Significant accomplishment of the post-disaster housing reconstruction: A community perspective from 2015 earthquake affected communities in Nepal[1]

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Abstract

In spite of the significant grants and supports after 2015 earthquake, housing reconstruction faced numerous challenges in addressing the needs of the disaster-affected communities. The earthquake threatened almost all aspects of the societies in 14 of the most affected districts. Government of Nepal and various development partners, including bilateral agencies, were involved in the implementation of housing reconstruction projects in different districts. All these initiatives in communities yielded diverse results. Because of the resulting disquiet from the public, the post-disaster housing reconstruction is becoming the concern and dilemma to researchers, development and humanitarian organizations worldwide. It is evident that private housing reconstruction is complicated and slow process, which is knotted with social, economic, and political dimensions. The paper highlights the significant contributing factors for accomplishing the housing reconstruction after the earthquake. A multi-dimensional holistic approach interprets the nexus of successful reconstruction, which are discussed in the paper. This paper serves as a valuable resource that highlights the significant factors for the government, development and humanitarian partners, and researchers.

Key Words*:* Disaster recovery; Housing reconstruction; Nepal earthquake; Post-disaster

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1. Introduction

Disaster housing reconstruction and recovery have been the concern of all international humanitarian and development partners, and government worldwide. Emergency relief perceived as useful as it happens immediately; however, housing recovery and reconstruction projects often face challenges in effective implementation. The unsatisfactory performance of housing recovery and reconstruction projects has been major concern of government and international humanitarian development organizations worldwide. Berke and Beatley (1997) note that the post-disaster housing recovery has received the least amount of attention from hazard researchers, and is the least understood area of study within the hazards field. This paper attempts to address the gap by examining the contributing factors for the achievement of successful housing recovery process in the earthquake affected central hills of Nepal.

This paper is abstracted from a larger Ph.D. research, which investigates briefly the positive impact on the housing reconstruction and recovery project implemented by Nepal government and development partners. This research was conducted in a collectivist society where the group's points of view profoundly impact individual decisions. Despite various changes and amendments of policies and laws, Nepal government earthquake recovery institution— Nepal Reconstruction Authority— was struggling for the achievement of successful outcome for the housing recovery. This paper tries to compare between the community where the NGO was working and where the Government of Nepal was distributing the cash grants directly, considering the clear need for systematic research on understanding factors for the successful housing recovery projects (Chang, Y.S et al., 2010). A comprehensive review of the literature was performed to explore and explain some of the reasons for a successful housing recovery.

Earthquake in Nepal is among the top 10 hazard types in Nepal. The devastating earthquake, the epicenter in Barpak of Gorkha district, on 26 April, 2015, has impacted Nepal's vast communities. Out of 75 districts, 14 were severely affected, and 31 were categorized into minor affected ones. As a country, Nepal struggled to cope with the scale of death and destruction. Nepal was not prepared to manage the disaster of such scale. Rescue workers, citizen groups, and non-governmental organizations from around the world entered into Kathmandu within three days to

provide immediate search, rescue and emergency humanitarian relief. Communities affected by the earthquake received swift search and rescue operations, followed by an emergency humanitarian relief response during the first few weeks. Later many communities received support from a different source for short-term to long-term recovery and reconstruction. The Government of Nepal introduced a significant five-year recovery framework for the rehabilitation of earthquake-affected communities. Recovery framework, which includes private housing recovery and reconstruction, was implemented by the Government, Nepal Reconstruction Authority, and implementing partner's organizations with many mixed results and outcomes.

Nepal earthquake was triggered on 25 April 2015 at 11:56 a.m. local time, on a 7.8 Richter scale, is one of the fatal disasters in Nepal (The US Geological Survey, 2015). Following the classification of the earthquake's size by Nepal's Department of Mining and Geology, the Gorkha earthquake is strongest. The epicenter was in Barpak of the Gorkha district in Nepal – about 80 KM north-west of Kathmandu valley. The quake lasted approximately 50 seconds, affecting 32 districts, out of which 14 districts being profoundly affected. According to Nepal's Department of Mining and Geology, a total of 447 earthquakes with 4 or more Richter Scales occurred between 25 April 2015, and 22 April 2016. After this initial strong earthquake, hundreds of aftershocks occurred in Kathmandu valley and surrounding hills and mountain areas. There were four strong aftershocks (6-6.9 Richter scale), 51 moderate aftershocks (5-5.9 Richter scale), and 391 light aftershocks (4-4.9 Richter scale). Around 773,095 private houses were completely damaged, and 298,998 houses were partially damaged.

Considering some deficiencies in past disaster policies and practices, the Government of Nepal established Nepal Reconstruction Authority (NRA) and developed a more focused policy for earthquake recovery using Post Disaster Need Assessment (PDNA)[2]a strategic earthquake impact management framework prepared by the Government of Nepal and development partners. The most significant single need identified in the PDNA was for "housing and human settlements": 755,000 houses were destroyed or damaged, accounting for US$3.27 billion or almost half of Nepal's total reconstruction needs" (World Bank, 2016). Because of the need for the

[2]The World Bank, United Nations Development Program (UNDP), European Union (EU), the Asian Development Bank (ADB), and the Japan International Cooperation Agency (JICA) supported a Post Disaster Needs Assessment (PDNA).

massive reconstruction work, the Government of Nepal decided to establish NRA. The establishment of NRA indicates that the previous disaster response policy and management needed to shift from a passive response to a progressive response that emphasizes non-structural measures (e.g., land use planning, building and development controls, regulations, displacement management, land allocation etc.). NRA has to perform almost from zero. The institution in the document stated will remain autonomous, however, in practice has to shuffle the similar bureaucracy challenges in channelizing funds from other ministries.

The PDNA prepared by the Government of Nepal in August 2015 estimated that the lives of eight million people, almost one-third of the population of Nepal, were impacted by the earthquakes of 25 April to 12 May 2015 and the subsequent aftershocks; over half a million homes were severely damaged or destroyed, primarily in rural areas. Nepal government's NRA structure formulation, policy development, and institution in action took almost 18 months, with this slow snail pace reconstruction, most people whose houses were severely damaged continue to live in temporary shelters over 18 months after the earthquakes. In the beginning, the recovery policy did not include I/NGOs and humanitarian organizations in the private housing reconstruction process. The Government of Nepal, and NRA wanted NGOs, and development partners to get involved in other structures like schools, health posts, roads, irrigation and drinking water structures. However, the demands for the private housing reconstruction was so high that the Reconstruction and Rehabilitation Policy 2072 (2016) got reformed for working with non-governmental organizations in constructing private houses.

The Central Bureau of Statistics (CBS) and National Planning Commission of Nepal were involved in conducting a comprehensive census of damage to the housing in all 14 severely affected districts. The survey was the basis for the housing reconstruction program where NRA prepared the eligibility criteria. A list of names of those who receive the cash grants for the construction of houses was generated. The name lists of all the eligible households were sent to respective Rural Municipality (RM) or Municipality. After RMs received the name list, all the eligible beneficiaries were enrolled through a legally binding Participation Agreement (PA) with their respective RM. The PA outlines the entitlements and obligations of both parties regarding the program's key details, such as payment, housing construction standards, and grievance mechanisms (how beneficiaries can address any

complaints)—the enrollment procedure covered and verified all legal documents including, citizenship, and land tenure. The agreement was the foundation for receiving cash-based assistance, provided in tranches. First trench of NRs. 50, 000, second NRs. 100,000 and third NRs. 100,000 was set initially, whereas the Government of Nepal increased NRs. 50,000 more with a total of NRs. 300,000 as cash-based assistance. The framework also has the top-on support of extra NRs. 50,000 which can be provided if the communities are marginalized, poor, and vulnerable.

Against this background, the paper contributes to a more nuanced understanding of the successful factors for the housing recovery of the earthquake affected communities in Kispang Rural Municipality, Nuwakot, Nepal. Various researchers have argued on how successful the housing recovery projects were in Tsunami, Gujrat earthquake, and Haiti earthquake. Comparing the case studies from these countries, the paper contextualizes the understanding of the successful housing recovery at a very local level in a rural Nepal. This knowledge is essential to policy makers, international humanitarian organizations and program managers of development partners, for effective post-disaster housing recovery implementation processes that will achieve the successful housing recovery.

2. Methodology

2.1. Study area background

The research area, Kispang Rural Municipality of Nuwakot district, is 90 kilometers north-west of Kathmandu valley, the capital of the county, and somewhat 30 KM from the Gorkha, earthquake epicenter Barpak. It lies on the latitude 28º 01'23" N to 28º 04'04" N and longitude 85º 10'47" E to 85º 12'39" E. Geographically 80% of the land is stiffed hills. Out of total land of 82.57 Sq. KM, only 2,141 hector lands are arable. The total population of Kispang is 19,885 which is 4.6 percent of the total district's population. Kispang Rural Municipality is one of the 12 municipalities in Nuwakot district. Nuwakot is one of the 77 districts of Nepal. The district headquarter is Bidur and it covers an area of 1,121 km (DDC, 2017).

2.2 Characteristics of the study area

Among the interviewed households, about 87 percent were male-headed while the rest 13 percent headed by females. The proportion of female-headed households is much lower than that of the national average of percent in 2016 according to the Nepal Demographic Health Survey. As expected, the majority (54%) of the households were headed by a person aged 40-64, while there is also a very considerable proportion of households headed by persons aged 65 years and above (18%). The Median Age of the household heads population is estimated to be 50 years.

The caste ethnicity of the respondents was organized into three different categories *Brahmin/ Chettri* is the social group that is considered privileged and has access to lands and has privileges of other resources, while *Dalit* and *Janajati* are considered severely disadvantaged. *Jananjati* here is mainly *Tamang*, while *Dalit* is mainly *Kami* and *Dami*. The highest numbers of respondents were *Janajati* (75%) and the lower numbers of respondents were *Dalit*. About the religion, the highest numbers of respondents were Buddhist (58%) and Hindu (38%) and the lowest numbers of respondents were Christians (4%). Examining the literacy status of the research area, it appeared that nearly half of the household heads are illiterates, major of the illiterate are comprised of women and *Dalit*. The study area houses were heavily damaged by the earthquake, 902 out of 912 households needed reconstruction in the research area.

Most of the houses that were collapsed in the research area were multi-story framed construction with stone, mud, and local materials. Houses constructed with local materials without proper reinforcement and bandings collapsed into rubbles with little or no room for survivors. The earthquake could have been more deadly had it occurred at night as private residential houses could be fully occupied. The respondents (99.2%) reported that their houses were completely collapsed, with no proper reinforcement structure. Most of the houses that were collapsed were built with stone, mud, and wood.

2.3 Data collection and analysis

The research used primary data collected using household interviews (912), focus group discussions (8), key informant interviews (36), and observations during

field work conducted between January and May 2018. Household census was used in ward 5 of Kispang rural municipality with semi structured questionnaires. To ensure the validity of the findings, the selection of the case studies was a major decision (Stuart et al. 2002, Yin 2013). The researcher used the case studies so that the cases would offer powerful and meaningful insights for the findings and discussions. This approach helped the researcher to understand complex issues. This study employs a mixed-method approach to increase the validity and reliability of the findings of the study. Therefore, descriptive statistics, frequency distribution, Chi-square tests, and multiple regression analyses were conducted to evaluate the overall research results.

3. Discussion and findings

3.1 Inclusive communities' participation

Post-disaster reconstruction of private housing needs high attention of the community and its meaningful participation. Community participation in emergency relief and rehabilitation was discussed since 1980s onwards. Kumar (2005) argues that the concept of community engagement in emergency project is poorly defined and vague. Without active community involvement and participation, there is always a chance of failure of the post-disaster private housing reconstruction. Hayles (2010) suggests that it must find a balance between affordability, technical feasibility and quality of life in disaster-related housing reconstruction. Without proper community consultation and their meaningful participation, there is always a high risk of destroying community cohesion (Ophiyandri, T et.al, 2010).

In the research area, there were two sets of populations, one who received support from the NGO and others who received direct support from the Government of Nepal through the municipality. The community initially did not want to participate in the reconstruction that was scheduled by NGO, as there were many complications like those who received support from NGOs not entitled to the bank loan facility, which was later changed. In the beginning, somewhat 85% of the respondents said they wanted the organization to build their house without community involvement. However, an effort was made for bringing out transformation in people's mindset. When asked the most critical factors for the successful private housing outcomes in Kispang, 95% of the respondents reported the community's meaningful participation. Meaningful participation is achieved when the community comes and gets organized spontaneously; there were over 29 community

meetings and separate 47 information-sharing meetings at the group level. What were discussed here in the meeting are very important to see, many respondents shared each individual problem related to construction that were discussed, and learnt together with team members from NGOs. The whole community felt the ownership over the construction of houses in the community. Poor, marginalized, disabled, single elderly men/ women's houses were constructed by the help of communities at the beginning.

In Haiti and Bangladesh, housing recovery project implementation were mostly without community meaningful participation, that caused tension, stood as a reason for the project failure (Alam, K. 2010). UNHCR (2007) reports that the permanent shelter operation in Aceh in Indonesia experienced a lot of problems and delivery has been far lower from the original targets, because there were two procurement methods adopted, one was contractor based approach and other was community-based approach. However, even though Government of Indonesia had appointed Banda Aceh, Rehabilitation and Reconstruction Agency (BRR) to speed up the reconstruction phase, the housing reconstruction was facing a lot of problems. Individual grit to recover is the foundation to motivate and develop community grit; this motivation leads to community participation for recovery.

How can a meaningful participation of the affected community be assured? Over 65% of the respondents in the focus group discussion reported the need of right information concerning disaster, its impacts, risk, prevention, how to rebuild, what support are available, where to find medical treatment and other relevant information. Respondents reported that communities wanted to be safe from the impact of the future disaster but many time communities lack right information and consultation. Community which was under the NGO supervision shared that they received all substantial information, whereas others under government supervision shared they received information from radio and television which has less impacts. Examples of a Sri Lankan Government, the decision and preparation for a buffer-zone policy preventing the building of certain structures within perceived tsunami tide reach areas in 2004, that did not involve the meaningful participation of the affected communities, resulted in delay in the recovery and housing reconstruction, the policy was amended in December 2005 (Shaw, J and I Ahmed. 2010).

Communities of Kispang rural municipality were consulted, acquired adequate information and formed groups and prepared for the construction in a cluster

group “batch” approach. One batch has 5-7 households as members. Their concern about the support was minimized and their concern about design, materials, and house construction was addressed technically by the technical person. Each individual was reached and communities meetings were conducted in each *tole* or village. Implementing NGO guided them and walked them through the recovery process until community actively participated and built their houses. Community confidence was built before community fully participated in the construction work. Then, community formed Housing Reconstruction Coordination Committee taking others who were not included by the NGOs. Communities themselves implemented collective decisions on buying materials in bulks, building a house through *arma-parma*, voluntary labor sharing.

3.2 Presence in the community

For achieving the community meaningful participation, Government and NGOs representatives need to have a visible presence in the community. Over 80% of the household respondents reported that community were confused, overwhelmed, and frustrated at the beginning, and these emotions were properly handled by the staff of the NGOs who were working in the field and residing in the community. Presence in the community here means, NGO program person including 5 engineers and community mobilizers living with the community and available to handle all community concerns, timely and effectively. Ramu Tamang shared: “many times satisfying information rarely forthcoming to the communities, we do not know exactly what those big words mean, but NGO people living in the community have been a very big help”.

While GOs and I/NGOs have played a key role in making humanitarian relief and recovery participatory, many times the project and program could not be effective because of the limited outreach. Respondents shared that the staff from NGOs were residing in the communities and were undertaking door to door outreach, sharing the information on housing recovery framework, types of houses needed to be constructed, information on designs and process and procedure of tranches transfer, how to open bank accounts and how to get the money of the trenches.

Mr. Dip Kumar Tamang from Kupa, ward 5 of Kispang Rural Municipality said: "I was easily getting information on government tranches money, technical construction information, all through the construction period; this has made me easy in completing the construction in 2 months". There were no local level government

presences at the beginning of the enrolment and first trench distribution. This also has slowed the recovery process. The vacuum of government entity was felt until the election of the local level official. The local level election which happened after 20 years, eased the community, elected representatives, diminish the vacuum of the government entity that NRA has felt missing. Dip Kumar further added, "not always the elected representative knows what to do and are pre-informed, so having people in our community with technical know-how, mobilizer motivated us to construct our houses".

In many cases, organizations have their offices in district headquarters and their staff travels to and forth during office hours. The door to door outreach may not be possible if the staff does not know the community, their culture, and houses, their language. The success model that was considered by the respondents was that the staffs of NGOs were living in the community as the community members not as an outsider which has been effective in winning the trust of the community.

3.3 Owner driven reconstruction and recovery model

In the aftermath of Gorkha Earthquake, homeowners in Nuwakot have faced immense challenges to rebuild their damaged homes. At the beginning, the organization involved in Kispang Rural Municipality introduced centralized donor-driven reconstruction model with the single design of a house, however, community people did not appreciate the original donor-driven reconstruction model of a village, so they later introduced owner-driven model. Leerum and Arora highlight that over the last two decades, centralized donor-driven reconstruction programs that standardize home design and construction for large-scale implementation through single models have been demonstrated to result in delayed home construction and occupation and low homeowner satisfaction (Leerum and Arora 2011). In consultations with communities the design of the house from a single model to 5 new models and from stone as a base of materials to bricks, blocks and mud were introduced as per the recommendations from the communities.

Given the high number, homes to be constructed and the scattered nature of earthquake-affected settlements and difficulties with the geographical situation in Nepal earthquake-affected districts, a decentralized Owner Driven Reconstruction and Recovery (ODRR) approach was implemented as a model for reconstructing houses affected by the earthquake. This model is identified as a dignified approach by Nepal Reconstruction Authority and NGOs involved in rebuilding houses, which

encouraged and motivated individual homeowners to implement safe building design and construct their culturally appropriate homes by themselves. Traditionally, houses in Nepal are owner driven, owners with their traditional knowledge construct almost all houses in rural areas, and they build their house according to their needs and culture. Different ethnic communities have their own housing needs and design.

"ODRR programs were also introduced during the reconstruction in post-earthquake Pakistan and Gujarat, as well as in post-tsunami Sri Lanka and Thailand. Three years after Pakistan's 2005 earthquake, 300,000 homes out of a target of 400,000 homes had been constructed across a disbursed area of earthquake-affected households through a government-led Earthquake Reconstruction and Rehabilitation Authority (ERRA)," (Jha and Duyne 2010: 96).

ODRR is a time consuming and slow process; usually owner considers his own timing of the year and sometime owner look for a special occasion to start their housing construction (Dikmen, 2005). However, it is learnt from the field that rapid construction through ODRR is possible if communities are rightly motivated and they have their involvement in all the process of the housing with the right information. If owner is allowed to make a right decision through right information, the rapid construction of houses is possible. Whereas the case of relocation to a new area and relocation of displaced communities is different. Many researchers criticized such approaches in terms of relocation impacts, the monotony of settlements, typology of houses, and their structural quality (Dikmen, 2005; Ersan, 2006).

The owner-driven reconstruction and recovery model has provided a critical opportunity to 'build back better' – a term that encompasses a community's physical, social, and economic state of the affected communities in Kispang Rural Municipality ward 5 in Nuwakot. The owner's engagement in a batch or a group worked self-construction or owner driven housing construction sharing the labor has enhanced resilience across physical, social, and economic domains (Clinton, 2006; Mannakkara, et al., 2014; Schilderman & Lyons, 2011; Paul, 2011; Wisner, et al., 2005). This model is highly considered as most viable and least costly option in the rural Kispang Rural Municipality (Green, 2008).

3.4 Acknowledge and fulfill the local needs

While conducting the research many post-earthquakes affected individuals in ward 5 of Kispang Rural Municipality in Nuwakot showed that affected communities can overcome disasters and rebuild houses according to their needs and requirements.

However, they also showed that their knowledge about their needs is important during the reconstruction phase. Ambar Bahadur Tamang who has 5 family members wanted to build 2 storey houses whereas the approved design from the NRA had one storey and he wanted to know how much the added storey would cost. He also wanted to construct his toilet away from the house separately. Mr. Ambar shared, "I got all the information what I need, and getting all the convincing information, I and my group worked together and constructed houses rapidly, having information on my needs and addressing them really motivated me for the reconstruction".

Comparing it with the 2004 Tsunami in Aceh-Indonesia and Sri Lanka, many construction plans included indoor toilets and kitchens, both of which were considered unhygienic and culturally inappropriate, and thus, in many cases, indoor kitchens were transformed into storage facilities. Which is very different in Nepal, the house design catalog was prepared in 2 volumes with over 50 designs. The house owners were free to choose from those flexible designs and make it contextualized as per their culture and context. However, communities were looking for many answers from the design which were addressed by the presence in the community through the door to door outreaches.

Construction alone cannot be successful if factors associated with it are unfavorable. For the effective construction, community realized the needs of fixing the roads so that construction materials are transported to the construction site. Select the vendor and suppliers so that community can buy in bulk for the group house. Aite Tamang: "I believe the other factors associated with the construction like 2 roads were fixed, water pipes were fixed, materials were supplied in construction site, tools for demolition and debris management and construction were helpful for all group members which encouraged and motivated us to work for the construction of our houses".

3.5 Housing reconstruction is a process

In any disaster usually two modes of construction are practiced, i.e., owner driven and contractor or donor driven (Ersan, 2006). If the affected communities are allowed to build back, in an owner-driven approach without new technology and techniques, it is common for construction processes to include the same inadequate traditional building practices and materials, uses of same traditional building practices and materials in a same way leave householders at risk from future disasters (Green, 2008; Coburn & Spence, 2002; Parrack, et al., 2014). NRA introduced "build back

better, through owner-driven model", but has recognized the need of the training to community member on new techniques and technology for the construction of houses. In research area 153 individuals were trained to become a mason. Before the construction of the houses community members considered all these factors like construction materials, what to use, where to find them, and resources. Logistical arrangements and difficulties with transportation of materials to the construction sites in slopes, land acquisition, and demolition and site preparation were pre-planned and discussed in the community. Verby et al. (2007) highlight that without considering all the dimensions of housing reconstruction and recovery, the practice will be failure or result in delay.

3.6 Conflict management and community reconciliation

Kispang ward 5, is the settlement of Tamang community, almost 75% of the population are *Janajati*, 19% of the population are *Brahimin* and *Chetteri* and rest 6% of the population are *Dalit*. They had community conflict. Many people were not speaking to one another because of their involvement in different political ideology, past involvement in conflict related to land, cattle and other economic aspects. A housing recovery policy prepared in Kathmandu is not going to help the divided community, share Mr. Bir Bahadur Tamang of Kispang 5: "without the initiatives for handling conflicts, it would have been impossible to achieve success in housing recovery". "The years of deep rooted conflict resolution were very difficult. People were not coming together, it took us many months to bring people together and form batches for the construction of houses", share Ms. Sunita Pandit, engineer and a Program Manager to a NGO working in the field. "The conflict management and reconciliation sessions were introduced. These sessions were able to settle and managed the conflict among people. The conflict was managed and promoted reconciliation which was the outcome bringing the community together and promoting community meaningful participation, empowering people and addressing their grievances, even the project team was able to ratify land issues that were there from many years".

3.7 Working in a group, sharing the labor, *arma-parma*

Owner driven model is possible only when community participates in supporting one another. One individual cannot build houses for a community, there is a need for a group of people who can support one another and build their houses together. Dudharam Tamang an elderly from the community share: "Conflict handling was the

beginning process for bringing people together, there were many people who did not talk to one another for so many years, but this earthquake has brought them together. They formed the groups in their locality, and started constructing houses in a group. The most important part was the group first started building houses of those who were single, disable and poor, this initiative really encouraged others in the group. I really liked the idea of a batch model which is a group of people living in a cluster in a nearby area where they can support one another while constructing houses".

There were over 20 batches with 288 peoples involved in an area where NGO was working, whereas, there were no batches in area where NRA and Government entity were distributing funds directly. The most vulnerable in government supported area were left out without construction as they could not build the house by themselves. Hearing the successful cases from the field, we can acknowledge that the batch model which incorporated all the people and built houses of each individual involved in a batch one by one starting from the marginalized and poor.

3.8 Earthquake resistant construction techniques training

Housing reconstruction and recovery after a disaster are essential for safety, good health and livelihood restoration of affected communities (Duyne Barenstein, 2006; The Sphere Project, 2011). Housing reconstruction and recovery without proper earthquake-resistant construction techniques are almost impossible. Earthquake resistant construction techniques were new in the Kispang Rural Municipality ward 5, the community without proper skills and knowledge on earthquake resistant construction and techniques housing construction may be prohibitive for many households. Government of Nepal has introduced many building codes and standards. But without proper knowledge of earthquake-resistant construction, the safety measures and techniques of their homes may not be a priority for the affected communities. The impact of limited resources can be exacerbated by a lack of understanding of safer building methods (Yahya, et al., 2001; Schilderman, 2004; Powell, 2011; Maynard & Barritt, 2015).

Bir Bahadur Tamang, a mason who built houses before the earthquake shares: "I built over hundred houses, but I regret not knowing the earthquake resistant construction techniques, I regret that people died and lost their houses, I wanted to learn new technology so that my houses stand during earthquake". In Kispang Rural municipality ward 5, masons who were already working on construction were selected and provided practical earthquake-resistant construction techniques to 113

individuals. Similarly, 40 individuals who were never involved in mason work were also selected and provided 50 days on the job training. Substantial manpower were produced before the construction of houses.

3.8 Demolition and debris management

The Federal Emergency Management Agency (FEMA) defines disaster-generated debris as, "Any material, including trees, branches, personal property and building material on public or private property that is directly deposited by the disaster." In ward 5 of Kispang Rural Municipality, over 997 houses needed reconstruction and their debris needed to manage. Communities wanted to change the construction materials and use brick and blocks. The stone debris has to be managed and the site has to be prepared for the new house construction. Even though the houses were small, people were confused and faced how to manage the debris and demolishing their houses. An orientation on safe demolition and debris management to the community groups was helpful. Owner driven debris management and demolition was visible and proved effective. This was also done in a batch or group through *arma parma*. Ambar Bahadur Tamang shares: “75% of the household learnt from the NGOs staff on how to do the proper management of debris and how to effectively and securely demolish the houses, the area where NGOs was not working came to learn from us and we also helped them to demolish and manage their debris”.

3.9 Demonstration construction of model house

The idea of the demo house was to be constructed so that the trained mason and other affected individuals in communities could see the technology used and the process of construction. This also enhances communities to understand the construction and familiarized themselves with the earthquake resistance technology methods. In the research area of Kispang rural municipality 6 demonstration houses, belonging to affected people who were most vulnerable, were constructed. The community selected the most vulnerable people. These were people who would never construct the house if left, so the community members selected these people. Ram Tamang shares: "Seeing the house style in the model house I decided to build blockhouse. I learned how to check the quality of the block by lifting them up and releasing it over another if that breaks that is of low quality. I learn this from the engineer who came

and taught this method." It shows that demonstration construction also helps in speeding the reconstruction of the houses damaged by the earthquake.

4. Conclusion

This paper outlines the significant accomplishments of housing reconstruction in the post-earthquake situation in Nepal. It discusses how the common factors discussed in the article helped reach the outcomes of post-earthquake housing reconstruction and recovery projects implemented in ward 5 of the Kispang Rural Municipality in Nuwakot district of Nepal. The paper examines successful and failed case studies of reconstruction projects across the world relating to the housing reconstruction. The findings reveal that most post-disaster housing reconstruction projects in Nepal can be labeled successful when the factors discussed above were considered. Reconstruction and recovery projects that are poorly designed at the top level (through top-level policymakers) without consultation and feedbacks of the affected community, implementation of reconstruction and recovery housing project without active community participation, avoiding the local needs and recommendation are most likely to either undergo massive program modification or failure.

Earthquake-affected communities in ward 5 of the Kispang Rural Municipality has shared that different sets of socio-economic engagement of communities have triggered after the earthquake. This has helped in the formation of new social-economic resources among communities through the emergence of earthquake technology, i.e. skill mason groups, working batches, active community shelter reconstruction and recovery committees that brought the community together and increased meaningful community participation in recovery and reconstruction (Audefroy, Joel F, 2010). Without community participation and support, the owner-driven model would not be useful.

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