' satisfaction both in non-relocation and relocation areas were equally dissatisfied as the bathrooms are located outside the house and built without a barrier. This raises a discomfort and worries particularly for women. The survivors expect the bathrooms are built inside the house/room.

The safe zone is perceived differently by the survivors who are in non-relocation and relocation areas. The survivors in non-relocation areas are satisfied with the location they live in. Even though the area is close to the ocean, their comfort and security remain the same since the environment and community, the place of their livelihoods

are not changed. Unlike the survivors in relocation area, the dissatisfaction with the location they live in is risen because of the survivors' vulnerability towards the changes in livelihoods. The majority of the relocated area survivors work as fishermen. The condition of the long distance from the place of work forces people to look for effective solutions such as switching jobs. In addition, dissatisfaction is also triggered by locations prone to other disasters such as floods and landslides.

### **3.2.2. The Satisfaction of Relocation and Non-relocation Survivors with the Housing Conditions After 16 Years of the Tsunami**

The satisfaction of tsunami survivors in the four villages on housing conditions after 16 years of the tsunami can be seen from several factors, similar to the factors described in the above sub-section. Here, we elaborate them further.

After 16 years of the tsunami, the satisfaction of survivors living in non-relocated areas with the type of house did not change. The type 36 is still considered a satisfactory for a family. In spite of an increase in the number of family members in several houses, this did not cause inequality and dissatisfaction with the condition of the houses settled.

On the other hand, after 16 years of tsunami, the survivors in the relocation area are dissatisfied with the house size they occupied. This dissatisfaction is triggered by the increase in the number of family members, lack of land and an economy shortage. In this way, some houses sometimes are occupied by more than one family. The houses located in a hilly area also complicates the survivors to build a room addition to their houses.

In recent years, there has been a change in the survivors' satisfaction in the non-relocated areas. The survivors at Lamdingin are still satisfied with the quality and materials used in the house construction. Whereas the dissatisfaction with the quality and house materials was occurred to the survivors in Mulia. This problem is happened by reason of the bad quality of house materials. The community appoints that the house with the same donor as in other areas had the poor-quality house materials. This was revealed after some parts of the house were damaged after several years of being occupied.

The same thing happened to the survivors in the two relocation areas. After several years settling the house, the dissatisfaction was triggered because the survivors thought the quality and house materials used were not good.

The survivors' satisfaction after 16 years of the tsunami still remains the same. Dissatisfaction was only found in the survivors in the non-relocation areas (Mulia village).

While the other non-relocated areas and relocation areas are still satisfied with the drainage canal.

The dissatisfaction of the survivors in Mulia was triggered by the absence of a drainage canal construction. The construction near the canal which was started in early 2008 is only limited to the canal located on the highway. Meanwhile, the canal around the residents' housing have not been built until now. This also causes the houses submerged in water when the rainy season comes. In addition, the absence of canals causes the environment dirty and trigger the vulnerability of high spread of disease in every year, especially malaria and dengue fever.

The survivors in the non-relocation areas express their satisfaction as the government has worked optimally in providing the access to public services. This public service access, which previously rebuilt since 2005, has been increasingly developed and completed.

On the contrary, the survivors in the relocation area are reported to be dissatisfied with the available public services access. This reason is due to several things, including;

1. Although the road conditions are better than before, the housing conditions located in hilly areas have the roads been repaired several times due to the severe damage. This damage is occurred in consequence of the land subsidence.
2. Some of the school facilities built have been abandoned in view of the fact that the schools have the lack of educator and students. Most of the survivors prefer to send their children to schools they consider qualified than the schools built in the housing.
3. After 16 years of the tsunami, the medical facilities built were rarely visited by the survivors due to the lack of services and medical workers. The medical facilities in the area are still inadequate and only active on weekdays. This is considered less effective for people who need an immediate health services on days outside of working hours. In addition, the availability of private clinics near the residential areas does not bring much impact on the survivors with an average lower-middle economy.
4. The market built and located between Neuhun and Labuy is not used anymore (Figure 3). In 2007, the local community operated the market. However, due to the long distance and the lack of buyers and goods suppliers, the sellers suffer a lot of losses. Consequently, the market is closed and neglected up till now.



**Figure 3:** The Market.

After 16 years of the tsunami, there is no difference in the survivors' satisfaction both in the relocation and non-relocation areas related to the available electricity. The survivors' satisfaction in the non-relocated areas regarding to PDAM or the availability of clean water still remains the same after 16 years of the tsunami. This satisfaction occurred due to the availability and the sufficiency of clean water and the good management process.

In reverse, the relocation area survivors are dissatisfied with the access of clean water. One of the objections faced is there is still a water allotment for the survivors, which make the amount of water needed for households is unfulfilled. In addition, the water that flows into this area is still frequently stagnate. Many residents in the relocation area finally decided to dig a borehole regardless to the fact that the water they got was often brackish. Despite the fact that PDAM is available in this area, the water supply is still insufficient. This problem provokes the survivors' dissatisfaction.

The survivors' satisfaction with toilets and bathrooms has changed significantly. Survivors are now satisfied as the bathroom has been renovated and built inside the house. A bathroom partition or wall is set in the bathroom by either using iron sheet or bricks material. This finally eases the survivors worry because of the safe and comfortable bathroom.

The survivors in the non-relocation areas have the constant satisfaction with the housing location. In spite of the fact that the population is increased and dense every year, the survivors are still satisfied with the location they currently live.

Contrastingly, even though 16 years of tsunami has passed, the dissatisfaction with the house location is still experienced by the survivors in the non-relocation areas. The vulnerability to other hazards such as floods and landslides that often occurred when the rainy season comes is the main reason why the survivors stay dissatisfied. In addition, the remote location disrupts the survivors' livelihood stability, particularly for those survivors with the lower middle-class economy.

TABLE 2: The state of satisfaction' relocation and the non-relocation survivors with the tsunami aid housing in the post-tsunami period.

| No | Name of Village | Relocation/ Non-relocation | The Satisfaction towards the Housing after Tsunami |                      |                |                       |             |                   |                   |                |
|----|-----------------|----------------------------|--|----------------------|----------------|-----------------------|-------------|-------------------|-------------------|----------------|
|    |                 |                            | Type of House                                      | Quality and Material | Drainage Canal | Public Service Access | Electricity | PDAM water supply | Toilet & Bathroom | Safe Zone      |
| 1  | Mulia           | Non-Relocation             | Satisfied  | Satisfied            | Less satisfied | Satisfied             | Satisfied   | Satisfied         | Less satisfied    | Satisfied      |
| 2  | Lamdingin       | Non-Relocation             | Satisfied  | Satisfied            | Satisfied      | Satisfied             | Satisfied   | Satisfied         | Less satisfied    | Satisfied      |
| 3  | Neuheun         | Relocation                 | Satisfied  | Satisfied            | Satisfied      | Less satisfied        | Satisfied   | Less satisfied    | Less satisfied    | Less satisfied |
| 4  | Labuy           | Relocation                 | Satisfied  | Satisfied            | Satisfied      | Less satisfied        | Satisfied   | Less satisfied    | Less satisfied    | Less satisfied |

TABLE 3: The state of satisfaction' relocation and non-relocation survivors with tsunami aid housing after 16 years of the tsunami.

| No | Name of village | Relocation/ Non-relocation | The Satisfaction towards the Housing after 16 Years of Tsunami |                       |                   |                       |             |                   |                   |                   |
|----|-----------------|----------------------------|--|-----------------------|-------------------|-----------------------|-------------|-------------------|-------------------|-------------------|
|    |                 |                            | Type of House  | Quality and materials | Drainage Canal    | Public Access Service | Electricity | PDAM water supply | Toilet & Bathroom | Safe Zone         |
| 1  | Mulia           | Non-Relocation             | Satisfied  | Less Dissatisfied     | Less Dissatisfied | Satisfied             | Satisfied   | Satisfied         | Satisfied         | Satisfied         |
| 2  | Lamdingin       | Non-Relocation             | Satisfied  | Less Dissatisfied     | Satisfied         | Satisfied             | Satisfied   | Satisfied         | Satisfied         | Satisfied         |
| 3  | Neuheun         | Relocation                 | Less Dissatisfied  | Less Dissatisfied     | Satisfied         | Less Dissatisfied     | Satisfied   | Less Dissatisfied | Satisfied         | Less Dissatisfied |
| 4  | Labuy           | Relocation                 | Less Dissatisfied  | Less Dissatisfied     | Satisfied         | Less Dissatisfied     | Satisfied   | Less Dissatisfied | Satisfied         | Satisfied         |

From the Table 2 and 3, it describes that after 16 years of the Aceh tsunami, the survivors in the non-relocation areas are more satisfied with the houses they lived in compared to the survivors in relocation areas. This result is obtained by combining and calculating the number of satisfaction and dissatisfaction according to the eight indicators in each region. The relocation area which consists of Neuheun and Labuy

are shown to have more dissatisfaction than the satisfaction with the comparison value 9:7. Nevertheless, in the non-relocation area include Mulia and Lamdingin, the total of comparison is 2:14. This prescribes that the level of survivors' satisfactions outnumbers the survivors' dissatisfaction level.

Aside from the factors described, there are other factors such as the need for the additional room. This is due to the increase in the number of family members as the house size allocated by the donors is considered too small to accommodate all of the members. As a consequence, the house renovation and the house sale are the actions taken by the survivors after a few years of living.

A few survivors who received housing assistance chose to sell and renovate the house in a few months by the reason of the house poor quality. The factors that trigger the survivors to sell the house are the access, the house size, the quality, and the distance from their workplace. This reason is generally a form of survivors' dissatisfaction with the housing they settle.

## 4. Conclusion

The decision-making mechanism related to the reconstruction of tsunami housing in relocation and relocation areas are both partly top-down. From the four aspects, (location selection, house quality and materials, house construction, and house construction supervision) both survivors in the relocation and non-relocation areas were only involved in two aspects include the house construction and the house construction supervision. The survivors' dissatisfaction in the relocation area with respect to the housing they occupied is influenced by the decision-making mechanisms during the reconstruction period. The survivors consider the community involvement in decision-making such as site selection to avoid the mismatches is highly required for the survivors. After 15 years of the Aceh tsunami, it is found that there are different survivors' satisfactions with the housing in the relocation and non-relocation areas. In general, survivors in non-relocated areas are more satisfied with the houses they live in. This is due to several factors such as housing materials, the access and location which is located in the urban areas. The opposite happened to survivors in the relocation areas. The factors of survivors' dissatisfaction are emerged due to the inadequate access to public facilities, house building materials, distant location from the urban areas, and the long distances from the workplace. Besides, the house location that are prone to flood and landslides is also the factor that make the survivor dissatisfied.



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