

Community Participation in Post-Disaster Shelter Programs: Examining the Evolution of Participation in Planning, Design, and Construction

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Abstract

Participation in post-disaster shelter reconstruction is recognized as an important factor for supporting the sustainability and resiliency of the built environment. Engaging communities in the reconstruction process can help build community capacity and lead to sustained success of recovery projects. However, existing practice often assumes that differing forms of participation are independent of one another, neglecting to understand the influence that early participation may have on participation in later stages of the project. Past literature identified how communities participated in the planning, design, and construction phases in 19 different shelter projects following Typhoon Haiyan in the Philippines. For this research, we used fuzzy-set qualitative comparative analysis (fsQCA) to analyze how participation in earlier phases of planning and design affected participation in the construction phase. Results show that early participation, particularly in the decisions of the planning phase, are critical in shaping later participation. Findings also reveal that participation is a process linked across multiple project phases and should not be viewed as a set of independent tasks. These results inform disaster recovery practice by encouraging project strategies that incorporate community participation from the beginning through the end of a project's lifecycle.

INTRODUCTION

This paper examines community participation in post-disaster humanitarian shelter reconstruction programs operating post disaster. Recent trends in research and development practice have stressed the importance of “Building Back Better” to improve community resilience (Rahmayati and Haigh 2016). Participation of beneficiary communities in post-disaster reconstruction projects has long been cited as important for project success (UNDRO 1982), and is accepted as necessary by organizations engaged in shelter reconstruction. More recent research has shown that community participation in post-disaster reconstruction is critical to encourage resilient and sustainable projects and may help to improve recovery outcomes (Jordan and Javernick-Will 2014; Vallance 2015). Previous work by the project team has also

found that participation of communities is nuanced across project phases (Opdyke 2017). However, we still lack recommendations for how and when communities should participate in shelter reconstruction processes (Davidson et al. 2007), and need to examine how early participation might influence participation in later project phases. Thus, we recognize the significance of the evolution of participation over the course of a project and ask:

RQ: How does household participation in the planning and design of humanitarian shelter projects impact participation in the construction of shelter projects?

BACKGROUND

Cohen and Uphoff (1980, p. 214) highlighted the need for specificity in defining participation and asked: “(1) What kind of participation is under consideration? (2) who is participating in it? and (3) how is participation occurring?” They recognized that participation in decision-making (*i.e.*, planning and design) is different from participation in implementation (*i.e.*, construction) and that participation in these different activities is often “limited or unequal” (Cohen and Uphoff 1980). Finsterbusch and Van Wicklin (1987) later argued that participation increases in importance in later project phases (*i.e.*, involvement in implementation is more important than involvement in decision-making). However, in more recent literature examining participation in various project phases, scholars advocate for participation as a process that includes beneficiaries from the beginning to the end of a project (Narayan-Parker 1995), particularly in post-disaster contexts (Davidson et al. 2007). Relevantly, this recent work hypothesizes that the level of participation in early decision-making phases impacts participation in later phases (Vallance 2015).

In this study, we examine how participation in the planning and design phases of shelter projects influences participation in four specific construction activities: sweat equity, material procurement, financial management, and oversight, described in Table 1. These four types of participation during the construction phase were identified previously and described by the authors in Opdyke (2017). Because we are interested in how participation in planning and design influences participation in construction, these four activities represent our outcomes of interest.

Table 1. Participation Outcomes (Opdyke 2017)

Condition	Definition
Sweat equity	Household provides unpaid labor contributions during construction that may consist of either skilled or unskilled tasks.
Material procurement	Household obtains materials required to complete construction of planned shelter.
Financial management	Household manages the financial resources required to complete shelter, including labor, materials, transportation, and other essential tasks.
Oversight	Household supervises construction tasks.

METHODOLOGY

To analyze the influence of household participation during planning and design phases on participation during construction, we employed fuzzy set qualitative comparative analysis (fsQCA). fsQCA allowed us to examine causal links, providing

a middle ground between in-depth case studies, which limit generalizations of findings, and large-N statistical studies, which can identify correlations but may limit the ability to draw causal links (Ragin 1987). fsQCA requires identifying an outcome of interest, which in our case is participation in construction activities (Table 1). It also requires identifying conditions posited to affect that outcome, which we have selected as participation in determination of aid, location selection, floorplan and layout design, and government permitting, described in Table 2. Using fsQCA we determined which pathways, or combination of conditions, led to our desired outcomes.

We examined the planning, design, and construction activities of shelter projects in the Philippines following Typhoon Haiyan, which damaged or destroyed more than 1.1 million homes and displaced 4 million people (NEDA 2013). We selected 19 shelter projects/cases, our unit of analysis, in the provinces of Cebu, Leyte, and Eastern Samar for longitudinal investigation. All projects were implemented in communities of comparable size, and all communities had experienced extensive damage. A project was implemented in each community by one organization. By choosing projects with different organizations, the selected projects showed diversity in shelter delivery methods and participation approaches. All projects were selected during the planning stages, allowing for the observation and study of participation during all project phases.

Data Collection

We conducted interviews and surveys, collected documentation, and recorded observations over the course of four field visits, occurring 6, 12, 28, and 36 months after Haiyan. During the first field visit, we conducted 32 semi-structured interviews with local government officials, non-governmental staff members, and community members in the selected communities. In this first stage of interviews, we focused on how households were, or were not, involved in the planning and design of shelter assistance. Interview questions to households include: *Who designed or made decisions regarding your shelter floorplan and features? How was the relocation site selected? Is there a process for you to provide feedback?* We recorded observations of stakeholder interactions during reconstruction and of dialogue from organization meetings, and collected documents regarding policy, recovery plans, and technical communication.

We conducted an additional 167 interviews during a second, three-month field visit. With these interviews, we again focused on how households were participating in shelter projects, but emphasized participation in design and construction. In a third, three-month field visit, we administered 320 in-person surveys to collect data on shelter project outcomes. During these surveys, households were asked to evaluate their current shelter and provide demographic information relevant to this study, such as weekly household income and expenses and number of household members with high school diplomas. An additional 12 interviews were conducted in a final two-week field visit to obtain missing data and validate findings.

Data Analysis

Interviews were translated, transcribed, and imported into NVivo qualitative analysis software. Data was inductively coded to identify types of participation in

planning and design phases. From this analysis, four participation conditions emerged, as defined in Table 2: two during the planning phase (determination of aid, and location selection) and two during the design phase (floorplan and layout, and government permitting). While we initially focused on household participation, the involvement of local governments in collaboration with the shelter organizations emerged as an important additional type of participation. Particularly, we found considerable differences in project outcomes between projects with high and low levels of government participation, leading to the inclusion of the condition of government permitting during the design phase. These types of participation are described in more detail in Opdyke (2017).

Table 2. Participation Definitions (Opdyke 2017)

	Condition	Definition
Plannin g	Determination of aid	Households are involved in formal needs assessment processes, either through a third party or the implementing shelter organization.
	Location selection	Households have agency in deciding the site of their shelter.
Design	Floorplan and layout	Households have the ability to control decisions regarding the layout and design of their shelter.
	Government permitting	Formal documented approval by the local municipality or city for the location and design of the shelter project.

Social Vulnerability

In addition to conditions of participation, we also analyzed conditions of social vulnerability using information collected from the household surveys. Social vulnerability has been widely recognized as influencing recovery in post-disaster situations (Cutter et al. 2003; Finch et al. 2010; Jordan et al. 2016). In addition to being more likely to live in hazardous locations, socially vulnerable populations can also face significant obstacles to recovery. These vulnerable populations may exhibit characteristics that can be prohibitive to participation in reconstruction activities. For example, resource-constrained households often have less money and time available for participating in recovery activities. Thus, we include social vulnerability as a condition posited to affect participation in different phases of reconstruction.

We selected three conditions to represent social vulnerability: education level, household wealth, and land tenure. Education level and household wealth, represented in this study by weekly per capita expenditures, are widely used indicators of social vulnerability (Cutter et al. 2003; Jordan et al. 2016). Additionally, recognizing the important connection between land and livelihood, we selected land tenure as the final indicator of social vulnerability. The livelihood of informal renters and households with insecure tenure is at greater risk of being threatened in a disaster (Reale and Handmer 2011). Amongst the nineteen cases, there was significant variation in the percentage of households that lived in informal settlements, were informal renters, or owned their land, both with and without titles.

Calibration of Conditions and Outcomes

Each condition and outcome for each project was scored with a value from 0 to 1, with 1 representing full membership in the set and 0 representing full non-

membership. Calibration was an iterative process based upon case and theoretical knowledge. We used two methods – direct and indirect – for calibration. Whereas the direct method is used for numerical data and requires the definition of three anchor points, the indirect method relies on qualitative grouping (Ragin 2009). For most conditions, we used the indirect method and, using quantitative and qualitative data, first identified what qualified as membership and non-membership. For example, for the social vulnerability condition of education, membership was based on meaningful separations between groupings of projects and full membership was classified as fewer than 30% of adults have high school diplomas (i.e. high vulnerability associated with education) and non-membership was classified for cases with more than 70% of adults have diplomas. If cases were not clearly dichotomous, we determined a greater number of set scores and classifications that varied from the spectrum of fully out of the set to fully in the set and assigned each classification a fuzzy value between 0 and 1 (see Opdyke 2017). Table 3 defines the education calibration.

Table 3. Fuzzy-Set Calibration for Education Vulnerability Condition

Fuzzy-Set Score	Score Description
0	Majority of adults have high school diplomas (>70%)
0.2	Some adults have high school diplomas (>40%) and school attendance by children is regular (>80%)
0.8	Some adults have high school diplomas (>40%) and school attendance by children is irregular (<50%)
1	Very few adults have high school diplomas (<30%)

The wealth condition of social vulnerability provides an example of a direct calibration based on quantitative data. Direct calibrations are used for conditions represented by quantitative data and rely on defining the threshold values associated with three breakpoints: full membership (0.95), the crossover point, or point of maximum ambiguity (0.5), and full non-membership (0.05). Once we defined these three points, we used fsQCA software (Ragin et al. 2008) to transform the original data into a fuzzy scale (ranging from 0 to 1) using log-odds.

After calibrating the sub-conditions for social vulnerability, using the direct method for wealth and the indirect method for education and land tenure, the scores were equally weighted and averaged together to obtain an overall social vulnerability score for each community. Once the participation conditions had also been indirectly calibrated (see Opdyke 2017 for details), we then calibrated the four outcomes of sweat equity, procurement, financial management, and oversight using the indirect method described above.

Analyzing Causal Pathways

After calibrating the conditions and outcomes, we compiled the values in a truth table (see Opdyke 2017). A truth table is a summary of the fuzzy scores assigned to all cases for all conditions and outcomes. We then conducted our analysis using fsQCA software, which seeks to identify the causal pathways between conditions and outcomes (Ragin et al. 2008). fsQCA relies on two metrics to measure

the usefulness of the determined pathways: consistency and coverage. A pathway is consistent (score of 1) if a majority of cases with the pathway also exhibit the outcome. Coverage measures the fraction of observed cases that exhibit an outcome that have the given combination of conditions (Rihoux and Ragin 2009). During this analysis, we also analyzed which individual conditions were necessary for an outcome. Necessity is a measure of the degree to which the outcome is a subset of the causal condition. Typically, QCA researchers require a consistency score of at least 0.8 and a necessity score of at least 0.9 (Ragin 2008) when determining the usefulness of causal pathways.

FINDINGS

In this section, we discuss our findings of the pathways linking conditions to each of the outcomes in Table 1. We present our results in standard QCA diagrams with a “~” indicating the absence of a condition and a “*” indicating the Boolean “and” operator.

We were unable to find consistent pathways for the outcomes of *sweat equity* and *material procurement*, suggesting that other missing conditions, in addition to participation, may be required to explain their presence. Because sweat equity is often required by humanitarian organizations, we expect that other organizational conditions may be able to explain this outcome. Similarly, participation of households in procurement of materials was observed to be largely dictated by local material availability. Thus, our analysis points to the limited role of participation in planning and design in resulting in later participation during these two construction activities.

Financial Management

The pathway identified for financial management in construction is illustrated in Figure 1. Beneficiaries were responsible for managing expenses in seven of the projects, and did not play any role in managing project finances in the other twelve cases. A single pathway emerged from our analysis with a consistency of 0.85 and coverage of 0.56 (i.e. describing 4 of the 7 financial management cases). Participation in selecting the location of shelter was found to be a necessary condition and was present in all the cases that included financial management.

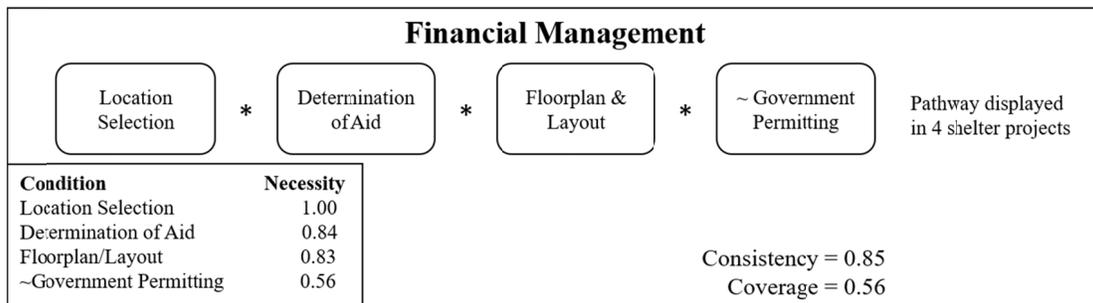


Figure 1. Financial Management Pathway

Participation of households in planning, including determining type of aid and selecting location, along with subsequent participation in designing shelter floorplans

and layouts were required for fostering an active role in financial management. All four of the projects identified in the pathway were either cash transfer (households are given cash to purchase materials or hire labor) or material in-kind distributions (households are given materials to repair or reconstruct their shelters). These projects included a needs assessment to determine household recovery priorities, either through direct surveys or an assessment by a third-party. While the projects encompassed by the pathway all had requirements tied to receiving assistance (e.g., households need to adhere to guidance for safer building practices), there was flexibility for individual households in deciding material use, explaining the presence of the floorplan and layout condition. For example, one beneficiary described the flexibility that came with these projects, *“We were free to build whatever we fancy but they provided all the beneficiaries with the same number of construction materials. If one household wanted something more sophisticated than the design that the available materials can accommodate then they will shoulder the extra expenses.”* In addition to the presence of the previous three conditions, the absence of government permitting was also a characteristic of the identified pathway. This lack of government approval of shelter plans can be explained by the low value of these projects (between 2,400 and 15,000 PHP; approx. 50 and 300 USD, respectively), resulting in humanitarian organizations not approaching municipal governments to approve shelter designs.

Given that we included four participation conditions in our analysis, it is surprising to see that all four conditions (either their presence or absence) arise in a single pathway. Additionally, findings show that social vulnerability, in isolation or combination with other conditions, did not lead to the outcome of financial management. This suggests that financial management is intrinsically tied to multiple forms of earlier participation, and that early participation is more important in encouraging financial management than a household’s vulnerability, or lack thereof. For example, by actively giving households a voice in the type of aid, cash transfer programs evolved out of this early feedback, thus eliciting financial management by beneficiaries.

These early processes serve not only to provide familiarity and knowledge of proposed construction to households, but incentivize ingenuity. For one project, early participation of households in deciding type of aid, location, and shelter designs led to cost savings of up to 30% of released cash transfers. As one beneficiary described, *“I saved some so I have money when it’s needed. My children don’t have work and my grandchildren go to school so I bought them school supplies.”* While this family invested the extra cash in education, others paid off debts, covered needed medical procedures, or started a new business. Importantly, these cost savings were achieved by identifying *flexible* shelter assistance as a priority, selecting sites within existing communities, and having decision control over shelter designs.

Oversight

Households and organizations demonstrated oversight at major construction milestones in twelve shelter projects. The remaining seven projects either experienced sporadic oversight or no inspections. From our analysis, two pathways emerged with a total consistency of 0.85 and coverage of 0.80, as illustrated in Figure 2. Government permitting was found to be a necessary condition and was central to

both pathways identified. As a byproduct of government approval, we observed that many organizations put processes in place, including household oversight, to ensure that government requirements were met. In addition, both of the pathways identified that participation in the planning phase, and not the design phase, was required for construction oversight. Thus, participation in the early phases of reconstruction was critical.

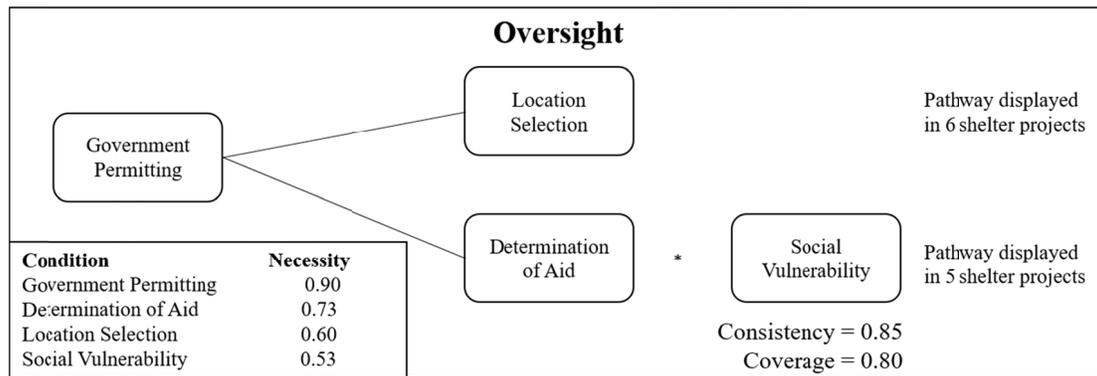


Figure 2. Oversight Pathways

In addition to the government permitting that was central for both pathways, the first pathway also required participation in the planning activity of location selection. For nearly all the cases found in this pathway, the projects employed single room shelters that were built by organizations, and that were intended to be expanded in the future by beneficiaries. These projects were built at the pre-disaster locations, suggesting that close proximity to pre-disaster sites is a contributing factor that enabled oversight by households.

For the second pathway, participation in determining the type of aid and high social vulnerability resulted in household participation in oversight. In comparison with the first pathway, all projects in this pathway were relocation sites. As discussed above, household participation in the early activity of determination of aid provides familiarity with the project scope, providing knowledge for construction oversight. The presence of social vulnerability as a condition leading to oversight is promising as it suggests that organizations gave agency to vulnerable beneficiary groups.

Financial management and construction oversight involve household participation in decisions rather than labor. While the impact of these different types of participation is beyond the scope of this paper (see Opdyke 2017), it is clear that decision-based participation in later project stages is dependent upon earlier participation. Labor-based participation, in contrast, can more easily be introduced independently of earlier participation. In the context of emerging research that links financial management and oversight to broader outcomes and benefits, such as community resilience and household savings (Opdyke 2017), our findings suggest there is a need to envision a comprehensive participation strategy that encourages household involvement in a series of activities from the initial to final project phases instead of eliciting household participation only in specific tasks.

CONCLUSION

This paper analyzed pathways of participation in the planning and design stages of humanitarian shelter projects in terms of its influence on participation in construction within the context of recovery following Typhoon Haiyan in the Philippines. We found that for outcomes of sweat equity and procurement, additional factors, such as organizational requirements and local material availability, and not participation in early project phases, may better explain participation in these activities. However, for outcomes of financial management and oversight, we found that participation in earlier phases of reconstruction was critical for enabling participation in these construction activities. Particularly, we found that participation in decision-making activities of the planning phase is required for participation during the construction phase.

These findings demonstrate that participation in later activities is not independent from participation in earlier phases of reconstruction. Often, participation is thought of in terms of individual tasks, but we found that for decision-based activities, such as financial management and oversight, it is intrinsically linked across the phases of planning, design, and construction. It will be important for humanitarian shelter actors to develop projects that support these decision-based forms of participation and envision strategies that encompass entire project timelines and encourage household participation from initial project phases to completion.

We found that cash transfer and material distribution programs demonstrated the outcomes of financial management and oversight. When implementing these types of programs, organizations should design them such that households are involved in early decisions such as determining the type of aid, which might require reorganizing the funding structure for shelter projects to allow for more flexibility in determining program modality based on feedback from local actors.

In characterizing the pathways to participation in construction, we have taken initial steps to fill a gap in literature surrounding how participation evolves throughout different phases of a shelter project and have found that participation, especially in decision-making activities, is a process. Future work will build on this paper by analyzing how participation in these various phases of planning, design, and construction influence the expected structural performance outcomes, such as strength of storm a shelter can resist or cost to repair expected damages.

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