

Long-Term Outcomes of Post-Disaster Housing: The Fate of Aid Houses in Aceh, Indonesia 18 years after the Indian Ocean Earthquake and Tsunami

Fieldwork Report

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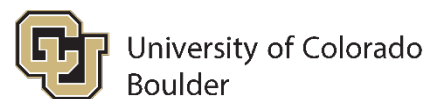


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Executive Summary

Following the Indian Ocean Earthquake and Tsunami in 2004, over 130,000 permanent and semi-permanent houses were reconstructed in Aceh, Indonesia, spending USD\$1.6 billion of aid (Masyrafah & McKeon, 2008). Today, only about half of the houses constructed under these programs are occupied; others have been abandoned. Besides housing, aid organizations provided livelihood assistance programs, costing around USD\$394 million (Daly et al., 2020). Although livelihoods are a core pillar of settlements, little is known about the long-term influence of these programs on the beneficiaries.

Research is needed to investigate the long-term outcomes of post-disaster housing reconstruction programs, including what caused people to continue to occupy or leave their housing. This research studies what forms of housing and livelihood assistance and contextual conditions led to (a) individual housing occupation or abandonment and (b) village-level outcomes, such as conditions of infrastructure and population characteristics. In addition, I will investigate factors that led to long-term beneficiary satisfaction.

I am conducting this research in Aceh, Indonesia, over fifteen years after reconstruction programs completed. I selected nine villages with high, middle, and low rate of occupancy by original residents across three municipalities: Banda Aceh, Aceh Besar, and Aceh Jaya. These villages were heavily affected by the disaster but have varying contextual factors, such as distance to the capital of province and from the sea.

Across the nine villages, interviews and focus groups are to be conducted with approximately 110 beneficiaries of post-tsunami housing and livelihoods programs, with 55 beneficiaries who remain in their original housing and 55 who have moved away. Interviews with remaining beneficiaries have completed. Those with relocated beneficiaries are still ongoing due to difficulties in tracing potential participants. Additional interviews are also underway with 30 decision makers, comprised of government officials and leaders of aid organizations, and 10 experts in post-disaster shelter and settlements, including researchers and practitioners who worked in Aceh during the reconstruction.

While data collection is ongoing and close to completion, analysis has begun and will include statistical and qualitative analysis. Statistical analysis will analyze numerical findings such as occupancy rates and distance to urban centers. For qualitative analysis, I will code all interviews,

focus group recordings, and observations in QSR Nvivo to find common patterns and trends based on relative frequency of response.

At this stage of analysis, some preliminary findings have emerged. First, reasons for leaving or staying in housing generally fall into three categories: person-based, such as being orphaned survivors and being a homeowner; place-based, including the ending of the 30-year-long armed conflict and trauma; and social-capital-based, such as a lack of perceived social safety from losing male family members and a sense of security from being close to family. Further, challenges were noted in sustaining livelihoods, including management-based issues, such as difficulty in managing joint work among beneficiaries; knowledge-based issues, such as incomplete knowledge transfer, infrastructure-based problems such as lack of transportation and waste management systems.

A few recommendations were made for different types of actors based on the preliminary findings. These include for humanitarian organization to contextualize assistance based on beneficiary's condition such as being orphans, for humanitarian and development actors to integrate development planning into humanitarian assistance, and for humanitarian engineers to answer the challenge of designing housing that are modular and movable but which are based on local construction practices and locally available material.

Introduction

In just four years after the Indian Ocean Earthquake and Tsunami in 2004, over 130,000 houses were rebuilt in Aceh, Indonesia. Over \$1.6 billion was spent in aid funding for housing, which involved around 120 local and international organizations delivering approximately 270 different housing reconstruction programs with various assistance modalities (Masyrafah & McKeon, 2008). The rapid nature of the construction caused a massive exploitation of natural resources that may have worsened or created new environmental hazards in the province. Today, almost 20 years post-disaster, only about half of the houses constructed under these programs are occupied; others have been abandoned, dismantled, deteriorated, or destroyed (Prasad, 2019). However, there have been few systematic studies that investigate the long-term outcomes of the housing reconstruction programs or reasoning for these outcomes and occupancy or abandonment of the housing.

In addition, prior studies have linked the success of post-disaster housing with livelihood recovery (Nabong et al., 2021), indicating both are needed for holistic long-term recovery. In post-tsunami Aceh, multiple organizations provided livelihood assistance programs, totaling approximately \$394 Million (Daly et al., 2020). Assistance modalities employed included cash transfer, provision of equipment, and vocational training. Although livelihoods are a core pillar of settlements for those affected by crises (Nabong et al., 2021), little is known about the long-term influence of these programs on the beneficiaries that they assisted. Further, we know little about the

integration of livelihoods recovery programs with housing reconstruction programs, and how the characteristics and dynamics between these programs influence the long-term recovery of beneficiaries.

Research Questions

At this stage of the research, I try to answer the following questions:

1. What forms of housing and livelihood assistance were implemented in the sample communities?
2. What are the reasons for leaving or staying in the permanent/semi-permanent aid houses among the beneficiaries?
3. What is the satisfaction rate with the permanent/semi-permanent houses among the beneficiaries?
4. What are the challenges in maintaining the houses and sustaining livelihoods in the sample communities?

Upon completion of data analysis, I aim to address the following questions:

1. What forms of assistance and contextual conditions caused beneficiaries to stay or leave?
2. What forms of assistance and contextual conditions lead to long-term beneficiary satisfaction?
3. What forms of assistance and contextual factors lead to the current long-term village recovery outcomes?

Methods

This research is conducted in Aceh, Indonesia, 18 years after the disaster and over fifteen years after housing reconstruction programs were completed. The fieldwork took place from June to October of 2022. Further fieldwork is planned for July to August 2023.

Since housing and livelihood programs were frequently administered at the village level, I selected nine villages across one municipality and two regencies—Banda Aceh, Aceh Besar, and Aceh Jaya—that were heavily affected by the disaster, but have varying contextual factors, such as distance to the capital of province and availability of infrastructure.

I selected villages that had varied occupancy rates. Three villages with high, middle, and low rates of occupancy by original residents, excluding renters and second-hand owners, were chosen from each municipality. Measuring the rate of occupancy by original owners was difficult, because eight of the nine villages did not keep a record of housing occupation and ownership. I therefore estimated village occupancy level by the accounts from officials at the district offices and the village heads and the prevalence of abandoned houses based on our observations. Based upon

this, I categorized villages with an occupancy rate of below 50% as low, 51% to 70% as middle, and above 71% as high. The selected villages are presented in Table 1.

Within each village, I conducted interviews, focus groups, and observations of housing and community infrastructure. Specifically, I selected six residents who remained and six who relocated in each village for interviews. The six remaining residents and their current and former village heads also participated in a focus group.

Table 1. Sample Villages
**Descriptions to follow under Context section*

Municipality/Regency	Village	Distance from Capital of Province	Estimated Occupancy Level	Forms of Housing Assistance*	Types of Houses*
Banda Aceh	Alue Naga	4 km	Low	Housing assistance B	Type E & F
	Alue Deah Teungoh	2 km	Middle	Housing assistance B	Type A & B
	Gampong Pande	1 km	High	Housing assistance B	Type A
Aceh Besar	Jantang	45 km	Low	Housing assistance A	Type C
	Neuheun	20 km	Middle	Housing assistance C	Type D
	Lam Teungoh	12 km	High	Housing assistance B	Type A
Aceh Jaya	Sawang	140 km	Low	Housing assistance B	Type A
	Kuta Tuha	160 km	Middle	Housing assistance B	Type A
	Keutapang	150 km	High	Housing assistance B	Type D

Across the nine villages, interviews and focus groups were conducted with approximately 110 beneficiaries of post-tsunami housing and livelihoods programs, including 55 beneficiaries who remained in their original housing and 55 who relocated.

I also conducted interviews with decision-makers from reconstruction and livelihood programs. Currently, interviews are underway with 30 decision makers, comprised of government officials and leaders of aid organizations, and 10 experts in post-disaster shelter and settlements, including researchers and practitioners who worked in Aceh during the reconstruction.

Data collection for this research is close to completion. Analysis has just begun and will include statistical analysis to analyze occupancy rates and distance to urban centers, and qualitative analysis using coding software to find common patterns and trends based upon relative frequency of response based upon programmatic, beneficiary, and contextual differences, as well as fuzzy set Qualitative Comparative Analysis to determine common conditions and pathways to outcomes across the nine villages.

Context

To set a background for the findings and recommendations, in this section I provide an overview of the historical context of the Acehnese traditional housing, the types of houses, and forms of housing and livelihood assistance. These lists include observational findings only from the nine sample villages where my data is collected.

Historical Context

Local values and traditions are important factors in designing and building post-disaster housing. It is thus important to introduce some key values in traditional Acehnese housing. Below is a picture of a traditional Acehnese house.



Figure 1. A traditional Acehnese house

A traditional Acehnese house is built entirely of wood, without using nails. Components of the house are connected by tying with ropes woven from palm fibers or carving holes and shafts on the timber to make joints. This enables the house to be easily dismantled and reassembled elsewhere, consistent with the traditional Acehnese view of a house as a movable property. The house is raised up to sixteen feet to mitigate flood risk and prevent animal attack. The lightweight material and non-rigid joints make the house more resistant to earthquakes.

Besides a safety measure, the open space under the house plays an important role in Acehnese daily life. Its usage includes storage for rice and firewood, workshops (sometimes being the only place for income generation), and a space for resting and socializing.

Types of house

Across the nine villages, I found four types of houses. They are as follows:

1. *Type A: Single-story confined masonry*



Figure 2. Single story confined masonry house

A confined masonry house is usually built with bricks laid in between lean concrete poles. Both the walls and the poles are load bearing. This type of house was found in all nine villages, although built by different organizations and with various designs. The house in the picture was found in Lamteungoh Village, Aceh Besar. It had two bedrooms, a living room, a bathroom outside, and ceramic tile flooring. It did not have a kitchen. In Gampong Pande, Banda Aceh, the houses had one bedroom, a living room, a kitchen, a bathroom outside, and concrete flooring. Confined masonry houses in seven other villages resembled those in Lamteungoh village.

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2. *Type B: Single story with timber posts and walls*



Figure 3. Single story confined masonry house

Houses of this type were found in Alue Deah Teungoh Village, Banda Aceh. The house had two bedrooms, a living room, a bathroom outside, concrete flooring, and no kitchen. Beneficiaries recalled that a team of foreign workers assembled each of their houses just within five hours.

3. *Type C: Single story with Kalsiboard (fiber cement) walls*



Figure 4. Single story with Kalsiboard walls house

This type of house was found in Jantang Village, Aceh Besar. This house had two bedrooms, a living room, a kitchen, a bathroom inside of the house, and concrete flooring. The bottom one meter of the walls was made of bricks that were confined by timber poles.

4. *Type D: Two story with reinforced concrete posts, concrete walls, and timber flooring*



Figure 5. Elevated house with reinforced concrete posts, concrete walls, and timber flooring

Most houses in Keutapang Village in Aceh Jaya are of this type. They had two bedrooms, a living room, a bathroom downstairs, and no kitchen. The first story of these houses was originally open and empty, resembling the traditional Acehese house. But now beneficiaries have installed walls and flooring and use the extra covered space as their living room. However, this addition to the house was mostly done without proper engineering, increasing the houses' vulnerability to earthquakes.

5. *Type E: Elevated single story with prefab concrete panel walls*

This type was found in Alue Naga Village in Banda Aceh. It had two bedrooms, a living room, a bathroom, concrete flooring, and no kitchen. The village is situated on a major



Figure 6. Elevated single story with prefab concrete panel walls house

estuary with high risk of coastal flood, hence the slight elevation of the houses. The walls are made of prefabricated concrete panels with wire mesh reinforcement.

6. Type F: Single story with prefab concrete panel walls



Figure 7. Single story with prefab concrete panel walls house

This house was found in the parts of Alue Naga Village with slightly higher elevation. It is similar to type 5 houses but with an underground foundation.

Forms of housing assistance

Housing assistance in the nine sample villages was provided in three forms, described here:

1. *Housing assistance A: Beneficiary-led with cash assistance*

This form of assistance was found in Jantang Village, Aceh Besar. Beneficiaries hired workers, procured some of the materials, such as timber and sand, and supervised the house construction. The donor organization provided some materials and equipment and paid beneficiaries in two installments.

2. *Housing assistance B: Contractor-led with beneficiary and community oversight*
Seven of the nine villages received this form of housing assistance, but with varying levels of beneficiary participation. In some villages, beneficiaries determined the location and orientation of the house, then the contractors built the house with occasional oversight from the beneficiaries. In other villages, beneficiaries could make changes to the house design and terminate the construction if they were not satisfied with the contractor's work.
3. *Housing assistance C: Fully contractor-led*
This form of assistance was found in Neuheun Village. Here, the village leaders and aid organizations determined where to build the houses, then contractors built them. The beneficiaries were assigned a house after they were built, without ability to make any choices. Some houses in this village also did not come with the security of ownership.

Forms of livelihood assistance

All three of the following forms of livelihood assistance were reported in all nine sample villages.

1. *Cash assistance in tranches*
This type of assistance was mostly given to each household to rebuild their pre-disaster business or start a new one. Common business forms include small grocery shops and farming.
2. *Vocational training*
This was mostly provided for women. Trainings provided include cooking, sewing, and making handicrafts.
3. *Cash and equipment*
Cash assistance and equipment, such as land mowers and boats, were often provided for each village to be used in turns by residents and for groups of beneficiaries.

Preliminary Findings

While data analysis has just begun, some valuable observational findings have surfaced, as discussed below. These findings are characterized as reasons for leaving or staying in the provided housing, satisfaction and challenges with post-disaster programming, and recommendations. At this stage, I am not yet able to address the three main research questions in full. I expect to complete data analysis in a few months and publish the results in at least three journal papers that I am to submit for review by 2024.

Reasons for leaving or staying in beneficiary housing

Respondents indicated reasons for staying or leaving their housing. Below, I outline reasons mentioned by more than one beneficiary for leaving, followed by the reasons beneficiaries provided for remaining in the housing. These reasons generally fall into three categories: person-, place-, and social-capital-based.

- **Reasons for leaving housing:**

- *Person-based*

- *Being orphan survivors*

This reason was mentioned by three of eighteen relocated beneficiaries who were orphans, at least five village heads, and one district official. Too young to live by themselves, survivors who became orphaned often went to live with their relatives or became adopted by other families away from their original village. However, houses were still built for them in the village at the same time as other houses, with the expectation that they would return when they are older. In the end, they rarely returned. All three orphans mentioned that they did not return because their houses had not been maintained, and thus were deteriorated and no longer fit for dwelling. Two of them mentioned that they felt socially divorced from the original community and they lacked the skills to survive in the original environment, especially fishing, an essential skill in rural coastal villages. I am recruiting more orphan survivors for interviews to capture more of their experiences and housing outcomes.

- *Place-based*

- *Ending of armed conflict*

During the three-decade-long war between the Acehese insurgency movement and the Indonesian government, many residents from the inland areas fled to the coast where it was relatively safer. Shortly after the tsunami, a peace agreement was reached, and inland areas became safer and increasingly favored over the tsunami-prone coasts. The residents then decided to return to their old villages, leaving their tsunami aid houses to rot. The village head of Sawang pointed out a few such cases in his village, but I only managed to trace one beneficiary who left his aid house to return to his old village.

- *Beneficiary not living in the village since before the disaster*

At least two of the eighteen relocated beneficiaries, who had left the village before the disaster but whose remaining family did not survive, received a house in the original village. In the first few years, they visited the house occasionally and kept it up. But overtime, it became too costly to maintain the additional house and they were forced to abandon or sell it at a low price. This reason was also noted in the interview with the village head of Alue Deah Teungoh, Banda Aceh.

- *Trauma*

While all eighteen of the relocated beneficiaries confessed to having trauma with the tsunami to a varying extent, at least three of them pointed out trauma as the main reason for leaving. One beneficiary from Banda Aceh recalled having a panic attack each time she felt a tremor and was forced to move away from her coastal village and live in rental housing in a district far away from the sea.

- *Long distance from work*

As economic opportunities became scarce in their village, beneficiaries had to find jobs in other districts or municipalities. Moving closer to work is among the most common

reasons of relocation and housing abandonment. At least seven of the relocated beneficiaries interviewed so far mentioned this reason.

- *Social-capital-based*

- *Lack of perceived social safety due to loss of male family members*

At least two of eighteen relocated female beneficiaries lost their husbands and children in the disaster and felt it was unsafe for them to continue to reside in the community. One of the two beneficiaries dismantled her Type C house in Jantang Village and used some of the materials to build a second house at her new location in Banda Aceh and rented it out. The other moved away from Gampong Pande, her husband's original village, after losing him in the disaster. However, she received a house at the site of her former house. The aid house was abandoned for several years as she was too traumatized and scared to even visit the village. She eventually fixed the house and rented it out.

- *Decreasing sense of community*

Original residents in the villages near or in Banda Aceh, which is the capital of the province, felt a decrease in social cohesion as more renters and secondhand owners moved in. Thus, they ended up moving away to be closer to friends or family. The houses they left were mostly rented out. This finding was noted from the interview with one district official in Banda Aceh.

In Kuta Tuha, a rural village in Aceh Jaya, the village head described that as more houses in the neighborhood went empty, social and economic life died away and remaining beneficiaries ended up moving away too, abandoning their houses. My enumerators tried to trace some of the beneficiaries who left the village but were not successful.

- ***Reasons for remaining in housing***

- *Person-based*

- *Security of home ownership*

Some beneficiaries who used to rent or live with their in-laws placed a great value in owning a house. They wanted to stay despite the shortcomings of the house, such as remote location and poor utility services.

- *Not being able to afford to move*

Some beneficiaries expressed desires to move to areas with less disaster risk or better economic opportunities, but they were forced to stay because they could not afford to rent or buy a property in such areas.

- *Place-based*

- *Life skills suitable primarily for original environment*

In at least two of the nine village-level focus groups, attended entirely by beneficiaries with informal livelihoods such as fishing and farming, participants mentioned having life skills and knowledge best suited for their original environment as one reason that they rebuilt and stayed in their village.

- *Social-capital-based*
 - *Wanting to stay close to family*

When asked why they decided to stay in their aid housing, at least fifteen of 51 remaining beneficiaries interviewed answered because they wanted to stay close to their family. While they admitted that their houses were deteriorating and they were facing financial struggles, being close to relatives gave them some sense of security.

Next, I looked at satisfaction and challenges specifically with housing assistance provided.

Satisfaction with housing

Figure 1 compares satisfaction with housing between beneficiaries who remained in their aid house and those who left, based on the data collected so far.

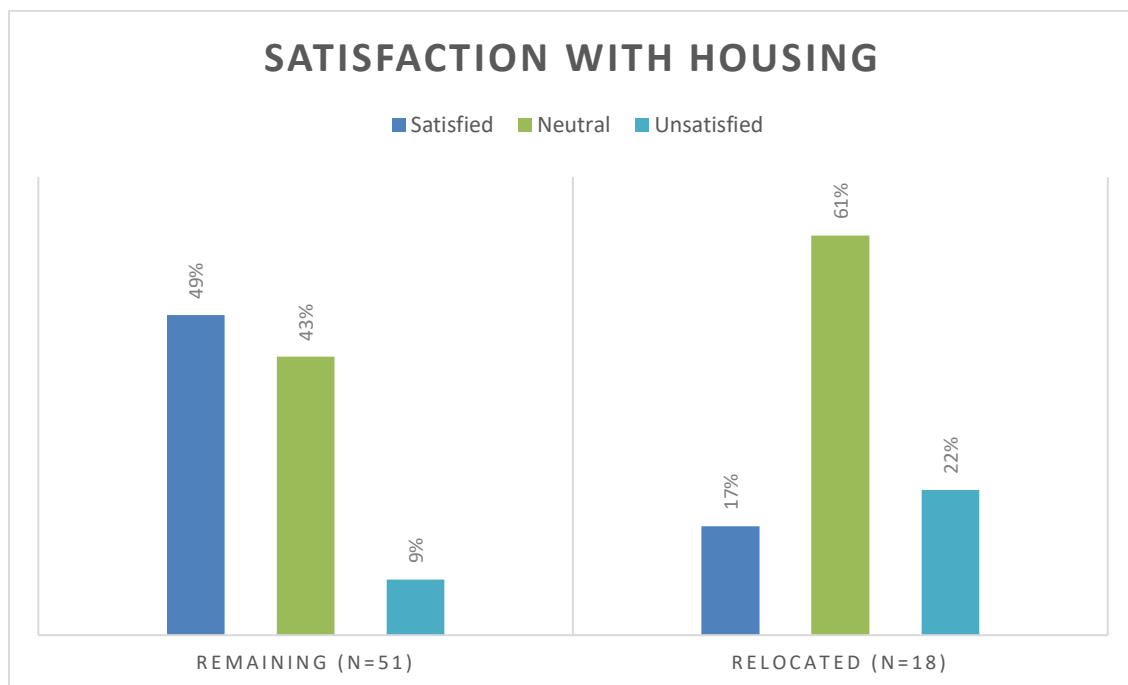


Figure 8. Satisfaction with housing among remaining and relocated beneficiaries

The survey I conducted showed that many more people are satisfied with their housing among the beneficiaries who stayed compared to those who left, but many beneficiaries in both groups were neutral. Further, although only a few of all participating beneficiaries said that they were not satisfied with their housing, the majority of respondents expressed multiple complaints about their house in other parts of the survey. Common complaints include low durability of materials, high cost of maintenance, and lack of utility services, particularly plumbing. The fact that Indonesian people tend to communicate implicitly adds more nuance to this finding. At this stage, satisfaction or dissatisfaction with housing seems instead to have a complex relationship to beneficiaries' decision to stay or leave. I expect to understand this relationship better as I move forward with the data analysis.

Challenges and complaints with housing

- ***Unfulfilled promise***

Beneficiaries in the village of Jantang and Alue Deah Teungoh who received houses with impermanent materials recalled being offered two options of housing aid at the beginning; one was to immediately receive short-term housing made from impermanent materials and later receive a permanent concrete house from one donor; the other is to wait for several months and receive a permanent concrete house from another donor. Weary of living in tents, the beneficiaries chose the first option. However, the donor who provided the impermanent housing never returned to replace the houses after over 15 years.

- ***Challenges in maintaining and repairing the house***

91% of the remaining beneficiaries said their house needed repair and maintenance, but only 70% of these had made some repairs, 30% had not made any repairs. Furthermore, all of them mentioned cost as the main obstacle to performing the much-needed repairs. Many also mentioned scarcity of replacement materials as an obstacle.

Challenges in sustaining livelihoods

Three categories of challenges were identified during interviews and focus groups, namely management-, knowledge-, and infrastructure-based. Below are some challenges in sustaining livelihoods captured during interviews:

- ***Management-based***

- Beneficiaries who received livelihood assistance jointly with other beneficiaries, instead of individually, faced challenges in managing costs, dividing tasks, and distributing profits, often leading to feuds and ending of the joint work. This challenge was noted across all interviews and focus groups in all nine villages.

- ***Knowledge-based***

- Beneficiaries received incomplete knowledge transfer during the assistance program, so they could not continue the work after the end of the assistance. In Lam Teungoh village for example, beneficiaries received assistance to establish tomato farms. In the program, they received tomato seedlings to plant and raise, but were not informed of where to source the seedlings or how to propagate them properly. Consequently, the beneficiaries stopped planting tomatoes soon after the program ended.

- ***Infrastructure-based***

- Lack of public transportation prevented some beneficiaries from being able to sell their products (i.e., fish, crops) at the market.
- Lack of public infrastructure, particularly waste management system, has a significant impact on beneficiaries' livelihood. In at least three of the nine focus groups held in each village, beneficiaries who were fish farmers complained that their yield decreased in both quality and quantity because their ponds had been polluted with toxic waste. The beneficiaries who were fishermen said that they could not find fish within the usual range

from the shoreline because the water was flooded with trash like plastics. The additional distance needed to travel to be able to fish was unsustainable, as it required additional resources, such as gas, which prevented profits.

Relationship between housing and livelihood assistance outcomes

Only one of the villages studied, Gampong Pande in Banda Aceh, had integration between housing and livelihood programs, as both were delivered by one organization, the Asian Development Bank (ADB). This village exhibited better long-term outcomes than the other eight sample villages, including better maintained infrastructure and very few abandoned houses. The villagers also spoke about the assistance more eagerly and expressed their satisfaction in an affirmed manner. However, further investigation into how housing and livelihood assistance was delivered in this village is needed. I plan to hold interviews with key persons from ADB who were involved in the project soon.

Recommendation

Based on the observational findings, preliminary recommendations include:

- *For humanitarian S&S organizations: Consider the beneficiary and contextualize solutions*
Different beneficiaries, such as orphan survivors and their caretakers, could be provided different options. Reallocating aid to other needs, such as extended education and health supports, may help them better in the long term. Delaying the construction of the housing or providing cash assistance for later construction when the children reach adulthood could also be an option as this would decrease abandonment of housing. While these options would require an extended period of assistance and there is often a limit of time for aid organizations to work in an area post-crisis, establishing a cooperative system with local governments and reputable local development organizations may enable assistance to continue beyond the physical presence of foreign aid bodies.
- *For humanitarian and development actors: Integrate long-term development planning into humanitarian assistance*
Post-disaster reconstruction often provides an opportunity to implement a better development planning. Before reconstructing housing, it is important for humanitarian and development actors to come together to plan comprehensive and connected infrastructure systems in addition to houses, including utility networks, drainage systems, waste management systems, and transportation networks. These will contribute significantly to the sustainability of the housing and livelihoods of the beneficiaries. Utility networks will lift so much burden off women's shoulders and enable them to do activities outside house chores, drainage systems will reduce flooding and eliminate disease like dengue fever, and waste management systems will ensure farms and the sea clear of damaging pollutants and maintain their capacity to support local livelihoods. Moreover, having an integrated plan may synchronize humanitarian and development works better and help to route resources to where they would make the most benefits.

- *For humanitarian engineers: Design modular houses that are based on local construction practices and locally available material.*

It is rather difficult to prevent housing abandonment as beneficiaries' decision to stay or leave is influenced by complex socio-economic factors, as suggested by the preliminary findings above. However, building houses that can be dismantled, partially or entirely, and reconstructed elsewhere can provide some future proofing in case beneficiaries have to relocate. At the very least, beneficiaries can dismantle their house, sell the materials, and use the money to pay for housing at the new location, if they cannot afford to transport and reconstruct them. While not ideal, this outcome is still better than total abandonment.

Future Steps

As I continue to work on this research, my next step is to finish cleaning up and transcribing data and continue data analysis. I will also conduct remote interviews with about 15 more of relocated beneficiaries, 10 local government officials, 5 aid organization leaders, and 5 humanitarian shelter and settlement practitioners who worked in Aceh during the post-tsunami reconstruction. At least three journal papers are expected to be submitted for peer review in 2024. Eventually, I plan to deliver the findings and recommendations in the form of policy briefs for the local government and aid organizations, and posters that I hope to hand out and discuss with participating beneficiaries and village heads.

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