

# Critical Success Factors for Post Disaster Housing Recovery: A Community Perspective from Central Hills of Nepal

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**Abstract**— Earthquake in Nepal comes among the top 10 hazards types in Nepal<sup>1</sup>. Devastating earthquake, epicenter in Barpak of Gorkha district on 26<sup>th</sup> April, 2015 has impacted vast communities in Nepal. Out of 75 districts, 14 districts were badly affected. Nepal as a state and national government agencies struggled to cope with the scale of death and destruction, rescue workers, citizen groups and non-governmental organizations from around the world poured into Kathmandu within few days to provide immediate Search and Rescue and emergency relief. Communities affected by the earthquake received swift search and rescue operation, followed by emergency humanitarian relief response during first few weeks. Later many communities received support from different source for short-term recovery to long-term recovery and reconstruction. Government of Nepal introduced a significant 5 years recovery framework for the recovery of earthquake affected communities. Recovery framework which includes private housing recovery and reconstruction was implemented by Government of Nepal, Nepal Reconstruction Authority and implementing partner's organizations with various mixed results and outcomes.

Despite many significant supports and efforts to achieve success in the housing recovery many organizations and Government of Nepal (NRA) is finding it challenging. Different projects implemented in different districts and different communities yielded mixed results. Because of yielding mixed results and disquiet from public, the post-disaster housing recovery is becoming the concerns and dilemmas to many concerned stakeholders in Nepal. Having said that, it is obvious, that private housing recovery is a complex in nature and is a slow process which is knotted with social, economic, and political dimension. The multi-dimensional nature of housing recovery requires a holistic integrated approach that interprets and weaves its numerous dimensions for achieving success. This study serves as a valuable resource by highlighting the key multi-faced dimensional issues for critical success factors for post-disaster housing reconstruction and recovery.

**Index Terms**— disaster, earthquake, community-based, recovery, housing reconstruction, Nepal earthquake

## 1 INTRODUCTION

Successful result oriented private housing recovery implementation in post-disaster situation has been the concern and priors intentions of the Government and international humanitarian and development organizations worldwide. Emergency relief is perceived to be effective as it happens immediately; however, housing recovery and reconstruction project often faces challenges for the successful implementation. The unsatisfactory performance of housing recovery and reconstruction projects has been a concern of Government and international humanitarian development organizations worldwide. (Berke and Beatley, 1997) note that, the historically post-disaster housing recovery has received the least amount of attention from hazard researchers, and is the least under-

stood area of study within the hazards field. This seminar paper attempts to address this gap in knowledge by examining post-disaster housing recovery processes and outlines and discusses on critical success factors that contribute to the successful earthquake housing reconstruction and recovery in the mid-hills of Nepal.

This paper is a form of a larger Ph.D. research paper, investigates briefly the positive impact of the successful housing recovery of the earthquake affected communities in Nuwakot district of Nepal. This research is conducted in a collectivist society where people individual decisions are heavily impacted by the group's points of views. Achieving disaster affected

<sup>1</sup> The other hazards include: epidemics, landslide, flood, fire, thunderstorm, accident, cold wave, boat capsizing. The entire territory of Nepal lies in a high seismic hazard zone.

housing recovery success after the major disaster has been challenged to Government and many I/NGOs and humanitarian organizations. There is a clear need for the systematic research on understanding challenges and factors for success in housing recovery projects (Chang, Y.S et.al, 2010). A comprehensive review of the literature was conducted to explore and explain some of the reason for a successful post-disaster housing recovery and reconstruction.

### GORKHA EARTHQUAKE

Nepal Gorkha earthquake was triggered on 25<sup>th</sup> April 2015 at 11:56 a.m. local time, on 7.8 Richter scale has been found to be one of the fatal disasters in Nepal<sup>2</sup>. Following the classification of the size of the earthquake by Nepal's Department of Mining and Geology, the Gorkha earthquake is a strong earthquake.

The epicenter was in Barpak of 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 heavily affected. According to Nepal's Department of Mining and Geology, a total of 447 earthquakes having 4 or more Richter Scales occurred in between April 25, 2015, and April 22, 2016. After this initial strong earthquake, hundreds of aftershocks occurred in Kathmandu valley and surrounding hills and mountains areas. There were 4 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 establish NRA and developed a more focused policy for earthquake recovery using PDNA<sup>3</sup> a strategic earthquake impact management frame-

work. The largest 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.”<sup>4</sup> Because of the massive reconstruction work, the Government of Nepal decided to establish NRA, the establishment of NRA indicate 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, etc.) and participatory collaboration among government agencies and stakeholders (people, public, and private agencies in the affected areas).

### RECOVERY FRAMEWORK AND NEPAL RECONSTRUCTION AUTHORITY (NRA)

Nepal Government has to perform almost from zero for the earthquake recovery. Despite all the policies and acts, Nepal Government established a separate institution called Nepal Reconstruction Authority (NRA). The institution in document stated will remain autonomy, however, in practice has to shuffle the similar bureaucracy challenges in channelizing funds from other ministries.

The Post-Disaster Needs Assessment (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 and 12 May 2015 and the subsequent aftershocks, and over half a million homes were badly damaged or destroyed, primarily in rural areas. Nepal government 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. This was

<sup>2</sup> <http://www.usaid.gov/press-releases/2015/04/20150425-nepal-earthquake>

<sup>3</sup> 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).

<sup>4</sup> World Bank, The Housing Recovery Project Documents, 2016

because NRA as an institution had to begin from zero developing financial and human resources and a concerted multi-pronged effort to address short-term requirements, develop a policy and institutional framework, design a financing strategy, and put all the implementation arrangements in place<sup>5</sup>. In order to get people back into safer, permanent housing, the Government of Nepal and major donors developed the Nepal Rural Housing Reconstruction Program (RHRP). Through this program, reconstruction cash grants, disbursed in three tranches, are provided to eligible beneficiaries to aid them in building earthquake-resistant houses.

At the beginning, the recovery policy did not include I/NGOs and humanitarian organizations in private housing reconstruction process. The government of Nepal, Nepal Reconstruction Authority wanted them to get involved in other structures like schools, health posts. Later after consultation and the requirements for the private housing reconstruction being high, the Reconstruction and Rehabilitation Policy 2072 (2016) provides the policy instrument for working with non-governmental organizations.

The Central Bureau of Statistics (CBS) of Nepal was involved in conducting a comprehensive census of damage to the housing in all 14 severe affected districts. The survey was the basis of the rural housing reconstruction program. NRA prepared the eligibility criteria, based on those eligibility criteria, as analysis of the survey results generated a list of eligible household that receive support. The name lists of all the eligible households were sent to respective VDC or Municipality. After VDCs received the name list all the eligible beneficiaries were enrolled through a legally binding *Participation Agreement* (PA) with their respective VDC. The PA outlines the enti-

tlements and obligations of both parties regarding key details of the program 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 of the land where houses are constructed. The agreement was the foundation for receiving cash-based assistance, provided in tranches. First trench of Nrs. 50, 000 second Nrs. 100000 and third Nrs.100000 was set originally, whereas the government of Nepal increased Nrs. 50,000 more with the total of Nrs. 300000 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.

The housing recovery framework of NRA and Nepal government design is highlighting owner-driven model, where beneficiaries will be supported with socio-technical assistance; training and market facilitation; and, upon certification of the utilization of earthquake-safer building techniques guided by Nepal's National Building Code (NBC). Each affected district has engineers working who inspect the stages of construction and certify, based on the certification government of Nepal entity provide money to beneficiaries respective bank account. Beneficiaries can withdraw the money and build their houses. The final stage of the program cycle is the completion of the house; the beneficiary will obtain the "Building Construction Completion Certificate", which precedes the occupancy of the housing unit.

## METHODOLOGY

For assessing the Post disaster housing recovery in Nepal, the academic and gray literature sources that state recovery and reconstruction in Nepal and other disaster affected countries were searched and reviewed. The searched research papers,

<sup>5</sup> Nepal Earthquake 2015, Post-Disaster Recovery Framework, National Reconstruction Authority Government of Nepal Kathmandu, April 2016

articles, and reports were screened to identify success and failure cases in housing recovery process in Sri Lanka, Indonesia, India, and Philippines. This article compares the cases from these countries with Nepal earthquake shelter recovery. I/NGO and Government funded recovery project is implemented in ward 5 of Kispang Rural Municipality; out of 996 HH, 789 HH were destroyed by the earthquake out of 789 HH, 316 HH were interviewed for the research papers. These 316 HH were selected randomly in ward 5 of Kispang Rural Municipality in Nuwakot district. The micro-analysis was chosen as an approach to assess the critical success factors in the view of the 316 earthquake affected communities in Ward 5 of Kispang Rural Municipality. The findings and recommendations in this report are the product of a meta-analysis of 316 house hold survey questionnaire studies performed by questionnaire survey. Out of the selected households 199 respondents were male and 117 were female. 248 respondents were head of the household and 67 were the family members.

## DISCUSSION ON KEY FINDINGS

### I. Meaningful Participation of the Beneficiaries from the Affected Communities

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

is always a high risk of destroying community cohesion (*Ophi-yandri, T et.al, 2010*).

In Kispang Rural Municipality, ward 5 of Nuwakot district, the community at the beginning did not want to participate in the reconstruction that was scheduled by NGO, 85% of the respondents said they wanted organization builds their house without community involvement. What changes the community? Why Kispang ward 5 was the one that started construction early and completed houses? The outcomes of the successful private housing in Kispang ward 5 are possible because of the community meaningful participation. Over 29 community meetings were done to make the community understand the concepts of Owner driven (Community driven) model and community meaningful participation in housing reconstruction. Separate several information sharing meetings on Government policy and framework were conducted to make the community aware of the process of housing amount disbursement, banking procedure and recovery framework of Nepal government.

In Haiti and in Bangladesh, housing recovery project implementation without community meaningful participation cause tension, this stood as a reason for the project failure (*Alam, K. 2010*). Nepal Government NRA introduced Owner Driven model which is different from Aceh, 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.

Right after disaster communities have many questions and concern regarding disasters, its impacts, risk, prevention, how to rebuild, what support are available, where to find medical treatment and how to survive<sup>6</sup>. Communities wanted to be safe from the impact of the future disaster. But many time communities lacks right information and consultation. Examples of a Sri Lankan Government where the Government made a decision and prepare a buffer-zone policy preventing the building of certain structures within perceived tsunami tide reach areas in 2004. The policy did not involve the meaningful participation of the affected communities which delay the recovery and housing reconstruction, after affecting and disruption for over a year, the policy was amended in December 2005 (Shaw, J and I Ahmed. 2010).

Communities of Kispang Rural municipality ward 5 were consulted, shared information and prepared for the construction. They received much information on recovery framework and how tranches cash support is received. Their concern on the support was minimized and their concern about design, materials, and process of 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 builds their houses. Community confident was built before community fully participated in the construction work. After communities confident were build, community-created Housing Reconstruction Coordination Committee in each working areas who guided them through the process. Housing Reconstruction Coordination Committees were the foundation of community participation and engagement in the housing recovery and reconstruction. Collective decisions on buying materials in bulks, building a house through "Arma-Parma" (Voluntary labor sharing)

were implemented by communities themselves.

## II. Presence in the Community

## III. Owner Driven Reconstruction and Recovery Model

In the aftermath of Gorkha Earthquake, homeowners in Nu-

wakot 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, introduced owner-driven model. The project was supposed to start in December 2015, however, it could not start until August 2016. Leerum and Arora, highlights that over the last two decades, centralized donor-driven reconstruction programs that standardize home design and construction for large-scale implementation through single model 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 rebuilt and the scattered nature of earthquake-affected settlements and difficulties with the geographical situation in Nepal earthquake-affected districts, a decentralized ODRR approach was implemented as a model for reconstructing houses affected by the earthquake in Kispang Ward 5 of Nuwakot district. 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, almost all houses in rural areas are constructed by owner with their traditional knowledge, and they build their house as per 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

Community meaningful participation is a challenge unless organization or government entity has its strong presence in the community. Community easily gets confused, overwhelmed and frustration, if these emotions are not handled timely there is always a chance of failure. Many times full satisfying information rarely forthcoming to the communities. While GOs and I/NGOs have played a key role in making humanitarian relief and recovery participatory, many times organizations have limited outreach. Many communities' people in Kispang Rural municipality in Nuwakot 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, information on designs and process and procedure of tranches transfer. 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". During the beginning of the enrolment and first trench distribution in Nepal, there were no local level government presences. 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 ease the community, elected representative diminish the vacuum of the government entity that NRA has felt missing.

In many cases, organizations have their offices in district headquarters and their staff travels to the field or site during office hours. The door to door outreach may not be possible if the staff does not know the community, their culture, and houses. The success model that was visible in

<sup>7</sup> Presence means staff live in the community, sharing the culture in the field. In Kispang, the staff of the NGOs were living from Sunday to Friday.

Sri Lanka and Thailand. Three years after Pakistan's earthquake in 2005, 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) designed using an ODRR framework (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. However in many cases, along with the pressure of rebuilding the private housing and settling them quickly after an earthquake, many decision-makers, stakeholders have often paid more attention to the speed of project completion than complex social needs of an owner who is building his own house. As a consequence in many case authorities generally prefer to relocate affected communities to a safer area, regardless of internal displacement. In addition, with the aim of minimizing cost and optimizing house layouts, the state also adopted the principle of standardization of housing projects. However, such approaches have been criticized by many researchers 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 successfully. 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 often con-

sidered as most viable and least costly option (Green, 2008).

#### **IV. Acknowledge and Heed the Local Needs**

While conducting the research many earthquake affected individuals in ward 5 of Kispang Rural Municipality in Nuwakot showed that affected communities do have the ability to overcome disasters and rebuild the houses as per their needs and requirements. However, they also showed that their knowledge about their needs is important during the reconstruction of houses. In 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. 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. The door to door outreaches were very helpful in helping the house owner finalize the design with detail material list and cost. The earthquake affected communities in ward 5 of Kispang Rural Municipality believed that traditional approach to housing construction was to blame for the loss of lives and houses, so as a result, the materials for house construction were changed. Most of the houses were constructed by stone before the earthquake but after the earthquake brick, rebar and blocks were used to construct the houses. Despite materials being changed traditional and local housing techniques were still considered.

Along the construction, community realized the needs of roads so that construction materials are transported to the construction site. Community engagement with NGOs constructed 2 new track of road that never had access before. Materials were easily transported and houses were constructed.

#### **V. Housing Reconstruction and Recovery is a Process**

In any disaster usually two modes of construction are practiced, i.e. is owner driven and contractor or donor driven. Previously there was a discussion on owner driven reconstruction and recovery model. If the affected communities are allowed to build back, in an owner-driven approach it is common for construction processes to include the same inadequate traditional building practices, uses of same traditional building practices leave householders at risk from future disasters (Green, 2008; Coburn & Spence, 2002; Parrack, et al., 2014). Nepal Reconstruction Authority (NRA) introduced "build back better, through owner-driven model", this has to consider many factors like shortage of resources, logistical difficulties with transportation of materials and portages, land acquisition, and demolition & site preparation. (Verby et al, 2007) highlights that without considering all the dimensional of housing reconstruction and recovery, the housing recovery and reconstruction will fail or delay.

In Nuwakot ward 5 of Kispang Rural Municipality, housing reconstruction and recovery was introduced in a process and found these factors mentioned below were introduced:

#### **Conflict Management and Community Reconciliation:**

Kispang ward 5, in Nuwakot district, is an inhabitant of Tamang communities. While conducting the assessment 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. Without the initiatives on handling conflicts among neighbors, it was very difficult to bring people together and form batches for the construction of houses. 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.

There were many land tenure related conflict and issues in the communities. The land was in the name of forefathers whereas they were not divided among many brothers and sisters. The land conflict between relatives and with neighbors was highly visible which needed resolution before the reconstruction of houses. Without resolving the land issues there was no probability of housing construction. NGOs and organization involved in housing reconstruction dealt with individual conflict and reconcile.

**Batch Formation for Construction:** Owner driven model is possible only when community participates in supporting one another. One individual cannot build a community, there is a need for a group of people who can support one another and build their houses. After the conflict management and reconciliation batches were formed. A batch is a group of people living in a cluster area nearby where they can support one another while constructing houses. There were 20 batches with 288 peoples. One batch has 6-9 members of people depending on the geography, socio-economic and vulnerability. Most vulnerable cannot build the house by them so the batch model incorporates all the people and built houses of each individual involved in a batch one by one. There is a traditional model in a Middle hill in Nuwakot district where people helping one another during cultivation, harvesting, birth-funeral occasion. This helping one another in local Tamang term is "Arma-Perma"

**Earthquake Resistant Construction Techniques Training:** Housing reconstruction and recovery after a disaster are essential for safety, good health and livelihood resto-



ration 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 are new in the Kispang Rural Municipality ward 5, community, without proper skills and knowledge on earthquake resistant construction and techniques housing construction may be prohibitive for many householders. The government of Nepal has introduced many building codes and standards. 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, who is one the mason who build houses before the earthquake share, "I built over hundred houses, but I regret not knowing the earthquake resistant construction techniques", I regret that people died and losses 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 109 individuals. Similarly, 40 individuals who were never involved in mason work were also selected and provided 50 days on the job training for 40 individuals. Substantial manpower's were produced before the construction of houses.

**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."<sup>8</sup> In ward 5 of Kispang Rural Municipality, there were over 997 houses that needed reconstruction and their debris needed to manage. Almost all houses were built by stones, communities wanted to change the construction materials and use brick, and blocks. All the stones have to be managed and the site has to be prepared for the new house construction. Even though the houses were small, people were confused on how to manage the debris and demolish their house. 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".

**Formation of Community Shelter Reconstruction and Recovery Committee:** Local communities seek information in many cases they seek information in a local language and from their own community members. The communities being a collectivist society listen to elderly and local leaders. It was found that there were 3 shelter reconstruction and recovery committees. The composition of the committee was elderly, local leaders, women that represent each tribe and composition in the community. The committees maximize the involvement of local communities for information sharing, for monitoring the progress, supporting the linkages between NGOs/Government in reaching information, connecting with a technical person for inspection of the houses. These committees were the foundation for holding community meetings and sharing information about the reconstruction, technical requirements of housing, how

<sup>8</sup> FEMA Disaster Assistance Policy 9523.14, Page 2, Published 2007

to get the cash support and when to call and how to call for the inspection of the house being constructed.

**Demonstration Construction of Model House:** The idea of demo house was to construct so that the trained mason and other affected individuals and people in communities could see the technology used. This also enhances communities to understand the construction and familiarized with the earthquake resistance technology methods. In ward 5 of Kispang rural municipality 6 demonstration houses of affected beneficiaries who were most vulnerable were constructed. 6 affected beneficiaries who would never be able to construct the house were selected on the basis of vulnerability assessment which is 1) single women with young children 2) old elderly people 3) female-headed house with old people 4) disabled people 5) Dalit and marginalized poor people. Based on the criteria Community Shelter Reconstruction and Recovery Committee and communities recommended the names of the people.

**Tools Distribution for Construction:** Without the proper tools for construction the housing recovery would not be successful. All 20 batches received tools for construction which helped the communities construct the houses. The basic tools for construction are a requirement when communities choose different house than that of their old one.

**The door to Door Technical Assistance:** Earthquake resistance technology transfer is a very new component in earthquake-affected ward 5 of Kispang Rural Municipality in Nuwakot. The mason training trained over 149 individuals; however, the challenge on quality of technical assistance was assured by teaching community members

on the standardization of materials. Many communities' members stated that they learn how to check the quality of materials.

*Ram Tamang, shares "I built 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."*

Many people in Ward 5 of Kispang Rural Municipality stated that engineers and a technical person from NGO perform household orientations and outreach, where the orientation and outreach are throughout every day until the houses are constructed.

## Conclusion

This paper outlines success factors for post-earthquake housing reconstruction and recovery and discusses how these common factors were helpful in reaching the outcomes of post-earthquake housing reconstruction and recovery projects in ward 5 of Kispang Rural Municipality in Nuwakot district of Nepal. The paper examines successful and failed case studies of reconstruction projects across the world. The findings reveal that in the majority of post-disaster housing reconstruction projects can be successful when these above-mentioned factors are considered. Reconstruction and recovery projects that are poorly designed at the top level (through top-level policy makers) without consultation and feedbacks of the affected community, implementation of reconstruction and recovery housing project without effective community participation, avoiding the local needs and recommendation are most likely to either undergo massive program modification or fail.

Earthquake-affected communities in ward 5 of 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 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). Nakagawa & Shaw highlight that the increase in the social-economic aspect of affected communities can increase the ability of communities to recover from disasters through collective action (Nakagawa & Shaw, 2004).

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