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NSET
Disaster Resilient Communities in Nepal

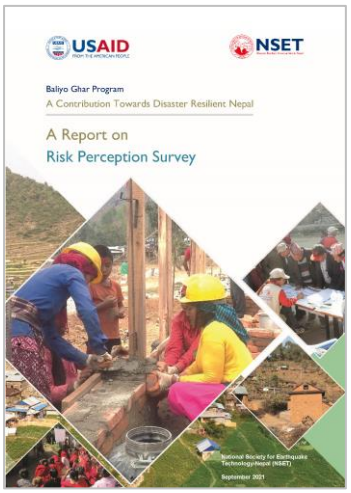
Baliyo Ghar Program

A Contribution Towards Disaster Resilient Nepal

A Report on
Risk Perception Survey

National Society for Earthquake Technology-Nepal (NSET)

September 2021



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Program Period:

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PREFACE

It is of great pleasure to share this report: **"Baliyo Ghar Program- A Contribution towards Disaster Resilient Nepal, A Report on Risk Perception Survey implemented under Baliyo Ghar Program"** to evaluate the effectiveness of the awareness activities carried out by the program implemented under the Baliyo Ghar program. The project was implemented during 2015-2021 by NSET with funding support from the United States Agency for International Development (USAID), Nepal and under the overall guidance and direction of the Government of Nepal, National Reconstruction Authority (NRA).

The Housing Reconstruction Technical Assistance Program, "Baliyo Ghar Program", is a key program of USAID-Nepal's reconstruction portfolio launched after 2015 Gorkha Earthquake that aimed to support Nepal Government's goal of "Build Back Better".

Baliyo Ghar program aimed to provide support to Nepal Government's owner-driven housing reconstruction program, which helped to empower and support homeowners, allowing them to build back safer. The program imparted knowledge, skills, and awareness about earthquake resistant building construction technology to house-owners and local masons. Furthermore, the program assisted the Government of Nepal, related authorities, and partner organizations to develop standards, guidelines, norms, and training curricula.

NSET executed this study to evaluate the effectiveness and impact as well as Baliyo Ghar program's contribution towards overall reconstruction in Nepal. The specific aims of the study are to:

- To examine the effectiveness of BG program in changing building construction practice.
- To understand the extent of social impacts of Baliyo Ghar program
- To assess the contribution of BG program towards sustainability of resilient reconstruction
- To capture and provide evidence and lessons useful for broader stakeholders

Risk Perception Survey was carried out in the entire Baliyo Ghar program VDCs and municipalities using the KAP survey approach. The Baseline Risk Perception Survey was conducted to study the baseline status of the people's perception and practice towards earthquake risk reduction. And as a follow up, End line survey was also conducted using the KAP Survey approach, similar to the one used in the Base line.

This report highlights the objective, methodology, results, discussion, and conclusions of the studies conducted as part of the Monitoring and Evaluation process of Baliyo Ghar program.

We are confident that this evaluation report will contribute on consolidating and sharing post-disaster reconstruction best practices both nationally and internationally. The outcomes of the study will also contribute to the improvement in future disaster management and the development of appropriate strategies for building disaster resilient Nepal. The report will be useful for decision makers, policymakers, and social leaders for future housing recovery planning after disasters. Relevant technical professionals and researchers may also find it a useful resource for better understanding the process of reconstruction in Nepal.

Mr. Surya Narayan Shrestha

Executive Director

NSET

ACKNOWLEDGEMENTS

This study and the report "Baliyo Ghar Program- A Contribution towards Disaster Resilient Nepal, A Report on Risk Perception Survey implemented under Baliyo Ghar Program" have been possible with sincere thoughts and inputs by several individuals, professionals and practitioners in the departments, municipalities, various organizations, and communities. We highly acknowledge the contribution by all institutions and individuals for the study and contribution to this report.

The change in perception of the people was measured to evaluate the effectiveness of the awareness activities carried out by the program and was done by NSET's MEL team with support from the program team.

We would like to thank the Baliyo Ghar program team for their excellent and tireless support in survey preparation, oversight, and data collection and analysis.

We are thankful to the National Reconstruction Authority (NRA), Ministry of Urban Development (MOUD), Department of Urban Development and Building Construction (DUDBC) and the respective local governments for their continuous guidance and inputs. The study might not have been possible without the active support from the reconstruction stakeholders and program beneficiaries. We express our sincere gratitude to all of them.

We extend our gratitude to the United States Agency for International Development (USAID), Nepal, for the funding support and for the continued guidance throughout the implementation of the Baliyo Ghar program.

Monitoring and Evaluation Team

NSET

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LIST OF ABBREVIATION

ANOVA	Analysis of Variance
BG	Baliyo Ghar
CGI	Corrugated Galvanised Iron
CL-PIU	Central Level Program Implementation Unit
DUDBC	Department of urban development and Building construction
DL-PIU	District Level Program Implementation Unit
FGD	Focus Group Discussion
GESI	Gender Equality and Social Inclusion
GoN	Government of Nepal
HRRP	Housing Recovery and Reconstruction Platform
IEC	Information, Education and Communication
INGO	International Non-governmental Organization
KAP	Knowledge, Attitude and Practice
LSM	Load Bearing Masonary
MDTF	Multi Donor Trust Fund
M & E	Monitoring and Evaluation
MIS	Management Information System
MoFAGA	Ministry of Federal Affairs and General Administration
MoFALD	Ministry of Federal Affairs and Local Development
MOUD	Ministry of Urban Development
NBC	National Building Code
NGO	Non-governmental Organization
NRA	National Reconstruction Authority
NSET	National Society for Earthquake Technology
ODR	Owner Driven Reconstruction
PDRF	Post Disaster Recovery Framework
PDNA	Post Disaster Need Assessment
RC	Reinformed Concrete
RPS	Risk Perception Survey
SMM	Stone and Mud Mortar Masonary
SPSS	Statstical Package for Social Science
USAID	United States Agency for International Development
VDC	Villiage Development Committee

EXECUTIVE SUMMARY

The earthquake of April 25, 2015 and the sequence of aftershocks caused 8,700 deaths and around 25,000 injuries. The earthquake sequence destroyed or significantly damaged over 755,000 homes in Nepal. With more than half of the total losses and damages incurred during the 2015 Gorkha earthquake, the private housing sector was the most affected, and evidently became the most prioritized sector during the Gorkha earthquake reconstruction campaign.

With an aim of supporting the Government of Nepal's owner driven approach for the reconstruction of private houses damaged during the 2015 Gorkha Earthquake, the Housing Reconstruction Technical Assistance Project "Baliyo Ghar Program" was conceptualized, developed and implemented by the National Society for Earthquake Technology Nepal (NSET) as a key part of the reconstruction portfolio of USAID/Nepal. Baliyo Ghar Program provided comprehensive technical support to the GoN's reconstruction project, by empowering and supporting communities to "Build Back Better". The program primarily imparted knowledge, skills and awareness regarding disaster resilient construction techniques to earthquake affected communities in four of the most affected districts in Nepal. Further, the program assisted the government in developing policies, guidelines, norms and training curricula to standardize the entire process of reconstruction under the leadership of the Government of Nepal (GoN) National Reconstruction Authority (NRA) and its project implementation units.

During its implementation period, Baliyo Ghar program reached to 166,424 beneficiaries directly through 8,263 different events. 2,554 Engineers, 13,474 masons, 3,202 government officials, 635 social mobilizers and 139 instructors were trained and around 146,559 people were oriented on safer construction.

Of the three intermediate results (IR) of Baliyo Ghar program i.e.., IR1- Improved policy and standardization of training, guidelines and manuals for disaster resilient construction technologies; IR2- Enhanced local capacity to apply disaster resilient construction methods and techniques and IR 3- Increased awareness on disaster resilient construction in Nepal, to achieve the third result, the awareness level of the community was increased through different program activities such as: orientations, door to door technical assistance, information desk, demonstration model, media campaigns etc.

Baliyo Ghar program also assisted Government of Nepal for the formulation of reconstruction related policies and its field implementation. Apart from the capacity building programs for different stakeholders, Baliyo Ghar Program conducted large number of orientation and interaction programs targeted towards a wide range of stakeholders, house owners, masons, engineers, local authorities etc. The purpose of the program was to enhance awareness and capacity of earthquake affected beneficiaries regarding reconstruction policies and earthquake resistant construction technologies. During the program implementation period Baliyo Ghar program oriented 1,46,559 people within

the program districts through 6,893 orientation events. These orientation programs addressed the governments grant facilitation process, and the safer construction techniques adhering the national building code compliance.

To measure the progress of the Baliyo Ghar program activities, a comprehensive Monitoring and Evaluation plan of Baliyo Ghar program was developed which had framed the program output, outcome, intermediate results and impact along with its' indicators. Data source, data collection methods, and mode of analysis were also defined for each indicator.

Change in the perception of the people was measured to evaluate the effectiveness of the awareness activities carried out by the program towards the end. Household level Risk Perception Surveys was conducted by the MEL team with support from the program team and external enumerators. One of the major objectives of the survey was to assess the change in the knowledge, attitude and practice of the people residing in the program communities. Baseline and Endline surveys were conducted to measure the change in the level of awareness of the people before and after the implementation of the program. Baseline was conducted during August-October 2016 while endline survey was conducted towards the end of the program, during January-March 2020 in all the program VDCs/municipalities. Both baseline and end-line study used simple random sampling based on the Stratified Systematic Area Sampling procedure. The sample size was calculated using the following Krejcie and Morgan, 1970 formula. Total number of households in each program wards were treated as population to calculate the sample size in each program wards. The results were extrapolated to the whole population with a confidence level of 95% and error margin of ± 10%. Due to human resource and time constraint, error margin was increased by ± 5% in this endline survey as compared to the baseline error margin.

A total of 3,073 surveys were administered in the three program districts: Nuwakot, Dhading and Dolakha during the endline survey while 9,856 surveys were administered in the then 33 VDCs and 3 municipalities of the three program districts. A follow-up qualitative study was subsequently conducted to further explore and expand on the insights gained from the survey. This report presents the results of the study. The report highlights the significance of awareness activities and change in risk perception towards promoting safer building construction.

As per the Monitoring and Evaluation plan of Baliyo Ghar Program in five years period after the implementation of the program, the Endline KAP score was targeted to increase by 60 % from the Baseline KAP Score. Aggregate KAP score was computed by combining related knowledge, attitude, and practice items and reported as score out of 100. The questions of the KAP assessment were grouped into separate categories. The sum of the scores was taken as the participant's KAP score.

The average KAP score in the baseline survey was 30 (out of 100) and 60% of 30 is 18, which makes the targeted KAP score to be achieved is 48 in the endline. A number of capacity building and awareness raising activities, door to door

technical assistance, and use of various media were done to raise the awareness of people under Baliyo Ghar program. These activities conducted in the Baliyo Ghar program districts were expected to contribute to the increase in the KAP scores of the respondents in the survey areas.

KAP score was computed from the endline study, and the results of the analysis showed that the KAP score increased to 50 during the endline survey which reflects that the set target in the M&E plan has been achieved. The average knowledge score increased from 36 out of 100 to 48, attitude score from 41 out of 100 to 57, and practice score which was 11 out of 100 increased to 46 out of 100. This baseline-end line comparison indicates that each component of KAP i.e., knowledge, attitude and practice score of the community people has been increased significantly. Massive change in practice score indicated that earthquake safe construction practices has been adopted widely by the community people during the reconstruction. This result implies that the reconstruction efforts made by the NRA as well as other relevant stakeholders may have positive impact on reconstruction activities.

The mean KAP score was higher among male respondents in both surveys. Each component of KAP score i.e., knowledge, attitude and practice score were higher in case of male respondents. The respondents in both surveys thought that it was their own responsibility to make community and individual houses safe from earthquake. During the earthquake safe construction respondents had faced many challenges. Among many challenges, lack of resources/money was the major challenge faced by the respondents in both surveys. Other challenges were lack of technology and knowledge, lack of trained human resource, lack of community unity etc. The percentage of the respondents who practiced correct pillar and beam size in RC frame houses has been significantly increased in end-line survey as compared to baseline survey. The practices of involvement of the trained masons fully or partially during reconstruction of houses has been increased significantly in case of end-line survey as compare to the baseline survey. Similarly, the respondents who took technical support during construction has been also increased in end-line survey

Number of factors such as gender, ethnicity, age group, education level, occupation, monthly income, participation in formal awareness program and listening/watching awareness program from different communication medium play the important role to changes the KAP score of the respondent. Most of the variable are significantly related with KAP score.

The survey conducted in the two different time periods; the initial phase and towards the end of the Baliyo Ghar program allowed us to explore similarities and differences in knowledge gained about earthquake-resistant construction techniques in ways that leaded towards earthquake safer constructions.

BG team had prioritized door-to-door assistance in the early days, gathering as much information as possible. Similarly, they also sought help from local leaders who were positive about the program. Interactions were held with beneficiaries and local leaders about the reconstruction policies, their implementation mechanism and grant disbursement process through series of

orientation campaigns and placing information and help desks at different locations. The beneficiaries were made aware about the importance and significance of incorporating earthquake resistant elements, and local masons were trained in several levels to enhance their skills which helped them hone their skills as well practice in field. With intensive and focused social mobilization, people started believing in technical assistance provided. Mobile teams conducted door to door campaigns regularly to aware people of the reconstruction strategies and norms as well as the assistance being provided by Baliyo Ghar Program. The blend of socio-technical expertise gained through these teams provides an ideal mechanism to interact with affected communities and provide effective assistance. This form of assistance is fruitful in earthquake-affected areas that have a reasonably low level of technical knowledge and awareness, especially in disseminating information on technical provisions related to safer reconstruction.

This exploration suggests that there are potential benefits of embedding robust public education campaigns within programs designed for shifting building practices in Nepal. While intensive, it appears that these programs of TV/radio broadcasting, community orientations, and door-to-door engagement may have been an important part of an effective strategy for educating people about these construction techniques but also convincing them of the importance and value of the techniques. The local government and other related stakeholders should therefore allocate more resources towards educating community people for achieving disaster resilient community.

Skill and knowledge transfer to the grass root level is the only solution for becoming safe from future disaster. Safer construction practices will only be achieved by the increased level of awareness of community people, utilization of skills and knowledge obtained by the trained construction workforce and establishment of robust building code implementation system at the local government.

Community people getting information through orientations, Jhule Dolakha

Buildings damaged by Gorkha Earthquake 2015, Dolakha

CHAPTER - 1: INTRODUCTION

1.1 Context of Nepal

Nepal is a small mountainous, land-locked country that lies between India and China. Three geographical division: Terai, Mountain and Himalaya, in a sequential order from south to north, define the county and its risk. The southern plain "Terai" ranges consisting of low elevated land covers only 17% of total land but the majority of population lies in this area. The mountain regions cover 68% of the total area. The northern part of the country is the Himalayas region, an area consisting of snow-covered higher peak, and is the remaining 15 % of total. The climate in Nepal ranges from sub-zero to tropical (DOIB, 2019). Flash floods, inundation and fire are common in the Terai region, debris flow and landslides mostly occur in the mountain and Himalayas whereas earthquake risk is same throughout the country. The entire length of Nepal straddles the boundary of Tibetan and Indian tectonic plates making it highly prone earthquakes. Apart from these major disasters avalanche, torrential rain, draught, thunderstorm, windstorm, hailstorm are natural hazards present in Nepal. Non-natural disasters like epidemics, traffic accidents and conflicts are also regular events disrupting human lives in Nepal. Nepal suffers an average of 900 disasters each year resulting in the loss of life and severe impacts on people's livelihoods (MoHA, 2009).

During the period of 1900-2005, 1674 flood events were reported in the Terai region of Nepal causing nearly 3 million casualties (Aryal, 2012). In 1988, an earthquake of magnitude of 6.5 claimed the lives of over 700 people with over 65,000 buildings damaged (Dixit, Yatabe, Dahal, & Bhandary, 2013). Nepal has a long history of earthquakes, which may be considered the country's most prominent hazard. As many as ten major earthquakes have been recorded in Kathmandu in the past 750 years (Bilham et al. 1997). The destructive earthquake of 1934, and the more recent 1988 Udaypur earthquake are still in the memory of Nepalese people.

In 2011, the M6.9 Sikkim Earthquake resulted in widespread building damage disproportionate to the shaking intensity. Poor construction material quality, construction workmanship, and a lack of adherence to earthquake-resistant construction techniques were identified as important factors in the earthquake's devastation (Rai, Goutam, Singhal, Parool, Pradhan, & Mitra, 2012). In 2015, the M7.6 Gorkha Earthquake resulted in nearly 750,000 houses experiencing damage. Of those, one-third experienced partial damage, broken down as 67% being low-strength masonry, 26% being cement mortar masonry, and just under 7% being reinforced concrete. Among the two-thirds that experienced unrepairable damage or collapse, the vast majority, 95%, was low-strength masonry (GoN, 2015). Notably, while modern Nepali construction seems to perform better than vernacular construction, modern construction itself remains highly vulnerable to seismic shaking (EERI, 2015; Adhikary, 2016). Timber frame construction, however, performed well (Kaushik *et al.*, 2016).

Both rural and urban construction in Nepal include material and construction techniques that result in seismic fragility. In its various geographic regions, cultural differences are also reflected in people's housing traditions. Several different typologies suited to the needs of different communities, occupations, geographic and climatic conditions have been built using local skills, materials, and resources. Housing typologies can be defined based on their design forms, building materials, various construction techniques and structural systems. In Nepal, the predominant walling materials are stone masonry with mud mortar, but one can also find other materials, such as adobe, rammed earth, or burnt brick masonry (**Figure 1**). Similarly, while thatch on wooden under-structure may be the most common roofing typology, one can also find slate stones, wooden shingles or clay tiles. Nepal government has a strategy to replace the thatched roof with modern materials like corrugated iron sheets considering the risk of fire hazard (NUDS 2017). Similarly, recent years have witnessed an increased use of cement as mortar, burnt bricks or concrete blocks for masonry walls, reinforced cement concrete for the structural frame or roof slabs, or CGI sheets as roofing material. As a result, housing and building practices in Nepal presents a rather complex scenario with various newer typologies being practiced alongside the wide range of vernacular housing typologies. This complexity of housing typologies reflects affordability issues, new aspirations, and poses a wide range of socioeconomic and environmental challenges. And to note, majority of the dwellings in Nepal are planned and constructed by the homeowners themselves.

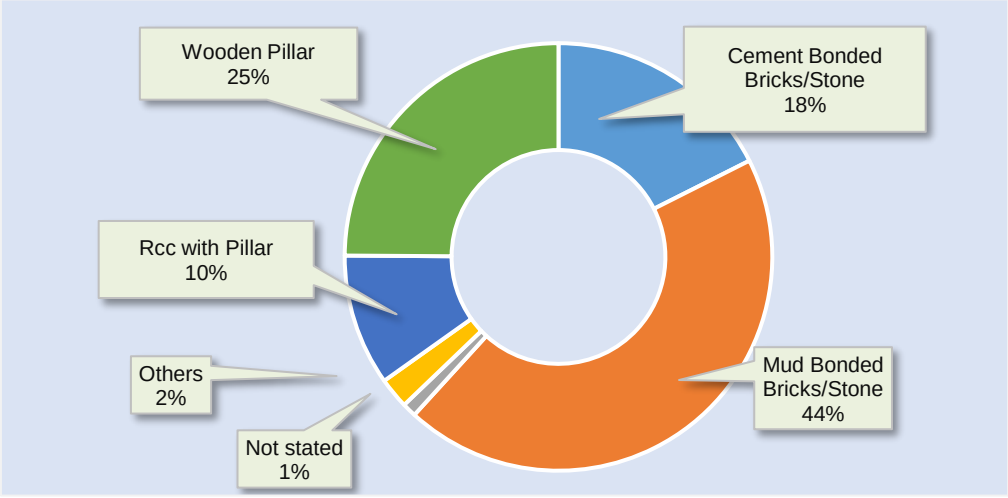


Figure 1. Percentage of Housing Typology as per the foundation of houses

(Source: CBS, 2011)

In urban areas, rapid urban growth and a lack of formal planning or robust adherence to a building code has also led to seismic risk. In particular, the introduction of steel reinforcement bars and cement has led to informal construction of reinforced concrete construction or the addition of new floors on older buildings (Anhorn, Kennartz, & Nusser, 2015). Structural analysis of reinforced concrete buildings with infill masonry walls has been found to be structurally deficient, with the possibility of heavy damage or collapse even at moderate shaking levels of 0.3g (Dumaru, Rodrigues & Varum, 2018). Use of these materials and the "(mal)-adoption of modern construction materials" had led to heightened building stock vulnerability in urban Nepal (Anhorn, Kennartz & Nusser, 2015). Such issues in both urban and rural construction led to the high rate of housing damage and collapse in recent earthquakes.

1.2 The 2015 Earthquake and its Impacts

The devastating 7.6 magnitude Gorkha earthquake of April 25, 2015, and its aftershocks severely affected 31 districts of Nepal in the central and western regions inhabited by 5.4 million people: The PDNA categorized these districts based on damages – 14 districts were categorized as highly affected and 17 as less affected. The GON designated fourteen Districts which comprise 20 % of the population of Nepal as heavily affected areas. According to the assessments by the United Nations (UN) and the GON, these fourteen districts hold more than 90% of the deceased and injured people, heavily affected public facilities and individual housing.

The earthquake caused extensive structural damage; a total 8979 people lost their lives while 22,303 reported injuries. More than 75 percent of the casualties and 22,303 injuries occurred in rural areas (NPC, 2015). A total of 854,992 eligible beneficiaries' houses require reconstruction, out of which more than 600,000 were located in rural areas. It was estimated that the lives of eight million people, almost one-third of the population of Nepal, have been impacted

by these earthquakes. The estimated damage in monetary terms was calculated at USD 7 billion. Post disaster assessments showed that the quakes destroyed at least 498,852 private houses and 2,656 government buildings and partially damaged 256,697 private houses and 3,622 government buildings (NPC, 2015).

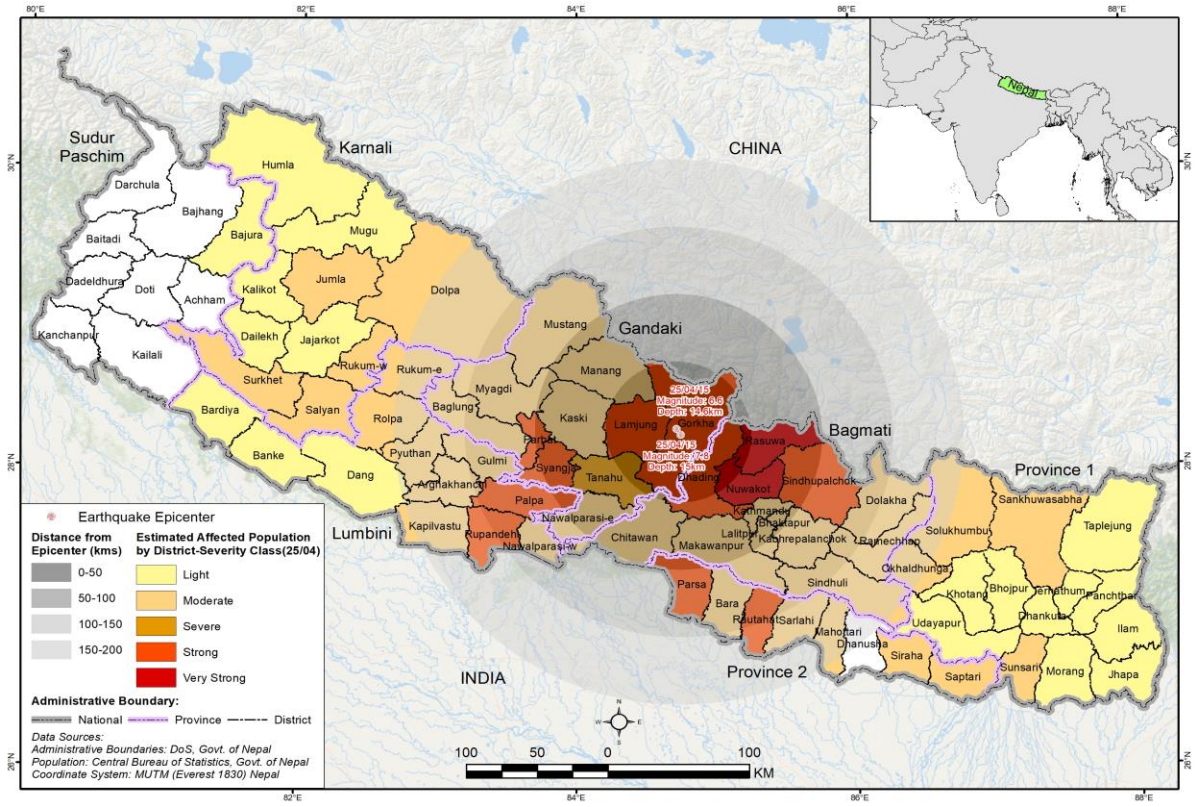


Figure 2. Map showing affected areas by 2015 Gorkha Earthquake

Source: HRRP

The PDNA describes the situation of damage including the estimated monetary amount in four sectors; 1) Social sectors, 2) Productive sectors, 3) Infrastructure sectors, and 4) Cross-cutting sectors, which further consist of relevant sectors. The estimated amount of damage indicated in the PDNA for entire Nepal is shown in **Figure 3**: Social sectors covered 58 percent of the total effects of which 86 percent included housing sector. This was followed by productive sectors (25 percent), infrastructure (10 percent) and cross-cutting issues (7 percent).

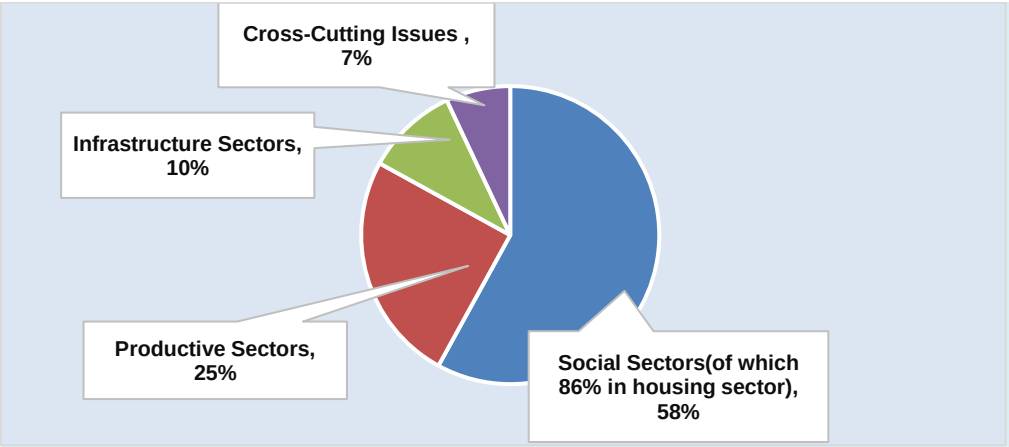


Figure 3. Share of Disaster effects across the sectors
(Source: PDNA, 2015)

The Post Disaster Need Assessment (PDNA) report prepared in 2015 by the National Planning Commission indicated that the estimated monetary value of disaster effects (damages and losses) caused by the earthquakes in the public building and infrastructure component sums up to 159 billion Nepalese Rupees (1.5 billion USD).

Damage to Housing Sector

Large majority of houses in Nepal are non-engineered and constructed by owners themselves through non-formal process. The existing building typology in the affected 31 districts is as given in **Table 1.**

Mostly, old, non-engineered, adobe and masonry buildings found in rural areas of Nepal were collapsed or were severely damaged by the 2015 Gorkha earthquake. In addition, some engineered buildings were also severely damaged or collapsed due to poor workmanship and quality of construction materials. Buildings damaged at grade 5 were mostly found in rural mountainous districts, according to the damage survey by National Reconstruction Authority (NRA 2016a), where low-strength masonry is most prevalent typology. Masonry houses with mud mortar binders are the most common typology in rural context. According to National Planning Commission, in all the affected areas, 96 percent of the damaged buildings were load bearing masonry structures (NPC, 2015). Most of the post-earthquake damage surveys (Goda et al. 2015; Parajuli and Kiyono 2015; Bhagat et al. 2018) reported that these typical load bearing masonry typologies sustained substantial damage due to the absence seismic resistant features like seismic band, through-thickness stones, diaphragm actions. The large damage during the 2015 Gorkha earthquake was in SMM (Stone and Mud Mortar Masonry) typology and contributed significant economic and human losses. SMM typology was the most common construction typology in the country. The contribution of SMM housing typology to the overall damage was more than 60 percent in badly affected rural areas such as Dolakha, Dhading, Nuwakot and Sindhupalchowk (HRRP, 2018). The inconsistent application of seismic resistant features and poor

implementation of Seismic design codes are the main reasons of the poor seismic performance of the residential building stock in the 2015 earthquake.

Table 1: Existing building typology in the affected 31 districts (Ref CBS 2011)

Low strength Masonry	Cement based masonry	Reinforced Concrete Frame	Wood and Bamboo based
58%	21%	15%	6%

The earthquake severely affected 14 districts (Gorkha, Dhading, Rasuwa, Nuwakot, Kathmandu, Lalitpur, Bhaktapur, Kavrepalanchowk, Sindhupalchowk, Dolakha, Sindhuli, Makawanpur, Ramechhap and Okhaldhunga) and another 31 districts affected to varying extents. According to the Post-Disaster Needs Assessment (PDNA) report, at least 500,000 buildings require reconstruction, and another 250,000 buildings require retrofitting and/or repair. In this way, this devastating earthquake has affected vast parts of Nepal and left deep scars in the economy and infrastructure of the country.

Damage to Social Sector

In mega disaster like Gorkha 2015 earthquake, a nation can be socially and economically affected not just for days or months, but for many years. In PDNA report Housing, Health & Population, Nutrition, Education and Cultural Heritage damage and losses were incorporated within the social sector. Within the different sectors housing sector required largest need followed by education sector (Table 2). Nearly 80 % of public health facilities were damaged and many of the government offices providing social services have been destroyed during the Gorkha 2015 earthquake in earthquake affected districts (HEOC, 2015). About 5.37 million population of the most-affected 14 districts of remote rural communities had faced many challenges in accessing social and economic services. As per the Government polices community infrastructure has covered seven sectors: rural transport, water supply and sanitation, irrigation, electricity, community buildings, social infrastructure, and solid waste infrastructure. The damage and losses to the components; trails bridges, footpaths, community buildings and micro communal works, amount to NPR 3.3 billion (US$ 33.5million) (PDNA, 2015).

The damage to community infrastructure has larger impacts of earthquake on 14 severely affected districts. Damage to community infrastructures has a negative social impact on villagers, particularly women who are responsible for household chores and looking after livestock as well. The damage to local infrastructure had a negative impact on economy, social and quality life by reducing productivity and access to key services such as electricity and drinking water.

Table 2: Summary of total needs within the social sector

Sector	Total Needs (NPR million)	Total Needs (US$ million)	Share of Needs by Sector
Social Sectors	407,747	4,077	60.9%
Housing	327,762	3,278	49.0%
Health	14,690	147	2.2%
Nutrition	5,056	50	0.8%
Education	39,706	397	5.9%
Cultural Heritage	20,553	206	3.1%

Source: PDNA Report

1.3 Post-Earthquake Reconstruction Process

Government of Nepal's housing reconstruction program was based on key principles derived from its own past learnings, international experiences and best practices of other housing programs. The program's four principles are: Owner driven construction, Equity, Safer Construction and Transparency and Accountability.

Owner Driven Construction: The program equips homeowners with multi-faceted support to direct the reconstruction of their home. It provides socio-technical assistance, training, market facilitation and cash-based subsidies, among other forms of assistance.

Equity: All beneficiaries receive the same subsidy amount of NPR 300,000 (about $3,000) to rebuild their home. This cash assistance was provided in three tranches, to ensure that earthquake-safer techniques are used in alignment with the government's national building code (NBC).

Safer Construction: Reconstructed housing is being rebuilt in a more resilient manner in order to withstand future disaster events. Key components of the program included technical assistance on resilient designs for housing, recommendations on appropriate local materials and the training of engineers, masons, and homeowners regarding resilient techniques, practices, and earthquake-safer materials.

Transparency and Accountability: The program included many features to ensure that the principles of transparency and accountability are respected. They include third-party monitoring and evaluation of transparency, the fairness of the program, and beneficiary satisfaction. The program also includes a formal grievance redress mechanism to register and address complaints by beneficiaries. In addition, the Management Information System (MIS) has been designed and implemented to monitor the project's physical and financial progress and to ensure fundamentals of transparency and accountability in the process (MDTF, 2015/16)

Additional elements of the government's housing reconstruction program included: A uniform and simple housing reconstruction and rehabilitation policy that is applied to all reconstruction, regardless of the funding source, with

responsibility shared by qualified development partners, under the overall guidance of the Government of Nepal. The program promoted a harmonized approach to reconstruction; Updating and dissemination of earthquake-safer construction standards, housing designs and construction practices, using accessible, affordable, and culturally appropriate materials, and construction methods flexible to reflect local realities. This facilitated resilient construction in the rebuilding process; Primarily in situ reconstruction followed except where relocation is necessary due to land vulnerability or loss of original location and Effective communication to the public throughout the process, ensuring effective feedback mechanisms.

1.3.1 Major Stakeholders of Reconstruction

The National Reconstruction Authority (NRA) is the lead government agency for all post-earthquake reconstruction activities and has a wide mandate relating to the coordination and facilitation of recovery and reconstruction works. Owner driven reconstruction approach was adopted by NRA and implemented by multi-stakeholders. Different reconstruction policies, frameworks and guidelines were prepared and implemented as per the need.

The NRA was mandated to work closely with a number of other government ministries. The Ministry of Federal Affairs and General Administration (MoFAGA), through its Central Level Program Implementation Unit (CL-PIU) and District Level Program Implementation Units (DL-PIUs), held primary responsibility for the disbursement of the housing grant. Primary responsibility for technical standards and staffing for housing reconstruction were the responsibility of the Ministry of Urban Development (MoUD), through its CL-PIU and DL-PIUs, as well as the Department of Urban Development and Building Construction (DUDBC). Later, these CL-PIUs and DL-PIUs were brought under the umbrella of NRA itself and operated in coordination with MOFAGA and MOUD. A Multi Donor Trust Fund (MDTF) assisted the NRA and supported the government-led Earthquake Housing Recovery Program (EHRP). The main partners involved were the World Bank, USAID, SDC, the Government of Canada, and DFID. The fund also worked closely with JICA and other development partners. The Housing Recovery and Reconstruction Platform (HRRP) further provided assistance through strategic planning and technical guidance to agencies involved in recovery and reconstruction and to the Government of Nepal, supporting the coordination of the national reconstruction program and facilitating coordination with other stakeholders (http://hrrpnepal.org). Apart from the central governing bodies NRA and it's PIU's and local government, the role of civil society, development partners and private sectors was highly supportive. Civil societies were important actors for delivery of social services and implementation of development programs, as a complement to government action (Mercer 2002). Development partners like I/NGOs, local civil society organizations, academic sectors, research organizations were another important aspect of the reconstruction as they were equipped with high-quality resources and were thus critical to accelerate the reconstruction mega campaign.

1.3.2 The Owner Driven Approach

Owner Driven Reconstruction (ODR) is identified as a dignified approach encouraging individual homeowners to implement safe building design and construction in disaster affected areas. ODR is a participatory and bottom-up approach which places homeowners at the centre of reconstruction, integrating homeowner's decisions on housing design and site selection for house construction with building techniques tailored to local environments and resilient to environmental hazards. Reconstruction mega campaign was initiated by Government of Nepal under the leadership of National Reconstruction Authority (NRA) with adopting 'owner driven reconstruction' approach for the housing reconstruction. Effectiveness of owner driven reconstruction in the context of developing countries has been well documented in past similar recovery experiences (Duyne, 2006). Noticing concerns of the vulnerable populations identified in PDNA, strategic objectives of PDRF included specific points to guide policy formulation. In the owner-driven reconstruction process, financial assistance as well as support for technical, material, supervisory, training and social facilitation is provided by government assisted mechanisms by which homeowners build back better with improved hazard resilience. Public infrastructure and private houses are encouraged to use locally available materials. Tax concessions were granted for building materials for a certain duration, to facilitate material supply.

1.3.3 The Socio-technical Assistance

Socio-technical assistance refers to the combination of various tools and techniques aimed at enhancing the knowledge and skills of all stakeholders involved in the process of reconstruction. Socio-technical assistance broadly included three types of support to the house owners: i) raising the demand for safe housing by enhancing communities' awareness on earthquake resilient building technologies; ii) capacity building of local builders to deliver disaster resilient houses; and iii) ensuring compliance with construction guidelines at local, district, and central level through support, facilitation, and enforcement mechanisms.

To ensure the reconstruction of disaster-resilient housing and with the support of different donors and partners, NRA implemented various socio-technical assistance program through training, awareness raising and information dissemination efforts. **Figure 4** shows the different components of socio-technical assistance being implemented in Nepal's Reconstruction.

Figure 4. Different Components of Socio-Technical Assistance Implemented in Nepal's Reconstruction

1.4 The Baliyo Ghar Program

The Housing Reconstruction Technical Assistance Program, "Baliyo Ghar", is a key program of USAID-Nepal's reconstruction portfolio launched after 2015 Gorkha Earthquake that aimed to support Nepal Government's goal of "Build Back Better". NSET implemented the program under Cooperative Agreement AID-367-A-15-00005 during the period from October 1, 2015, until September 30, 2021. "Baliyo Ghar" program aimed to provide support to Nepal Government's owner-driven housing reconstruction program, which helped to empower and support homeowners, allowing them to build back safer. The program imparted knowledge, skills, and awareness about earthquake resistant building construction technology to house-owners and local masons. Furthermore, the program assisted the Government of Nepal, related authorities and partner organizations to develop standards, guidelines, norms, and training curricula.

The Baliyo Ghar program has two-fold goals; in shorter-term, the program aimed at ensuring earthquake safer construction of all houses being reconstructed; and for longer-term, the program aimed to establish a system of disaster-resilient construction to achieve the goal of disaster-resilient communities in Nepal.

The goals are achieved through the following three Intermediate Results (IRs):

- IR 1: Improved policy and standardization of training, guidelines and manuals for disaster resilient construction technologies
- IR 2: Enhanced local capacity to apply disaster resilient construction methods and techniques
- IR 3: Increased awareness on disaster resilient construction in Nepal

Baliyo Ghar Program contributed to the overall reconstruction program of the Government of Nepal through mobilization of technical assistance at three levels: national, district and local. **Figure 5** shows the major program activities at the three levels.

Figure 5. Baliyo Ghar Program activities at National, District and Local levels

Baliyo Ghar program implemented its activities in four (4) of the fourteen (14) severely affected districts by the Gorkha earthquake 2015, namely, Dhading, Dolakha, Nuwakot, and Kathmandu. **Figure 6** shows the coverage of Baliyo Ghar Program.

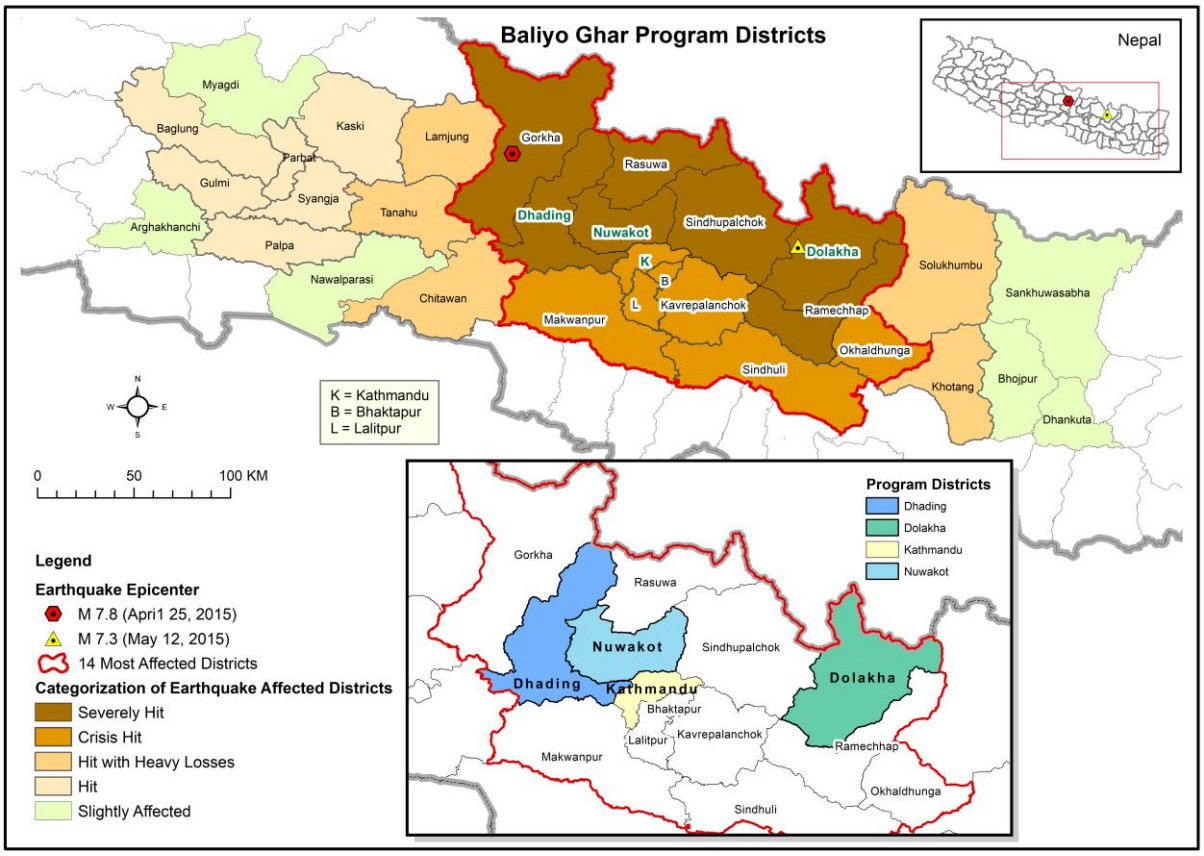


Figure 6. Earthquake affected and Baliyo Ghar Program districts

The **Table 3** below highlights the program coverage in terms of number of wards and beneficiaries within the four program districts. In these four districts, Baliyo Ghar program covered 23 wards of 3 Urban Municipalities (UM) and 43 wards of 12 Rural Municipalities (RM), 66 wards of 15 municipalities in total. Similarly, in terms of number of earthquake housing reconstruction beneficiaries, Baliyo Ghar provided direct technical assistance to 61,444 out of total 274,910 beneficiaries in the four districts. In total, 16.6% of the wards and 21.74% of the listed beneficiaries of the four districts have been covered with blanket technical support through Baliyo Ghar Program.

Table 3: Coverage of Baliyo Ghar Program in terms of wards and beneficiaries

SN	Name of Districts	District Total		BG Coverage		BG Coverage (%)	
		Mun. (wards)	Beneficiaries	Mun. (wards)	Beneficiaries	Wards	Beneficiaries
1	Dhading	13 (104)	84,393	6 (31)	26,614	29.81 %	31.54%
2	Dolakha	8 (67)	72,859	5 (21)	24,143	31.34 %	33.14%
3	Nuwakot	12 (88)	78,770	3 (11)	8,983	12.5%	11.40%
4	Kathmandu	11 (138)	48,612	1 (3)	2,127	2.17%	4.38%
Total		44 (397)	284,634	15 (66)	61,867	16.6%	21.74%

1.4.1 Socio technical assistance under Baliyo Ghar Program

Figure 7. Baliyo Ghar Program strategy, key areas of interventions and relevant stakeholders

The program primarily imparted knowledge, skills and awareness regarding disaster resilient construction techniques to earthquake-affected communities in four of the most affected districts in Nepal. Further, the program assisted the government in developing policies, guidelines, norms and training curricula to standardize the entire process of reconstruction under the leadership of the National Reconstruction Authority (NRA) and its project implementation units. The program covered a wide range of stakeholders targeted through its comprehensive technical assistance for awareness, capacity building and institutional improvements as shown in **Figure 7.**

To enhance the local, district and national capacity to undertake the reconstruction process, the program targeted mainly six groups of beneficiaries at different levels:

1. **Construction workers** – masons (brick layers, stone layers, concrete workers), carpenters, bar benders, contractors; termed "mason" in general
2. **Social Mobilizers** – community mobilizers, social activists
3. **Technical professionals** – Structural and Earthquake Engineers, Civil Engineers, Architects, Sub Engineers, Assistant Sub Engineers deployed in earthquake affected areas by GON, local governments and partner organizations
4. **Common People** – house owners, beneficiaries, consumer groups, clubs, and community-based committees
5. **Policy and decision makers** – elected representatives and officials at local (rural and urban municipalities), provincial and central level governments,

district and central level NRA officials and PIUs, political leaders, officials at ministries and departments; and

6. **Partner Organizations** involved in reconstruction and platforms

Given the scale of the reconstruction, vast numbers of trained and skilled human resources were required to undertake the massive campaign. Similarly, owing to the low level of existing knowledge on earthquake risks and mitigation, awareness raising through different approaches was also incorporated in the program. As such, Baliyo Ghar Program stipulated socio-technical assistance in six major themes, as categorized by NRA.

1. **Community Based Orientations:** To make the house owners aware on the need of earthquake resistant construction, massive level of awareness campaign consisting of classroom-based sessions on earthquake risks, mitigation measures and the technical and administrative provisions of reconstruction were conducted in program areas. Such orientations were very helpful to build people's confidence on the housing reconstruction program
2. **Short Trainings:** Short duration trainings (typically between 3 to 7 days) for engineers, masons, and social mobilizers on different aspects of reconstruction and earthquake resistant construction were the other major component of socio-technical assistance. These trainings for enhancing the capacity of masons, artisans, social mobilizers, stakeholders and technical personnel were also considered of vital importance. The trained manpower was instrumental to raise awareness and to ensure construction quality through regular monitoring. Moreover, engineers and social mobilizers trained as part of these trainings were further developed into Master Instructors.
3. **On-the-Job Trainings:** These are the vocational trainings targeted towards developing new skilled masons to support the demand of human resources during surge of reconstruction activity.
4. **Door-to-Door Assistance:** Household level assistance provided to earthquake affected beneficiaries to support their decision-making as well as supervise their construction in order to help make the houses compliant to the standards.
5. **Demonstration Construction:** Construction of small and large-scale demonstration models to aid house owners, masons, engineers and other stakeholders to adequately visualize earthquake resistant construction techniques. Such demonstration houses helped to increase the understanding and confidence of the community in the prescribed building technologies.
6. **Information Desks:** These consisted of mobile outlets and information hubs aimed at providing information to a large group of beneficiaries in quick time and increasing outreach. These hubs also functioned as distribution points of free information and communication materials like flyers, posters, brochures, and books.

1.5 Significance of Risk Perception for promoting safer building construction

Homeowners' knowledge of earthquake-resistant construction techniques and their adoption of these techniques in the construction of their own homes is an important contributor to reducing seismic risk in low- and middle-income countries with high levels of informal construction (Lyons & Schilderman, 2010). Nepal, a country with high seismic risk and a rapid urbanization process that has occurred primarily through informal construction (Dixit, 2009), is a prime example of a society where homeowner awareness of earthquake-resistant construction techniques and use of these construction techniques can directly reduce seismic risk at the household and community scale.

One of the intermediate results (IR3) set for the Baliyo Ghar program was: Increased awareness on disaster resilient construction in Nepal. This entails raising awareness among the residents, professionals and practitioners on the need for disaster- resilient construction technology. To achieve this, different program activities like orientations, door to door technical assistance, information desk, demonstration model, media campaign were conducted. Baliyo Ghar program also assisted Government of Nepal for the formulation of reconstruction related policies and its field implementation. The program conducted large number of orientation and interaction programs targeted towards a wide range of stakeholders, house owners, masons, engineers, local authorities etc. The purpose of the program was to enhance awareness of earthquake affected beneficiaries regarding reconstruction policies and earthquake resistant construction technologies. Various community-based awareness and engagement activities, were identified and implemented through the program such as:

i) House owners and common people orientations

Baliyo Ghar Program conducted large number of orientation and interaction programs targeted towards a wide range of stakeholders, house owners, masons, engineers, local authorities etc. The purpose of the orientation was to enhance awareness of earthquake affected beneficiaries regarding reconstruction policies and earthquake resistant construction. During the program implementation period Baliyo Ghar program oriented 146,559 community people with the program districts through 6,893 orientation events. Among those, 57% of total participants were males whereas 43% of the total participants were females. As such, a wide diversity in the socio-economic and demographic distribution can be seen among the earthquake affected households in these program areas. The diversity required program activities, although under the same alias, be conducted in different modes depending upon the needs of the community as well as the availability of resources. Similarly, as the reconstruction was a fairly dynamic process with new information on technical and administrative provisions being produced on a regular basis, orientation events were also synchronized and remodelled with updates on reconstruction policies, technical norms, and other information from the National

Reconstruction Authority. Thus, orientation program across the program areas were diversified in terms of content, mode of delivery etc.

ii) Door to Door Technical Assistance

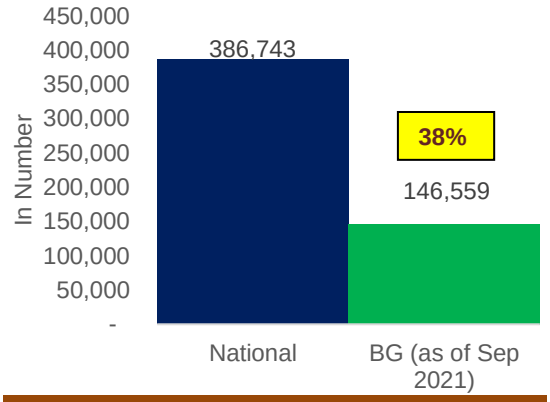
With a view to provide household level assistance reaching their doorsteps, to build earthquake safe home, Baliyo Ghar Program mobile team conducted the Door-to-door campaign. Mobile technical support was provided on-site to earthquake-affected people during the construction of their houses. Homeowners as well as masons could interact with the technical support team and adopt correction measures during the construction of their houses in case mistakes were detected. The mobile technical teams consisted of an engineer, a social mobilizer and construction technician. Throughout the reconstruction process, these teams visited the buildings under construction in every corner of the areas designated to them and thus played a crucial role in ensuring earthquake-resistant housing.

The main objective of Door-to-door technical assistance or Mobile Clinic was to ensure that the houses that were to go under construction comply with the building code. Altogether 48,838 beneficiaries of Baliyo Ghar program area benefitted from door-to-door technical assistance during the program implementation period. Apart from door to door visit the program also provided support and assistance to the beneficiaries on a need basis, primarily through telephone conversation or informal discussions at ward and municipal offices.

iii) Demonstration models on earthquake-resistant construction technology

Baliyo Ghar program implemented the concept of construction of small and large-scale demonstration models to aid house owners, masons, engineers and other stakeholders adequately visualize earthquake resistant construction techniques. Such demonstration houses helped to increase the understanding and confidence of the community in the prescribed building technologies. The small-scale demonstration model provided hands on skills of the technology of resilient construction to the masons. The masons in the training learned the proper way of construction using the same materials that were used before. Total of 437 training models, 4 demonstration model of retrofitting at non-Baliyo Ghar program area and 974 demonstration houses were built during On-the-Job Trainings.

Contribution of Baliyo Ghar Program on increasing awareness in National Reconstruction



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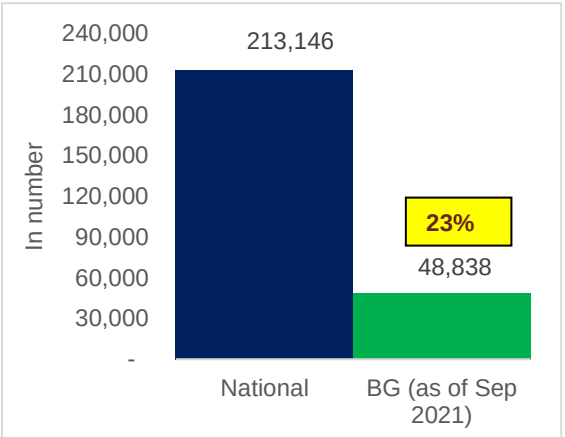
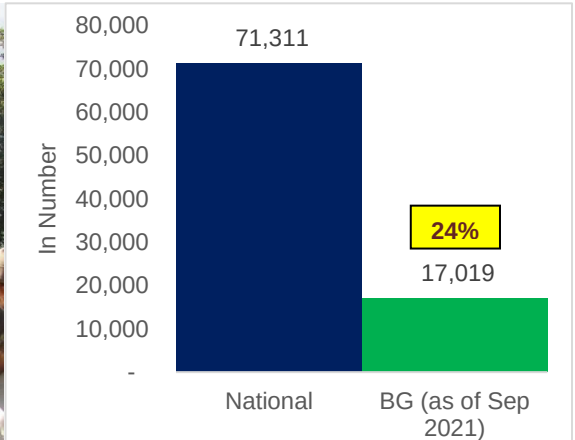
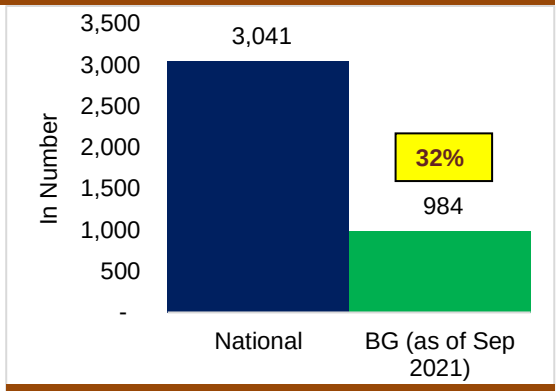


Door to Door Technical Assistaance (Mobile Technical Support)



Help Desk Support Center (Information Desk for dissemination of awareness materials)

Contribution of Baliyo Ghar Program on increasing awareness in National Reconstruction



Demonstration Model Houses
(910 model houses from 50 days on the job mason training & 74 model houses from 25 days on the job mason training on retrofitting)

Number of episodes produced 156

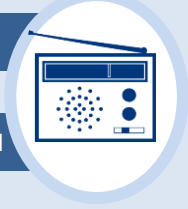
Number of episwqodes broadcaste 1,370

Television Episodes

Through 5 National Televisions: Kantipur TV, Image TV, News24 TV, Avenues TV, Nepal Television

1,720 Number of episodes produced

3,296 Number of episodes broadcasted



Through 14 National & Local Radio Stations

Radio Programs

IEC Materials
66,986
Disseminated

Outreach through Mass Media

iv) Awareness materials on disaster resilient construction methods

To inform quake-affected communities to rebuild damaged structures with seismic safety measures, promote safer construction practice, and support the reconstruction activities, a range of awareness materials (print, audio and video) were produced during the Baliyo Ghar program implementation period. Mass media has been one of the most effective means to reach to wider population for awareness raising through disseminating information, knowledge and ideas.

Baliyo Ghar program collaborated with various media mainly television channels and local FM radios stations at central level as well as in program districts for the production and broadcast of regular weekly magazine and messages on earthquake resilient construction techniques. From the very beginning days of reconstruction, Baliyo Ghar TV Program had started to advocate on the various issues of reconstruction. Reaching to the grassroots and capturing the problems, hindrances and voices of beneficiaries and getting back to the policy makers was the routine of the TV program. The program was broadcasted from 4 national TV channels in the first phase of contract while, later government-owned Nepal Television was added to broadcast TV program. Similarly, Baliyo Ghar partnered with 14 radio stations from Kathmandu Valley and districts to jointly produce and disseminate regular weekly magazine format programs focusing on various aspects of safer reconstruction.

During the Baliyo Ghar program period total were 66,986 copies of 3 different types of printed material were disseminated, 1720 unique Radio episodes produced and broadcasted 3296 times, and 156 Television episodes produced which were broadcasted 1,370 times through different channels.

v) Information Desk for dissemination of awareness materials

To support large number of people at a time, information desks were placed in different places of the districts where a group of people were provided with the NRA policy updates, construction technologies as well as their concerns regarding the policies and the reconstruction process. Information desks were very useful in distributing the publications and the IEC materials produced by NRA and Baliyo Ghar Program. These desks, in mobile form, were placed in strategic locations, such as during enrolment camp, at bank branch offices during tranche disbursement, at ward office or during any communal functions. The information desk was targeted for house owners and trained masons. Through information desk more than 7,000 beneficiaries got benefitted in different program areas of Baliyo Ghar.

One of the intermediate result set for the Baliyo Ghar program was IR 3: Increased awareness on disaster resilient construction in Nepal. A comprehensive Monitoring and Evaluation plan of Baliyo Ghar program was developed which had framed the program output, outcome, intermediate results and impact along with its' indicators to measure the progress of program activities. To measure the progress related to the set indicators data source, data collection methods, and mode of analysis were also defined for each indicator.

Change in the perception of the people was measured to evaluate the effectiveness of the awareness activities carried out by the program towards the end. This report highlights the significance of awareness activities and change in risk perception towards promoting safer building construction.

Community people participating in the orientation program organized by BG program at Sertung, Ward 3 of Ruby Valley RM, Dhading (photo above) and at Samundradevi, Ward 6 of Shivapuri RM, Nuwakot (photo below)

During the focus group discussion (FGD), Alampu, Dolakha

CHAPTER - 2: METHODOLOGY FOR EVALUATION OF CHANGE IN PERCEPTION

2.1 Risk Perception Study (RPS): An Overview

Risk perception is the subjective judgment that people make about the characteristics and severity of a risk. Studies on risk perception examine the opinions expressed when people are asked in various ways to characterize and evaluate various hazards and risk reduction technologies.

Perception is the organization, identification, and interpretation of sensory information in order to represent and understand the presented information or environment (Schacter et al., 2011). Studies on risk perception examine the opinions people express when they are asked in various ways to characterize and evaluate hazardous activities and technologies (Slovic, Fischhoff & Lichtenstein, 1982). Risk research has found significant differences in perception between groups of individuals divided by, for example, gender, age groups and different cultural settings (Gustafson, 1998; Rohrmann, 2000; Savage, 1993). Characteristics of gender, age, and location of residence also influences on risk perceptions and intended actions. (Potter *et al.*, 2018). Experience also plays a part. The degree to which individuals prepare for hazards is dependent upon complex dynamics, including what disasters, what impacts, and what frequency individual experience (Becker, Paton, Johnston, Ronan & McClure, 2017).

Studies of seismic risk perception illustrate the complexities of risk perception. In a study of seismic risk perception in four low- and middle-income countries, demographic variables of sex, education, occupation, household income and disaster experience, among others, influenced risk perception and the choices made during home construction (Okazaki *et al.*, 2008). Proximity to areas heavily impacted by earthquakes also heightens risk perception (Okazaki, 2006). However, people experiencing frequent earthquakes tend to have lower risk perception -- that is they tend to become accustomed to the events (Knuth, Kehl, Hulse & Schmidt, 2014); those who have suffered serious earthquake loss, in contrast, tend to have a higher risk perception (Tian, Yao, & Jiang, 2014). Once people experience a major disaster, they may be able to see themselves more readily as potential victims, prompting them to take protective action steps to prepare or mitigate.

Generally, adoption of earthquake hazard protective actions is based, in part, upon risk perception (Lindell & Perry, 2016), but also on other factors such as motivational values (Nordenstedt & Ivanisevic, 2010). Because of this, seismic risk perception and behaviour are not always positively correlated. In one study, more than 80% of the house owners stated they would be willing to spend five years of their income to achieve an earthquake-resistant house (Naeem & Okazaki, 2009), though this may not translate to actual investments in safer construction or strengthening of their existing homes. In Pakistan, even where people had a better understanding of the seismic risk, most of them were reluctant to pay for seismic retrofitting, because of its risk-seeking nature and inter-temporal discount (Okazaki, 2006). When it comes to addressing the physical safety of their home, homeowners may have widely varying perceptions of housing safety depending upon their exposure to hazards, their observations of hazard-resistant construction practices, and experience in disasters (Venable, Javernick-Will, & Liel, 2020).

Importantly, earthquake risk perception that does lead to protective action can affect household and societal seismic risk levels. At the household level, effective disaster preparedness can reduce the impact of disasters on families (Xu, Qing, Deng, Yong, Zhou, & Ma, 2020). At the community level, proactive approaches of stakeholder's engagement can also reduce disaster risk significantly (Mohammad & Bee, 2016). Specifically, researchers have found that participation in the planning and construction phases of disaster housing reconstruction leads to safer housing, as well as higher homeowner satisfaction (Opdyke, Javernick-Will, & Koschmann, 2019). However, the risk perception of the public and elected officials will also shape type and number of resources brought to bear on risk reduction (Pidgeon, 1998).

At the societal level, Seismic building codes and enforcement mechanisms have resulted in a significant reduction in earthquake-induced fatalities in developed countries. However, similar efforts to achieve similar results remain elusive in developing countries. Yet, achieving earthquake-resistant construction is technically feasible. The low-strength load-bearing masonry (LSM) buildings of many low and middle-income countries can be constructed with better construction practices by integrating basic seismic resilience components such

as bands and forms of vertical reinforcements at wall junctions and door/window jams. Where these techniques have been used, buildings have shown much better performance during earthquakes than their counterparts lacking these features (Bothara, Ingham & Dizhur, 2018).

Thus, Homeowner knowledge of earthquake-resistant construction techniques and their adoption of these techniques in the construction of their own homes is an important contributor to reducing seismic risk in low- and middle-income countries with high levels of informal construction (Lyons & Schilderman, 2010). Nepal, a country with high seismic risk and a rapid urbanization process that has occurred primarily through informal construction (Dixit, 2009), is a prime example of a society where homeowner awareness of earthquake-resistant construction techniques and use of these construction techniques can directly reduce seismic risk at the household and community scale.

Risk perception studies in all the Baliyo Ghar program VDCs and municipalities were undertaken using the KAP survey approach. The Baseline Risk Perception Survey was conducted to study the baseline status of the people's perception and practice towards earthquake risk reduction. As a follow up, End line survey was also conducted using the KAP Survey approach, similar to the one used in the Base line. KAP is an acronym that stands for Knowledge, Attitude and Practice where,

K: What the respondents know about an issue (Knowledge)

A: How the respondents feel about it (Attitude)

P: What the respondents do about it (Practice)

KAP is based on the assumption that a person's knowledge influences their attitude, which in turn influences their behaviour or practice. It usually involves standardized written questionnaires that are composed of yes/no, multiple choice questions and also the Likert-scale based questions.

KAP surveys are useful for determining what the target audience already knows and does. They can give an insight into a large group of people in a short time frame and are particularly useful to draw a conclusion before and after a program's completion. Data has statistical significance if we randomly select our interviewees, and it can be used as a baseline against which to measure findings at the end of our project.

In this case, the survey is designed for a specific issue (earthquake risk). The "knowledge" possessed by the community refers to their understanding of earthquakes and their associated risk. "Attitude" refers to their feelings toward the issue as well as any preconceived ideas they may have. "Practice" refers to the ways in which they demonstrate their knowledge and attitudes through their actions.

2.2 Objectives of Risk Perception Survey

The overall objective of the survey is to measure the change in the residents' perception of risk during 2016 and 2020 in Baliyo Ghar program municipalities. Specific objectives of the Survey include:

- To understand the change in level of awareness, understanding and practice of at-risk communities towards earthquake risk and disaster resilient construction technologies,
- To compare the End line findings with the Baseline findings to identify the effectiveness and impact of the project
- To recommend the stakeholders (residents, professionals, and practitioners) strategies to ensure safe practices addressing earthquake risks and to promote disaster-resilient construction technologies in a long run.

2.3 Scope of the Report

This report highlights the objective, methodology, results, discussion, and conclusions of the Risk Perception Survey conducted as part of the M&E process of Baliyo Ghar Program.

The report will be useful for decision makers, policymakers, social leaders and for common people. Relevant technical professionals and researchers may also find it as a useful resource for better understanding the existing perception and the process of reconstruction in Nepal

2.4 Survey Methodology

2.4.1 Baseline Survey

The Baseline Risk Perception Survey was conducted during August- October 2016. Social mobilizers and technical officers of Baliyo Ghar in the various VDC/Municipalities of three districts were trained on conducting the Baseline Risk Perception Survey. The study used simple random sampling based on Stratified Systematic Area Sampling procedures. The results can be extrapolated to the whole population with a confidence level of 95% and an accuracy of $\pm$ 5%. A cross-sectional study was conducted in the program area of Baliyo Ghar. The whole population in the program area was taken as a study population.

A total of 9856 surveys were administered by the social mobilizer team in all the then 33 VDCs and 3 municipalities. A sample of 3.6-7% of total household of each of the municipalities and 15-48% of total household of each VDC was selected for conducting the Baseline Risk Perception Survey. Sample units were taken proportionately from each ward of the target VDC/municipality. The random samples included representatives of people from different professions, ethnic groups, economic status group, etc.

2.4.2 Endline Survey

The endline survey was conducted during Jan- March 2020 using the same methodology used for the Baseline. The endline survey was based on the stratified systematic sampling technique, which was used in the baseline survey. The results will be extrapolated to the whole population with a confidence level of 95% and error margin of ± 10%. Due to human resource and time constraint, error margin was increased by ± 5% in this endline survey in compared to the baseline error margin.

The sample size was calculated based on the formula used in baseline survey. The sample size is calculated using the following Krejcie and Morgan, 1970 formula. Total number of households in each program wards were treated as population to calculate the sample size in each program wards. A total of 3,073 surveys were administered in the three program districts: Nuwakot, Dhading and Dolakha. Enumerators were hired to conduct the survey. The enumerators were trained on the concept, questionnaire, data collection tool and the process of conducting the Endline Risk Perception Survey through a 3-day training program organized by the M&E team. The sample size for the endline was limited by feasibility and time constraints but was sufficient to detect practically significant differences between the intervention and comparison at the endline.

2.5 Survey Questionnaire

A set of structured questionnaires was developed by the M&E team with the guidance and support from program team and senior experts at NSET.

The questionnaire used in the survey comprised of different questions to measure respondents' demographic characteristics, knowledge about earthquake and risks in their community, their attitude towards earthquake risk reduction and uptake of precautionary measures (practice). To assess the change in respondents' behaviours in terms of reducing earthquake risks, few questions were added to conduct the End line survey. However, the specific questions to measure the Knowledge, Attitude and Practice (KAP) remained same in both the surveys. The questionnaires are presented in **Annex 2 and 3.**

2.6 Measurements

Data on following attributes of the respondents was collected in the survey:

Demographic Variables

Fourteen questions were administered related to the demographic characteristics of the participants. These included the participant's ethnicity group, gender, physical status, family members, marital status, age, education, occupation, monthly family income and whether they had a trained mason in their family.

Knowledge about Earthquake Preparedness, Safer Construction Techniques

Twelve questions were asked to evaluate the respondents' knowledge of preparedness, awareness, experience regarding to the earthquake and its response, knowledge on safe evacuation, safer construction techniques and related policies which were followed. Each question tested their knowledge on earthquake risk reduction and earthquake resilient construction. Questions were given certain weightage score depending on their importance. Different scores are assigned for correct answers, depending on their answer, and received zero for an incorrect answer. The sum of the scores was used as the knowledge score for each respondent.

Attitude toward Earthquake Risk Reduction

Six questions were asked to evaluate the attitude of the participants towards the earthquake resilient reconstruction. These were related to systems, policies, related to financial problems, availability of masons, challenges faced during reconstruction, information and communication medium and safer building types. For example, this section contained question such as, "Who has the major responsibility to make the community safe from earthquake risk?" As in the previous section, each question was given a certain weighting score depending on its importance. Different scores are assigned for correct answers, depending on their answer, and received zero for an incorrect answer. The sum of the scores was used as the attitude score for each respondent.

Earthquake Preparedness and Safer Construction Practices

Ten questions were asked to assess the earthquake preparedness and safer construction practices adopted by respondents. Questions were related to the involvement of a trained mason in construction, adoption of earthquake resilient construction methods while constructing their house, actions to be done during earthquake if the respondents are inside the buildings etc. Questions were about the actions that can reduce the damages of earthquakes, such as "Have you taken technical support and suggestions form technician while making house?" Here also, each question was given weightage score depending upon their importance. Respondents received different scores for correct answers, depending on their answer, and received zero for an incorrect answer. The sum of the scores was used as the practice score for each respondent.

KAP Score

Aggregate KAP score was computed by combining scores of knowledges, attitude, and practice items and reported as score out of 100. The questions of the KAP assessment were grouped into separate categories. A certain score was given based on the answer of the respondent. Each question of knowledge section, attitude section and practices section were given certain weightage based on the importance. The sum of the scores was taken as the participant's KAP score. The KAP Score Matrix is attached in **Annex 4 & 5** of this report.

2.7 Qualitative Assessment

A qualitative approach was also undertaken involving key informant interview and focus group discussions with community members to triangulate the quantitative findings through household surveys. Total of 8 focus group discussions (FGDs) were conducted in 3 districts Dhading, Nuwakot and Dolakha to know the perception of people towards the earthquake risk reduction. Participants of each FGDs were houseowners and trained masons of Baliyo Ghar program. Total 83 participants participated in the FGDs followed by in depth interview with 3 of the houseowners of those districts. The interaction/ discussions were guided through prepared set of questionnaires. The qualitative data were transcribed through the non-verbatim transcripts and were analysed following the steps of coding. These generated codes were categorized and then interpretations were compiled and used for data triangulation.

2.8 Data Collection, Validation and Storage

M&E team trained the enumerators to conduct the survey. Standard guidelines, recording formats, and KOBO app user manual were developed and used for the survey. Supervisors were assigned to coordinate and oversee the survey in each of the three districts. A daily log sheet of the survey was maintained with detail description of the respondents. The real time data uploaded in KOBO server were cross checked with the respondents randomly through phone contact from the head office. Beside this, field monitoring was also conducted in each district during the survey.

The questionnaire was designed for mandatory data entry in each question. This ensured no questions were skipped for the response recording. Some of the questions were revisited as per the suggestions from field enumerators during field survey. In case of any confusion throughout the survey, clarification was done through verbal as well as email communication with the respective supervisors as well as enumerators at field as per requirement.

The KOBO digital data collection platform was used as tools for data collection which has its own data storage system. Stored data can be extracted freely at any time by using authentic login user ID and password.

2.9 Data Analysis

The data stored in the Kobo toolbox was then downloaded in excel format. The data was subsequently validated by data analysts and M&E team members. Errors detected during this process were minimized as far as possible by referring to the original survey responses and field enumerators. The extracted data from Kobo was then cleaned, coded and analysed. Statistical analysis software was used to analyse the collected data. All the socio-demographic variables were assumed as categorical. The individual KAP score of each participant was taken as the summation of the mean value of the score obtained in knowledge, attitude and practice.

Various descriptive statistical methods such as frequency tables, bar diagrams and pie-charts were used to present the characteristics of the respondents. Cross-tabulation was also used to present the distribution of the respondents' answers based on the selected factors. Inferential statistics (Chi-square, t-test, ANOVA) was used to test the relationship between the components and the demographic variables.

2.10 Limitation

The study used simple random sampling based on stratified systematic area sampling procedures. The results were extrapolated to the whole population with a confidence level of 95% and error margin of ± 10%. Due to human resource and time constraint, error margin was increased by ± 5% in this endline survey compared to baseline error margin. The total of 3,073 households were visited for the endline survey while 9,856 households were visited during the baseline Risk Perception survey

Reconstruction scenario of Alampu, Dolakha ©NSET

CHAPTER - 3: ANALYSIS AND RESULTS

This section presents the results and findings from the information collected from the respondents during the survey. The comparison of the results from both Baseline and End line survey was done. A total of 3,073 surveys were administered in the three program districts: Nuwakot, Dhading and Dolakha during the endline survey while 9,856 surveys were administered in the then 33 VDCs and 3 municipalities of the three program districts. **Figure 8** shows the surveyed districts.

Table 4 below shows the population distribution of the surveyed districts along with their literacy rate.

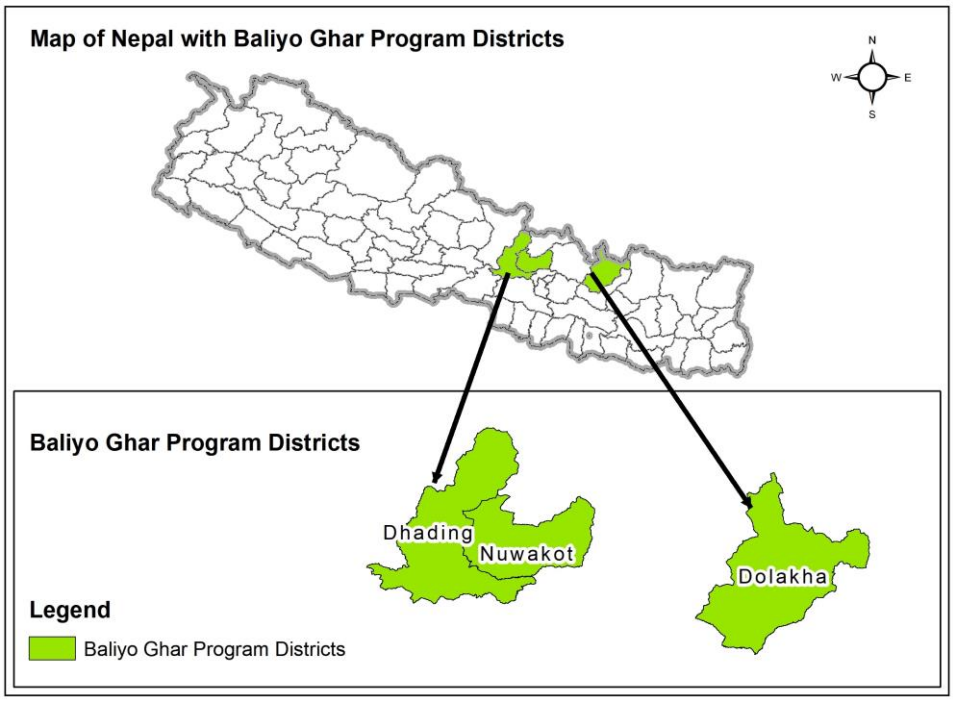


Figure 8. Map Showing Survey Districts

Table 4: Demographic Details of Baliyo Ghar Program Districts

Population					
S.No.	Districts	Male	Female	Total	Literacy Rate
1	Dolakha	99,554	87,003	186,557	62.8
2	Dhading	178,233	157,834	336,067	62.9
3	Nuwakot	144,684	132,787	277,471	59.8

Source: Government of Nepal, 2011 Census CBS, National data portal (http://nationaldata.gov.np/)

3.1 Demographic Status

Different questions were administered in both baseline and endline survey to assess the demographic characteristics of the participants. These included the participant's gender, ethnicity, marital status, age group, education level, occupation, monthly income, physical status, family members. Detailed characteristics of the study population is presented in **Annex 6**.

Distribution based on Gender and Ethnicity

Of the participants involved in both the surveys the proportion of male and female respondents were 51% female and 49% male in baseline study and 47% female and 53% male in endline study. In both surveys, higher percentage of respondents were from Janajati (45%, 43.8%) followed by Brahmin/Chhetri, Newars and Dalits.

Distribution based on Age Group and Education

Respondents from all age groups were covered under the study to understand knowledge of disaster risk reduction across a cross-section of the population. Of the participants the highest proportion was from the age group 35-45 in both surveys (Baseline and Endline), followed by the age group 46-55 and 56-65. There were also significant number of respondents belonging to 15-30 group. In endline survey, higher percentage (42.5%) of the respondents were literate followed by respondents with primary education (20.6%). In case of baseline survey, 30.8% were literate followed by 14.5% respondents with primary education, 13.4% secondary and others.

Distribution Based on Occupation and Monthly Income, Marital Status and Role in Family

In both Surveys (Baseline and Endline) for majority of the respondents (>60%) Agriculture was the main occupation with other diverse types of occupation such as business, mason and around 9% housewives. Majority of the respondents surveyed more than 60% belonged to income group less than 20,000(i.e. less than 200USD as their monthly income). The monthly income of the respondents was less than ten thousand Nepali rupees (<100USD, as mentioned by 32% respondents) and in between ten thousand to twenty thousand Nepali Rupees (100-200 USD, mentioned by 32.1% and 28%) during both studies.

Out of total respondents involved in baseline and endline survey, majority of the respondents 85% & 90% were unmarried and married respectively. And majority of them were head of the household (55%, 65%).

Types of houses of the respondents

Most of the houses in the program area were damaged by the earthquake in the initial days. More than half (58%) of the respondents were living in temporary homes during the baseline survey, only 36% had stone masonry house and 4% houses with pillar structures. While during the endline survey most of the houses had been reconstructed and majority of the respondents, 85.9% mentioned that their house was stone masonry along with 12.3% Pillar houses and 0.5% wooden frame structures.

Table 5: Housing typologies of respondent's involvement in different surveys

Houses Typologies	Baseline (2016/17)	Endline (2020)
House with pillar/RC framed houses	4%	12.3 %
Stone Masonry Houses	36%	85.9%
Wooden frame Houses	2%	0.5%
Temporary Houses	58 %	1.3%

Sources of Information

To assess the source of information for disaster/earthquake in the communities, respondents were asked if they have listened / watched disaster / earthquake awareness program on Radio / TV, or if they have seen or observed the model houses for demonstration of earthquake resistant technologies.

61% of the respondents had listened/watched earthquake awareness program on Radio/TV during the baseline, the percentage of people watching/listening the awareness program increased to 85% in the endline survey (**Fig 9**). Similarly, when asked if they have seen/observed the earthquake resistant model house?" More than 50% of the respondents had mentioned that they haven't seen such type of model houses during the baseline survey on the contrary 71% of the respondents during the endline survey mentioned that they have seen/observed the model houses (**Figure 10**).

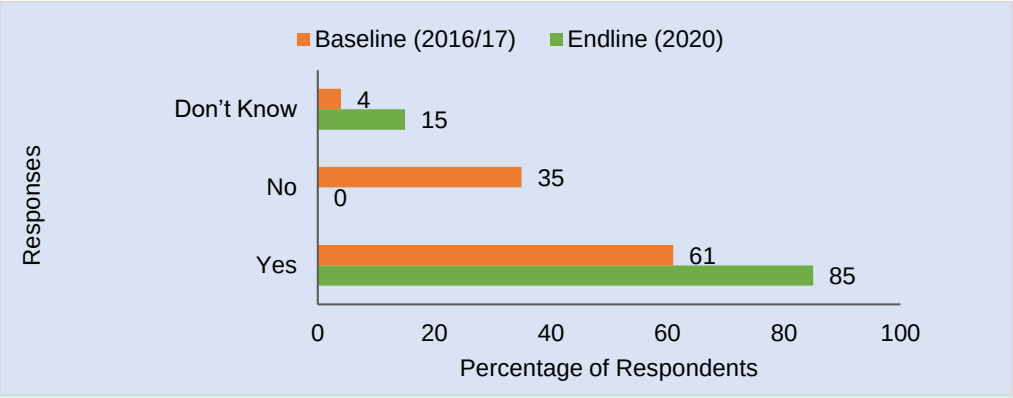


Figure 9. Responses on Listened/watched Radio/TV program

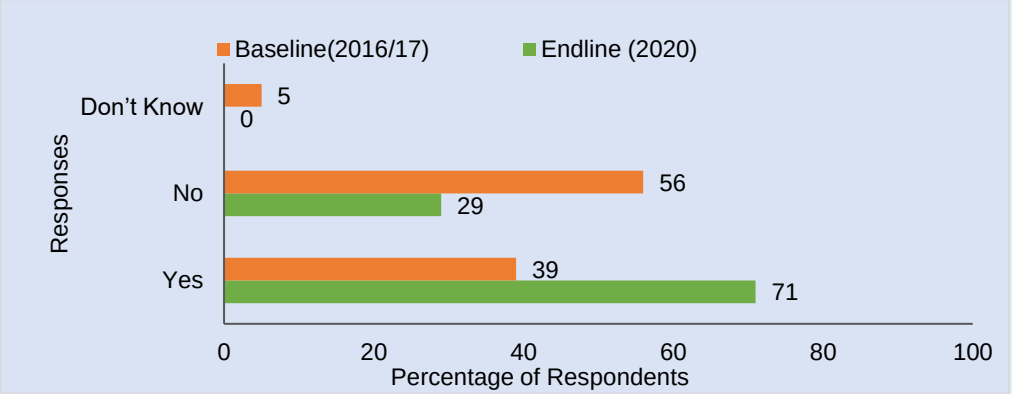


Figure 10. Seen/observed earthquake resistant model house

3.2 Earthquake Risk Perception and Experience

This section describes the change of respondents' knowledge about the earthquakes, its causes, and main reasons for risk. The survey tried to measure the knowledge of the respondents regarding the cause of earthquake, what do they think about their community's risk/vulnerability and the reasons for the risk.

The respondents were asked if they have information on earthquake and its causes, 71 % of the respondents during baseline survey mentioned that they don't know about the earthquake and its causes, however the percentage of people not knowing the causes of earthquake decreased to 49 % in endline survey (**Figure 11**). Similarly, when asked what they think about the vulnerability of their community, 69% felt their community is vulnerable which decreased to 24.3% during the endline survey. 66% of the respondents felt that their community is no more vulnerable. And when asked for the reasons of risk and vulnerability they mentioned that it was because of weak houses, weak infrastructures, lack of open space, lack of knowledge on earthquake safety and lack of earthquake preparedness.

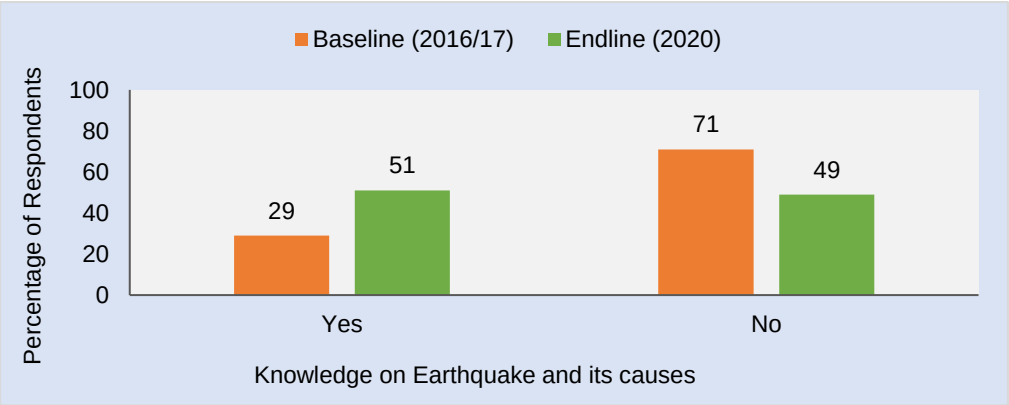


Figure 11. Knowledge about earthquake and its causes

From the conducted qualitative surveys like FGD, one of the house owners stated, "In the process of reconstruction, public awareness was raised at all

community levels through various orientation programs on how to build earthquake resistant house from Baliyo ghar program. And also, while there were technical support services during the construction of the house, there was no such assistance from the local government and others."

"We can use the Stones, Timbers and locally available materials to build a Strong House"

The April 25 Gorkha earthquake and several big aftershocks have knocked down some 469,539 houses partially or completely. The damaged areas in central Nepal were occupied by the rubble of solid wastes like stones, bricks and timbers. These materials were discarded as solid wastes for some months and still some take the rubble as burden. Most of the villages have cleared the rubbles by throwing them in ditches.

Few of them embraced those materials for future reconstruction works and Mr. Saroj Khadka along with his wife Ms. Sakhari Khadka, residents of Dhakrebot, Chilankha-Dolakha are few of those persons to utilize those materials. Khadka family has used the stones, doors and windows from their previous flattened house in rebuilding their house.

"We had three houses made for 3 brothers, but we were not separated legally. We were much worried after all the houses got flattened. For more than 18 months, we coped with sun and rain under the temporary shelter confused on how to rebuild our houses. But after the intervention of Baliyo Ghar, I came to know that the house can be made strong-earthquake resistant by the using stones as well, therefore I used the stones from my flattened house. I advised my brothers to do the same. Also, we had very artistic windows and doors which after minimal maintenance were used to build this house," Mr. Saroj says showing towards his house. "Locally available construction materials can be used to build seismic resistant houses, not necessary to use concrete, which may interrupt our culture and identity," he says, "I came to know all about these after the mobile team of Baliyo Ghar came to our village to guide us build safe houses."

Now, Khadka family is living happily in their seismic resistant house. But Saroj is not limiting his wisdom to his house, he is visiting his neighbours and next village to promote safer reconstruction using the locally available materials. He says, "It's my duty to make villagers aware on earthquake safety, preparedness and safer reconstruction." . In these days too, I am visiting every household to encourage them to use the stones, timbers and locally available materials to rebuild their homes."

Mr. Saroj Khadka is physically disabled person who served more than 30 years teaching students of northern Dolakha. He has problem in his right leg and has to walk bending his whole body with support of stick. Though he has retired from his teaching job, but he is still very active and is an influential social leader of Chilankha, Dolakha.

Mr and Mrs Khadka in front of their House, two houses have been separated by certain gap in between

I survived the earthquake by doing "Drop, Cover and Hold"

Mr. Khadka says he survived only because of doing Drop, Cover and hold at the time of earthquake. At the time of ground shaking, he was at the second floor of his house with some work. When his house started to spin, quickly he entered the space beneath his bed. He heard some stones and wood pieces falling in the bed and inside he prayed to his God wishing for his and family member's life. He remembers, "My wife was downstairs with son in-law and daughter, and I was there alone on the second floor. I heard them crying but couldn't step downstairs as I am physically weak. I had heard about the "Drop, Cover and Hold" in the school, I did the same. I know hadn't I dropped inside my bed, I would have been killed by stones of my roof wall that fell during the shakings and definitely I would not be here right now talking to you.

3.3 Knowledge on Earthquake Resilient Construction

This section describes the change of respondents' knowledge about the earthquake resilient construction practices. The survey tried to measure the knowledge of the respondents about the technical details of safer buildings. The main details include, knowledge of building code, size of pillar, size of beam and technical details for masonry buildings and timber frame buildings.

Knowledge on National Building Code

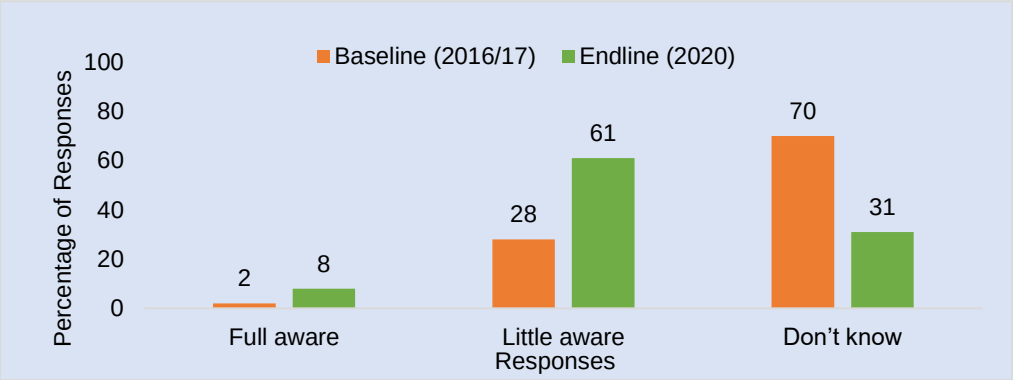


Figure 12. Knowledge of Respondents on National Building code

Majority of respondents (70%) in baseline survey answered they have not heard about the National Building Code whereas in endline survey similar percentage, 69 % of the respondents answered that they are aware (either fully or little) about the National Building code (**Figure 12**). This shows that the number of people who have heard about Building Code have increased over the years.

Pillar Size in RC Frame structure

Respondents in both surveys were asked about the size of pillar for making RC Frame structure earthquake resistant.

33.6% people in the endline survey mentioned that it has to be 12*12 inches for the pillar size, the number of people knowing the exact size of the pillar required as per the national building code has increased over the years, only 14.5% of the respondent had answered that during the baseline study. The percentage of respondents who don't know the accurate size of pillar in RC frame structure to make earthquake resistant house also decreased from 80.2 % to 62.2% (**Table 6**). This result indicates that the understanding level of the respondents has been increased significantly towards the earthquake resistant RC frame structure and its basic components.

Table 6: Pillar size for earthquake resistant RC frame houses

Surveys	Pillar size		
	12*12 inch	Other Dimensions	Don't know
Baseline (2016/17)	14.5%	5.3%	80.2%
Endline (2020)	33.6%	4.2%	62.2%

Beam Size in RC Frame structure

Respondents when asked about the size of beam for making RC Frame structure earthquake resistant, 19% of the respondents gave the correct answer (i.e., 9 by 14 inch as per the national building code) in the endline survey. The number of people knowing even the technical details about beam size has increased over the years, it was 10.1 % of the respondents giving the correct answer during the baseline survey. The percentage of respondents who has reported that they don't know about the size of beam also decreased from 83.7% to 67.6% in both the surveys (**Table 7**).

Table 7: Beam Size for earthquake resistant RC frame structure

Surveys	Beam size		
	9*14 inch	Other Dimensions	Don't know
Baseline (2016/17)	10.1 %	6.2 %	83.7
Endline (2020)	19 %	13.4 %	67.6 %

Earthquake-Resistant Masonry Buildings

Respondents in both surveys were asked about what could be done to make masonry buildings Earthquake resistant. Only 48.5 % answered that we must put band during baseline study however the percentage of respondents knowing about the requirement of band increased, 82.4% answered that we must put bands during the endline survey. The don't know group also decreased from 39.7% to 9.7% (**Figure 13**).

In addition to that respondent when asked where the band should be kept in masonry buildings, 96.6 % of the respondents in endline survey answered that band should be kept everywhere. The percentage of the respondents who answered band should be placed everywhere in masonry buildings was increased by 24% (**Figure 14**).

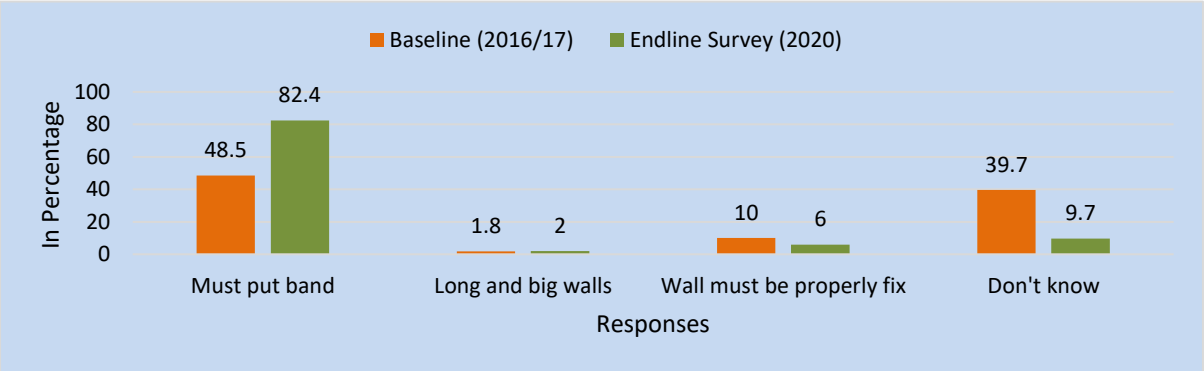
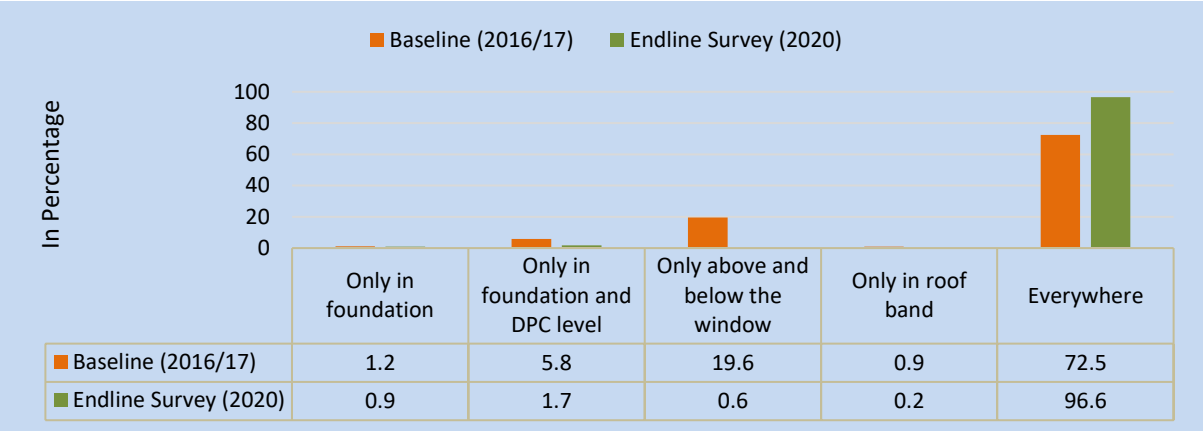


Figure 13. Baseline and Endline survey result on way of masonry building making safer



	Only in foundation	Only in foundation and DPC level	Only above and below the window	Only in roof band	Everywhere
Baseline (2016/17)	1.2	5.8	19.6	0.9	72.5
Endline Survey (2020)	0.9	1.7	0.6	0.2	96.6

Figure 14. Baseline and Endline survey result on Band placement for masonry buildings

Earthquake-Resistant Timber Frame Buildings

Respondents demonstrated having good knowledge during the endline study. Respondents were asked "What should be done in Timber frame building to make it earthquake resistant?" 74.1% of the respondents didn't know the answer during the baseline survey which decreased to 39.2% during the endline. Almost around 30% of the respondents in the endline survey had knowledge about the detailed requirements such as bracing, timber joints and locks (**Figure 15**).

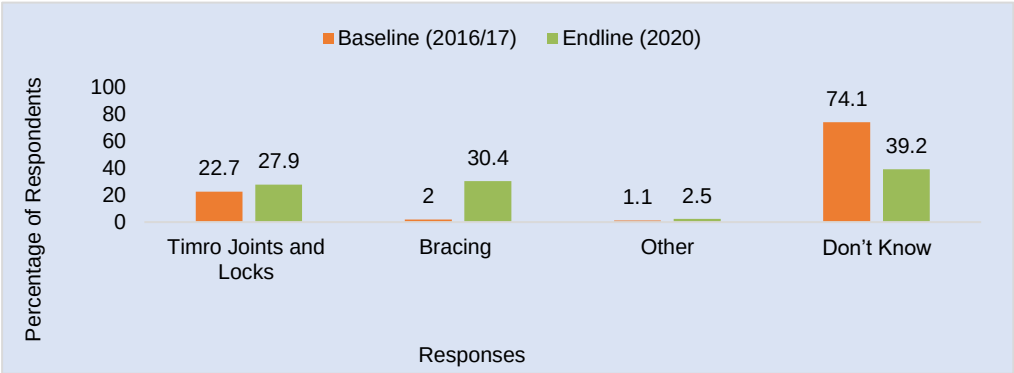


Figure 15. Ways to make timber frame building earthquake resistant

3.4 Attitude towards Earthquake Resilient Construction

This section describes the attitude of respondents towards earthquake resistant construction practices. The proportion of the respondents exhibiting desired attitude varied widely by the items.

Responsibility for Earthquake Risk Reduction (Community)

Respondents thought on the primary responsibility of making communities earthquake resilient varied in both the surveys. The score was distributed among all the key stakeholders such as masons, engineers, local government, community, and they themselves. However, in the endline survey there was slight increase in the percentage of masons, engineers, and local government.

Also, one of the house owner from FGD, said "Thinking as my prime responsibility to make community earthquake resilient, I shared my experience and i have conveyed my community perform retrofitting as it is very effective in terms of technology transfer and also very sound financially and it will also help to conserve our history, house and culture too."

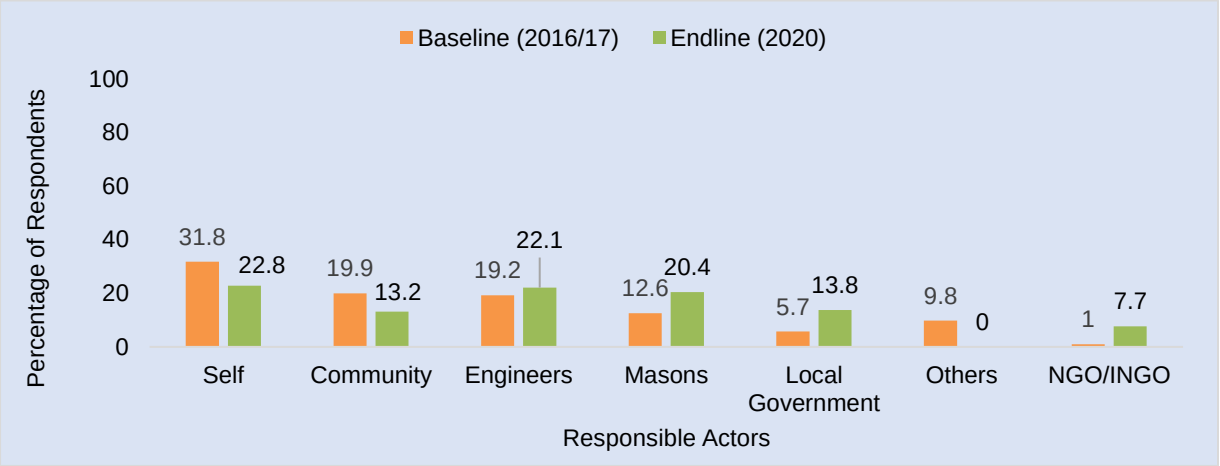


Figure 16. Primary responsible actors for making earthquake resilient community

Willingness for investing additional cost for Earthquake-Resistant Buildings

To gauge the respondent's attitude towards their willingness to pay additional cost to make their buildings safe, respondents were asked how much extra they are willing to pay. It was observed that almost 59% of the respondents were willing to invest double the cost, 19% were even ready to pay 3 times the cost in the endline survey. These percentage were significantly increased from the baseline survey, 39% were willing to pay double during the baseline (**Figure 17**).

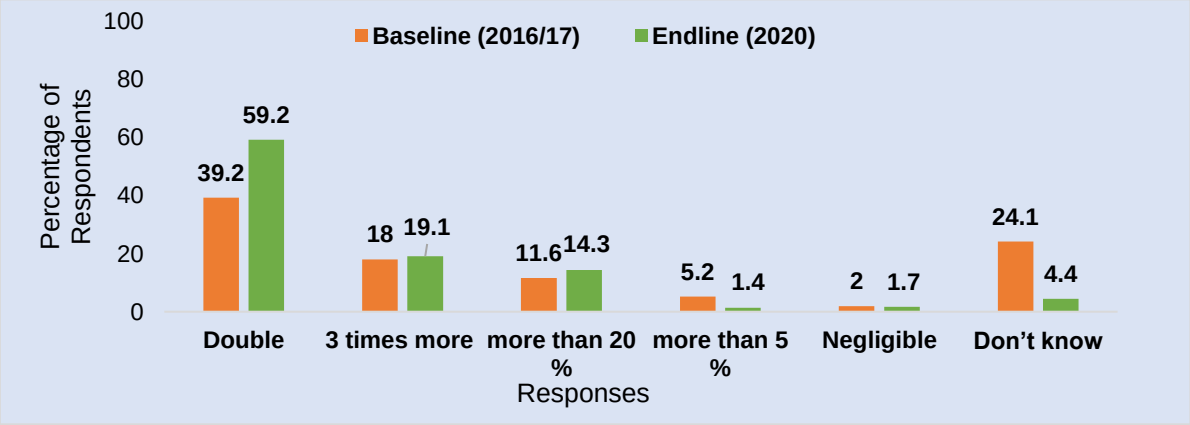


Figure 17. Respondent's willingness to invest additional cost earthquake resilient houses

3.5 Practice on Earthquake Resilient Construction

This section describes the change in respondents' practices on earthquake resistant construction techniques. The practice items included use of trained mason while constructing their house, taken technical support for construction, size of the pillar/beam used for RC frame house, use of bands if masonry buildings and use bolts and bracings for timber houses.

Involvement of Trained Masons while constructing their house

Figure 18 presents the comparative result of baseline and endline survey of the respondents who had employed trained masons in the construction of their houses.

91% of the respondents during baseline survey had mentioned that they have not used trained mason while constructing their house. However, during the endline survey more than 85% mentioned that they have involved trained mason (either fully or partially) while constructing their houses. 45.2% of respondents mentioned that there was full involvement of trained mason while constructing their house and partial involvement as mentioned by 41.1% of the respondents.

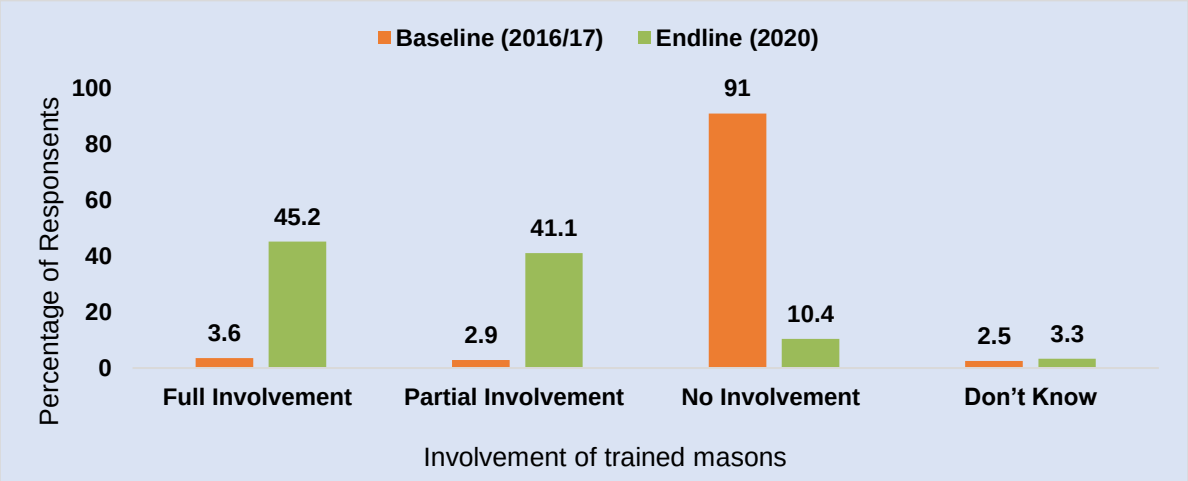


Figure 18. Involvement of trained masons while constructing their house

"Sertung Village of Northern Dhading geared up towards building resilient communities"

The devastating Gorkha Earthquake left hundred-thousands of people homeless with entire villages flattened across 31 districts of the country. Nothing is more distressful and insecure than losing own house and to witness own house collapsing just in few seconds. One of the former far northern VDCs of Dhading, Sertung, now ward no. 3 & 4 of Ruby Valley Rural Municipality was one of the villages that witnessed the shatter after Gorkha Earthquake.

Sertung is surrounded by Tipling, Lapa and Jharlang the former VDC's, located approximately 65 KM far from the district headquarter. Topographically and geologically, it has steep terrain, high hills and fragile topography. The altitude of Sertung VDC ranges from 1400m to 4500m. But normally the residential settlement at this place is up to the altitude of 2400m . There is a settlement of Janajati ethnic group, and 806 beneficiaries. The building typology at this place is dry stone masonry which were constructed with traditional construction technology but lacked earthquake resistant components. As a consequence, the Gorkha Earthquake 2015 hit this village damaging all the houses. Places like Sertung where there is lack of basic infrastructure i.e., no transportation, no proper health facilities, no better educational opportunities added troubles to the people after the earthquake. Living in a temporary shelter was never good to feel warm and secure. Going through all the troubles and half informed about the reconstruction process people were in perplexed situation to construct their houses to resist future earthquake.

After the implementation of Baliyo Ghar program in their community it became easy for Sertung dwellers to get informed about the government process for reconstruction, receive grant and rebuild earthquake safe homes as per the NRA guidelines. Awareness activities like orientations, help desk, discussion programs, focused group discussion and mason trainings to local masons and frequent door to door technical support were the significant factors that enabled the Sertung community to construct earthquake resilient houses. As a result, Sertung is becoming quake safe Sertung these days. Constructing resilient house following all the set guidelines is not only the priority of the reconstruction beneficiaries but also for non-beneficiaries and regular builders of Sertung. They have already started constructing their house according to NRA guidelines.

"It's not the grant we are seeking but its our safety"

Chanduman Tamang, 24, resident at ward no:-4 (former ward no:-3), Awai, Sertung, is one of the trained masons of Baliyo Ghar program. "Being a trained mason, it gives me huge responsibility to make resilient community. It does not matter whether I get government grant or not, but I feel I must construct following NRA guidelines which I have learnt from the 7 days mason training organized by Baliyo Ghar", said Chanduman. He added "We had to suffer a lot because of the earthquake destruction, so after receiving the 7 days mason training and a number of orientations and also the 50 days On the Job training being conducted in our village, all these activities gave us so much knowledge and guided us to construct earthquake resistant house."

Chanduman Tamang outside the house being reconstructed in Sertung, Dhading

Received technical Support and suggestions while constructing their house

When asked if the respondents have received technical support and suggestions while constructing their house, 92% of respondents mentioned that they haven't received any technical support or suggestions while constructing their house during the baseline survey while during the endline the percentage of respondents who have not received any technical support decreased to 14%. Almost 82% of the respondents mentioned that they have received technical support while constructing their house during endline study (**Figure 19**).

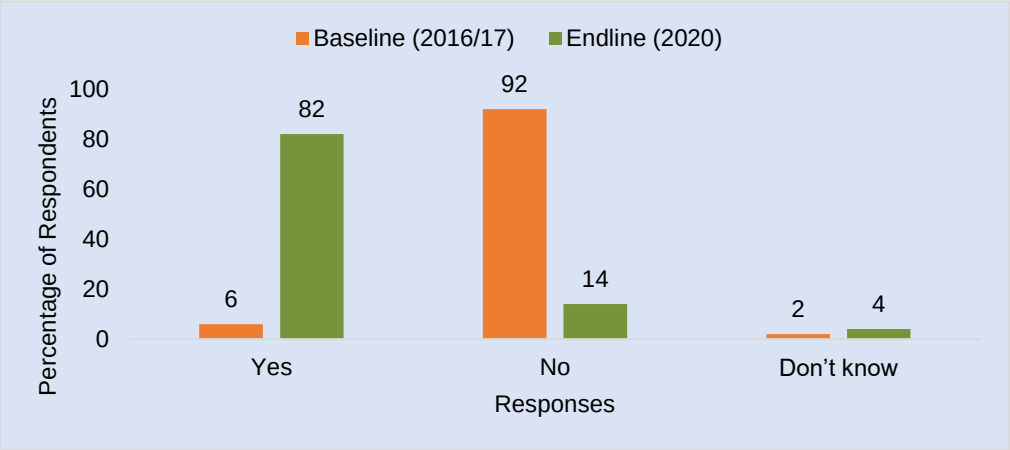


Figure 19. Technical support and suggestion taken during reconstruction

They mentioned that they had took the technical support for overall construction and supervision while those who mentioned they have received the technical support during baseline was only for design. FGD house owner states, "The NSET Baliyo Ghar program provided assistance such as technical counselling services, public awareness programs, door-to-door programs and orientation programs. All of these aspects helped build the house. First the community was warned that the house should be made earthquake resistant then helped to make the house stronger by organizing door to door program to prevent any mistake in the house while the house is being built"

Size of Pillar and Beam Used in RC Frame house

Out of the respondents interviewed 4% respondents of baseline survey and 12.3% respondents in endline survey had RC Frame houses.

For RC frame structures, size of the pillar and beam used is one of the major components which makes the houses earthquake resistant. Change in practice was observed over the years. Respondents having RC Frame houses were asked about the size of the pillar they have used in their houses. Nearly 68% of the respondents during endline survey mentioned that they have used the correct size (12*12 inches) of pillar. The percentage of the respondents who used the correct pillar size in their house has increased significantly, it was only 26.1% during the baseline study (**Table 8**).

Similarly, increase in the percentage of respondents who have started using the standard size of the beam was also observed. The percentage increased from 26.6% to 41.3% from baseline to endline (**Table 9**).

Table 8: Pillar size used for earthquake resistant RC frame houses

Surveys	Pillar size		
	12*12 inch	Other Dimensions	Don't know
Baseline (2016/17)	26.1%	36.8%	37.1%
Endline (2020)	68%	13%	19%

Table 9: Beam size used for earthquake resistant RC frame houses

Surveys	Beam Size		
	9*14 inch	Other Dimensions	Don't know
Baseline (2016/17)	26.6 %	27.1 %	46.3 %
Endline (2020)	41.3 %	34.7%	24.%

Practices in Masonry Housing and use of Earthquake-Safe Bands

Out of the respondents interviewed 36% respondents of baseline survey and 86 % respondents of endline survey had masonry houses.

Placement of bands is considered as one of the most important methods of increasing the seismic resistance of masonry buildings. Changes in practice was observed, it was evident that people have started following the safe construction practices. Respondents when asked if they have put bands in their houses, nearly 89.5% of the respondents during endline survey mentioned that they have put bands, the number was only 25.1% during the baseline survey. During the baseline survey, almost 60% didn't know about the techniques as 38.5% of respondents mentioned they did nothing and 21.7% didn't know about that (**Figure 20**).

Further when asked where they have put bands in their houses, almost all, (97.5%) respondents during endline study mentioned that they have kept bands everywhere, it was only 46.8% during the baseline study (**Table 10**).

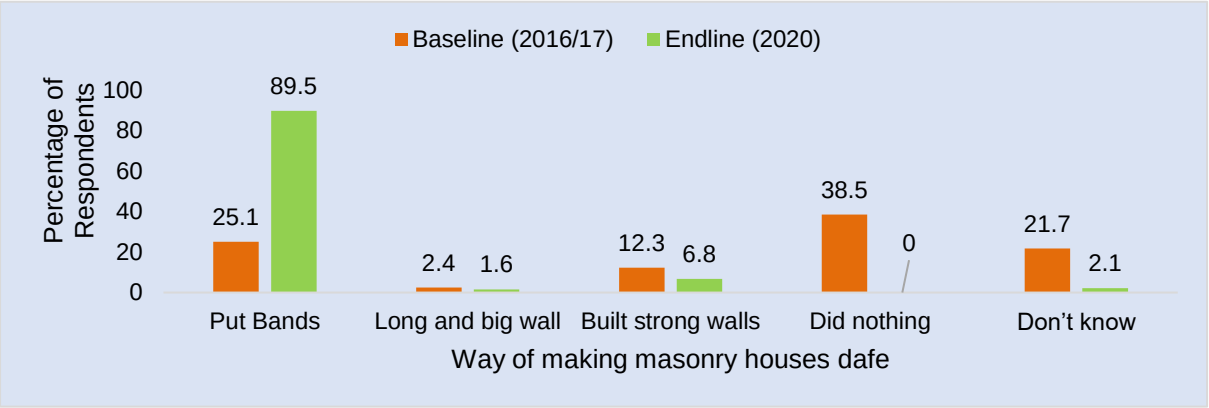


Figure 20. Ways of making masonry houses safe from earthquake

Table 10:Band placement practices adopted for earthquake resistant masonry houses

Band Placement	Surveys	
	Baseline (2016/17)	Endline (2020)
Everywhere	46.8 %	97.5%
Only Roof Band	3.8%	0.2%
Only above and below the window	29.7%	0.3%
Only in foundation and DPC level	18.3%	1.6%
Only in foundation level	1.4%	0.4%

Earthquake-Safe Practices in Timber Frame Houses

Out of the respondents interviewed 2% respondents of baseline survey and 0.5 % of respondents of endline survey had timber frame houses.

Bracing, timber joints and locks are considered as earthquake resistant techniques for timber frame houses. Changes in practice was observed in the timber structure as well, it was evident that people have started following the safe construction practices. 56.3% of the respondents during endline survey mentioned that they have placed timber joint and locks and 37.5% mentioned that bracing was done in their timber frame houses. Almost 60% of the respondents were not aware on the techniques during the baseline survey (**Table 11**).

Table 11:Practices adopted for earthquake safe timber frame housing

Practices Used	Surveys	
	Baseline (2016/17)	Endline (2020)
Timber joints and locks	33%	56.3%
Bracing	3.1%	37.5%
Don't know	24.7%	6.2%
Did nothing	34.4%	0
Others	4.8%	0

3.6 Change in Risk Perception- Evaluation of the KAP Score

One of the major objectives of the survey was to assess the change in the knowledge, attitude and practice of the people residing in the program communities. Baseline and Endline surveys were conducted to measure the change in the level of awareness of the people before and after the implementation of the program. As per the Monitoring and Evaluation plan of Baliyo Ghar Program in five years period after the implementation of the program, the Endline KAP score was targeted to increase by 60 % from the Baseline KAP Score. Aggregate KAP score was computed by combining related knowledge, attitude, and practice items and reported as score out of 100. The questions of the KAP assessment were grouped into separate categories. The sum of the scores was taken as the participant's KAP score.

The average KAP score in the baseline survey was 30 (out of 100) and 60% of 30 is 18, which makes the targeted KAP score to be achieved is 48 in the endline. A number of capacity building and awareness raising activities, door to door technical assistance, and use of various media were done to raise the awareness of people under Baliyo Ghar program. These activities conducted in the Baliyo Ghar program districts were expected to contribute to the increase in the KAP scores of the respondents in the survey areas.

KAP score was computed from the endline study, and the results of the analysis showed that the KAP score increased to 50 during the endline survey which reflects that the set target in the M&E plan has been achieved. The **Figure 21** below presents the mean KAP Scores of the respondents during the Baseline and End line surveys. Each component of KAP score i.e., knowledge, attitude and practice score were found to be increased during endline survey as compared to the baseline. The average knowledge score increased from 36 out of 100 to 48, attitude score from 41 out of 100 to 57, and practice score which was 11 out of 100 increased to 46 out of 100.

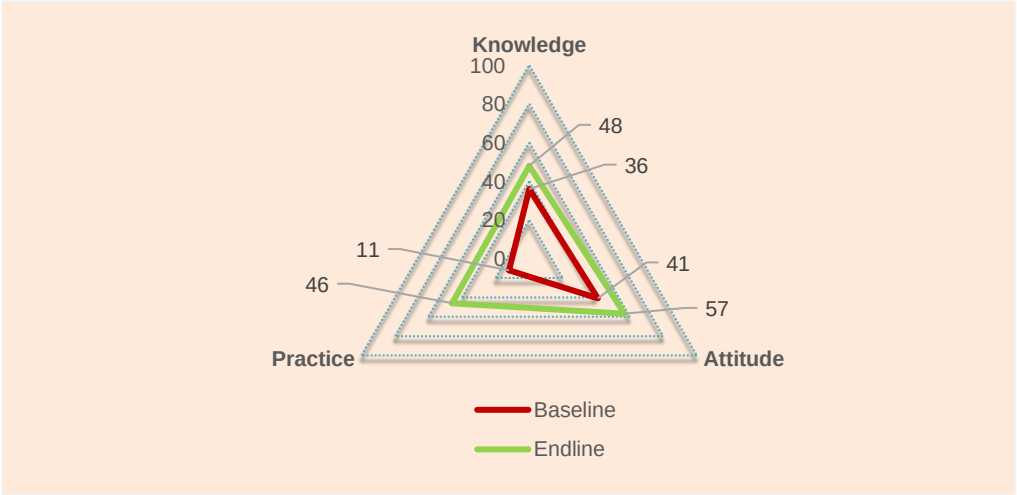


Figure 21. KAP score of respondents in Baseline and Endline survey

3.7 KAP Score by Geographic locations

The assessment of the KAP score across the program VDC/municipalities of the 3 districts of Baliyo Ghar Program indicated that those VDCs/municipalities have made a significant progress in raising the awareness of the community on earthquake/disaster risk reduction over the years. There has been increase in the average KAP score of the residents in the year 2020 from that of 2016/17. It was also observed that the increase in KAP score was not uniform in all the program areas as reflected in **Table 12**, The then VDCs such as Alampu, Bigu, Chilankha, Laduk (now all merged into one- Bigu Rural municipality of Dolakha district) were found to have the highest scores while Talakhu(Nuwakot district), Kumpur, Nalang(Dhading district) were with little less score than others. There was more than 60% increase in the KAP score of the then VDCs Sertung and Tipling (Now Rubi Valley Rural Municipality of Dhading district) which was the most remote area (accessibility wise) among others.

Table 12:KAP Score distributed across program districts

District	VDC/Mun.	KAP Score		Differences
		Baseline (2016/17)	Endline (2020)	
Nuwakot	Chaturale	34	51	17
	Chhap	18	51	33
	Likhu	25	52	27
	Mahakali	24	52	28
	Samundradevi	26	50	24
	Sikre	32	50	18
	Talakhu	28	41	13
	Thanapati	22	52	30
	Thansing	23	49	26
Dhading	Darkha	38	50	12
	Dhuwakot	33	52	19
	Jyamrung	46	51	5
	Kalleri	23	52	29
	Khalte	28	52	24
	Kumpur	29	42	13
	Marpak	32	50	18
	Nalang	26	42	16
	Nilkantha	26	50	24
	Semjong	36	48	12
	Sertung	25	47	22
	Tipling	24	47	23
Dolakha	Alampu	25	55	30
	Babare	27	53	26
	Bhimeshwor	33	48	15
	Bhirkot	26	53	27
	Bigu	26	55	29
	Chilankha	27	56	29
	Chyama	29	53	24
	Japhe	37	52	15
	Jhule	36	52	16
	Katakuti	31	51	20
	Laduk	31	57	26
	Lamidada	31	52	21
	Magapauwa	38	48	10
	Malu	29	52	23

To explore more on the quantitative findings and triangulate the data focus group discussions were conducted with around 83 houseowners and masons in different events.

During the discussion participants highlighted that they have received information like earthquake resilient construction techniques, causes of earthquake, safety measures that should be adopted for minimizing the earthquake risk etc. Besides these, information related to the tranche distribution criteria and design provided by the NRA were disseminated by different stakeholders working in reconstruction. Different stakeholders working in the field of reconstruction like Local governments, I/NGO's, NRA field engineers provided necessary information and support for reconstruction through various trainings, orientations, door to door visits, visit by technician on construction sites and various other events.

The houseowners interviewed specifically mentioned, that NSET Baliyo Ghar program has very been a big support for them in the reconstruction process as it provided assistance such as technical counselling services, public awareness programs, door-to-door programs and orientation programs. All of these aspects helped build strong houses. First the community was made aware that the house should be made earthquake resilient and then the program helped to make the house stronger by organizing door to door program to prevent any mistakes in the house while the house is being built. Discussion conducted at Magapauwa, Dolakha mentioned that training program has effectively produced new masons and enhanced skills of existing masons. It has helped female masons become economically stable. Also, orientation has been helpful to raise the awareness of house owners regarding the basic component of earthquake resilient construction technologies.

One of the Houseowner, Dhading said, "We learned about the government standard design, the tranche system and the codal provision from NSET technical team, ward members, radio and television programs. It was very helpful for us.

The FGD participants seemed confident that similar types of earthquake resilient construction technology will be adopted in future constructions by the community.

Increased Awareness of the Communities contributing to the disaster resilient construction in Alampu

Alampu was one such community in Dolakha district where most of the houses were damaged by Gorkha Earthquake. More than 600 houses were damaged beyond repair and four people lost their lives. These losses were the result of lack of awareness on simple cost- effective techniques that could significantly increase seismic safety of the buildings. After the devastating earthquake, this remote VDC had difficult time in receiving instant relief materials and even faced difficulty in preparation of their temporary shelters. In the initial phases the reconstruction modality adopted by NRA was not clear to the beneficiaries, and such the situation was complete chaos in the beginning.

With a wide array of activities and campaigns, Baliyo Ghar Program worked intensively to enhance the awareness of local community and stakeholders in disaster risk and reduction measures, especially pertaining to earthquake risk. In Alampu, more than 200 local masons actively contributed to the disaster resilient reconstruction, supported by capacity building trainings and continuous door-to-door technical assistance and social mobilization by Baliyo Ghar Program. The mobile teams stationed at Alampu were able to impart awareness on disaster resilient reconstruction to more than 4500 households through orientation and door-to-door campaigns. Evidence of the increased awareness can be witnessed in the construction of disaster resilient houses in Alampu, which have not only incorporated the earthquake resistant measures but also have received the government grant support with ease. Similarly, disaster resilient construction practices were also practiced in other structures such as toilets, communal buildings, schools and other structures. To ascertain the impact of Baliyo Ghar Program on awareness, Risk Perception Surveys were carried out as a part of the program evaluation mechanism. It was observed that there has been a substantial increase in the level of awareness of earthquake affected communities in Alampu during the implementation of Baliyo Ghar Program. The Knowledge score of respondents in Alampu was only 32 during the Baseline survey, lesser than the district average of Dolakha. The score has increased to 55.4 during the endline survey, a 72% increase. The Attitude score has also increased by 72%. Interestingly, the Practice Score which was a mere 11 during the baseline survey has increased by nearly 4 times to 54 in the endline survey. The increase in these scores highlights the increased understanding and awareness of community people in Alampu towards earthquake risk and mitigation measures and their roles in mitigation. It was observed that the KAP score of respondents in Alampu was higher than the overall district average in the endline survey.

Evidently, an overwhelming 98% of the houses in Alampu were constructed by trained masons, which is the direct outcome of the several short- and long-term trainings and awareness activities carried out by Baliyo Ghar Program in the community. The trained masons themselves have further transferred their skills to other local masons and as such the remaining households may also have some form of skilled masons, despite not being trained through a formal training program. In Alampu, Baliyo Ghar program interventions in the form of trainings, awareness activities policy advocacy has not only served in earthquake resistant houses but also eased in government inspections and grant support mechanism and has also boosted the reconstruction of the entire region i.e., Bigu Rural Municipality and Dolakha district. These points towards the fact that socio-technical assistance and awareness activities were much more effective in Alampu. However, a rigorous future study could provide insight into it.

Tipling becoming Seismic Resilient Village, A Community (Tole) named as "Baliyo Tole"

Tipling, one of the northern most area in Dhading lies in Ruby Valley Rural Municipality of the district, one of the tourist trail in Nepal. A village with historical and religious significance was severely damaged by 2015 Gorkha Earthquake. With no road access, no electricity and lack of awareness and low literacy rate but with magnificent natural beauty, Tipling, has woken up with all new seismic resilient houses.

Tipling dwellers have entitled one of the settlements as Baliyo Tole (Strong Tole). All of the houses flattened by Gorkha Earthquake have now been rebuilt to resist earthquakes, hence villagers have coined the name Baliyo Tole. "At first, we were not aware of making quake safe houses, but when NSET- Baliyo Ghar provided us 7-days mason training we have been successful to make our village seismic resilient," Bikash Ghale, a lead mason of Baliyo Tole said.

There are more than 25 houses in Baliyo Tole, almost all resembling each other and all incorporating the earthquake resistant techniques. "If the metals cannot be found in village, we can use the pieces of zinc sheets with two or three folds-in to join vertical reinforcements with wall," Ranjan Dhungel, Manager, Baliyo Ghar said. "We have found the reconstructed houses as strong as we had expected" Dr. Ramesh Guragain, Deputy Executive Director, NSET stressed.

The villagers are pleased to receive the government grant worth NRs. Three hundred thousand timely as they have completed their houses. "We have suffered lot by rain, mice and leeches, but now we have entered in the quake safe houses, very happy to be here" Jerung Ghale, a local of Tipling said. Majet Tole, next village to Baliyo Tole has been rebuilt as the model village. 9 houses of a single family were rebuilt simultaneously. The family had 10 trained masons who all got trained and was involved to rebuild the flattened houses to resist future earthquakes.

"We have our sons, sons-in-law and brothers-in-law as trained masons in our family, so no worries!" Syu Tamang, a local from Baliyo Tole said. Tipling dwellers say their new houses are the government houses, as government has provided grant to rebuild.

These houses have been the model houses for northern belt of Dhading district. After the villagers got to know about the construction of earthquake resilient houses using the locally available materials and when trained masons(trained through Baliyo Ghar program) were available in their own locality, people started rebuilding their house hence making the whole community earthquake resilient. This village has now become a model village for other areas hit by Gorkha Earthquake.

3.8 KAP Score by Demographic characteristics

Table 13 summarize respondents KAP score by demographic characteristics. Scores of the respondents in two surveys are compared by gender, age group and level of education, occupation, income etc. An independent sample t-test and ANOVA test are used to check whether the relationship between the respondent's characteristics and Knowledge, Attitude and Practice Scores they obtained are statistically significant or not.

Men had higher KAP scores than women in both surveys. Independent t-test was performed between KAP and Gender in both surveys. The p-value for knowledge attitude and practice was 0.00 in both cases. Which shows that there is significant relationship between KAP score and gender.

Among the ethnic groups of the community, it was observed that Brahmin/Chhetri had higher KAP score in both the surveys followed by Newar and Janajati. Dalit and others minority group was with the lowest KAP score in the baseline survey which seemed to have increased significantly during the endline survey. However, Brahmin and Chhetri are still the highest KAP scorers. ANOVA test was performed between KAP and ethnicity. In both surveys, the p-value (0.00) indicates the rejection of null hypothesis which means that the knowledge, attitude and practice score of respondents was significantly affected by ethnicity, with p-value of 0.00.

The Older age group (65 and above) were found to have lower KAP score compared the age group between 25- 55 years. Higher education level was associated with higher scores of desired knowledge, attitudes, and practices

The KAP score of people in government job, NGOs/INGOs, business was found to be higher in both the cases while Housewives had the lowest KAP scores. Significant change in the KAP score of Masons was observed over the years. The higher income level was associated with higher scores of desired knowledge, attitudes, and practice.

KAP score of those who have participated in the formal awareness program and have listened/watched awareness programs in radio/television was found to be higher in both studies.

Demographic characteristics of respondents such as Gender, Ethnicity, Age group, Education level, Occupation, Income level, Participation in formal awareness program and Status of Listening/Watching Awareness Program was found to have statistically significant association in between Knowledge, Attitude and Practice Scores obtained by the respondents in both Baseline and Endline Surveys.

Table 13:Association result KAP Scores among Respondents with Different Characteristics

Respondent's Characteristics	Baseline Survey (2016/17)			Statistical test/ Result	Endline Survey (2020)			Statistical test/ Result
	Knowledge	Attitude	Practice		Knowledge	Attitude	Practice	
Gender								
Male	41.51	43.25	12.29	t-test, p<0.05 *	53.15	57.53	47.4	t-test, p<0.05 *
Female	31.51	39.23	9.29		42.26	56.14	44.99	
Ethnicity								
Dalit	34.81	38.63	8.21	ANOVA test, p<0.05 *	47.56	54.82	46.46	ANOVA test, p<0.05 *
Brahmin/Chhetri	38.79	43.1	12.57		50.65	56.99	47.81	
Newar	37.99	41.25	10.2		46.21	55.43	43.74	
Janajati	34.45	40.29	10.04		46.57	57.51	45.67	
Other	32.66	36.79	8.11		45.98	59.44	42.55	
Age group								
15-19	37.38	40.95	9.79	ANOVA test, p<0.05 *	46.44	57.71	48.21	ANOVA test, p<0.05 *
20-24	36.25	42.51	0.03		48.21	57.08	43.29	
25-29	37.04	42.96	10.69		51.29	57.39	45.85	
30-34	37.81	42.44	10.33		51.2	58.1	48.17	
35-45	38.69	42.46	11.92		49.79	57.12	45.89	
46-55	38.22	42.03	11.22		48.99	56.99	47.36	
56-65	34.76	39.71	11.45		46.98	56.82	46.51	
65 and above	30.47	37.56	9.09		42.53	55.37	45.34	
Education Level								
Illiterate	22.23	33.48	7.98	ANOVA test, p<0.05 *	36.96	55.48	42.99	ANOVA test, p<0.05 *
Literate	33.12	42.5	11.92		46.76	56.7	46.82	
Primary	38.72	40.67	11.78		50.25	57.21	46.85	
Secondary	39.32	42.37	12.68		51.64	58.08	48.08	
Higher Secondary	41.44	42.85	11.85		51.57	58.39	45.08	
Bachelor and Above	42.6	50.05	18.08		53.78	57.93	50.02	
Occupation								
Other	37.71	42.17	11.51	ANOVA test, p<0.05 *	47.6	56.4	44.51	ANOVA test, p<0.05 *
Agriculture	33.74	40.37	10.01		46.41	56.51	45.92	
Government Job	47.73	47.62	17.16		53.76	57.71	44.94	

Respondent's Characteristics	Baseline Survey (2016/17)			Statistical test/ Result	Endline Survey (2020)			Statistical test/ Result
	Knowledge	Attitude	Practice		Knowledge	Attitude	Practice	
Student	33.56	42.44	10.65		52.43	57.49	46.37	
Politician	45.11	47.38	16.55		52.96	55.96	53.28	
Daily Wages	30.52	41.65	7.4		53.57	55.22	48.61	
Mason	30.4	45.2	15.33		51.29	58.91	51.29	
Private Organization	31.29	43.4	10.03		53.27	51	45.5	
Housewife	30.1	36.9	8.64		37.75	57.31	44.63	
Unemployed	32.19	41.24	8.9		44.93	55.62	42.67	
Freelancer/Advisor	31.44	43.58	14.67		51.42	55.8	51.23	
Business	33.67	43.6	11.96		53.37	58.21	45.05	
NGO/INGO	47.45	45.94	11.47		52.3	58.4	52.27	
Social Work	47.03	41.42	16.15		52.06	60.6	51.36	
Income Level								
No Income	31.23	37.29	11.41		42.18	55.66	46.81	
less than 10,000	32.54	38.9	9.2		48.93	56.52	46.2	
10,001-20,000	40.22	43.5	10.85		51.06	57.95	47.44	
20,001-30,000	40.58	43.9	11.82		51.05	57.81	45.63	
30,001-50,000	39.16	44.4	12.64	ANOVA test, p<0.05 *	52.58	56.18	47.51	ANOVA test, p<0.05 *
50,001-100,000	42.26	46.07	13.91		52.53	58.41	47.21	
More than 100,000	34.73	42.63	13.18		52.8	53.2	50.46	
Can't Say/Don't Want to Say	34.66	40.88	15.03		39.39	57.53	48.2	
Don’t know	31.96	36.92	9.63		34.95	55.26	40.96	
Participation in Formal awareness Program								
Yes	44.6	42.5	15.4	t-test, p<0.05 *	55.8	57.5	56	t-test, p<0.05 *
No	27.5	40	7.1		44.5	56.6	41.8	
Listening/watching awareness program								
Yes	41.21	43.27	14.01	t-test, p<0.05 *	55.3	57.94	49.245	t-test, p<0.05 *
No	29.11	38.28	7.15		39.84	55.91	42.56	

Note: *Denotes that the association in-between respective respondent's characteristics and Knowledge, Attitude and Practice Scores are statistically significant
A detailed individual association in-between respective respondent's characteristics and Knowledge, Attitude and Practice Scores are presented in Annex 8

Relation between KAP score and use of trained masons

Further analysis was done to find if there is any relation between level of KAP score and use of trained mason. It was observed that those with higher KAP scores tend to use trained masons while constructing their house. Use of trained masons were also high during the endline. Attitude of the respondent seemed to be more leading than knowledge towards the use of trained masons in construction.

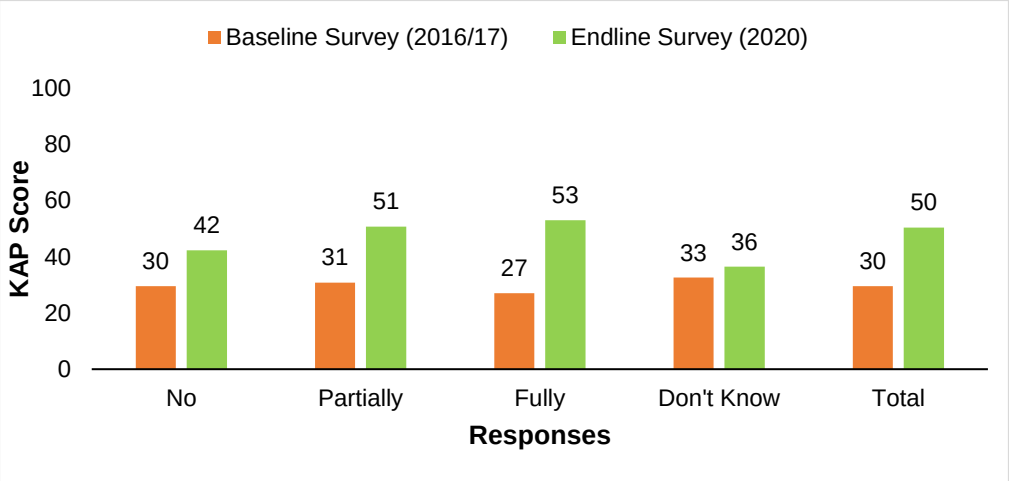


Figure 22. KAP score and Status of trained masons used while constructing houses

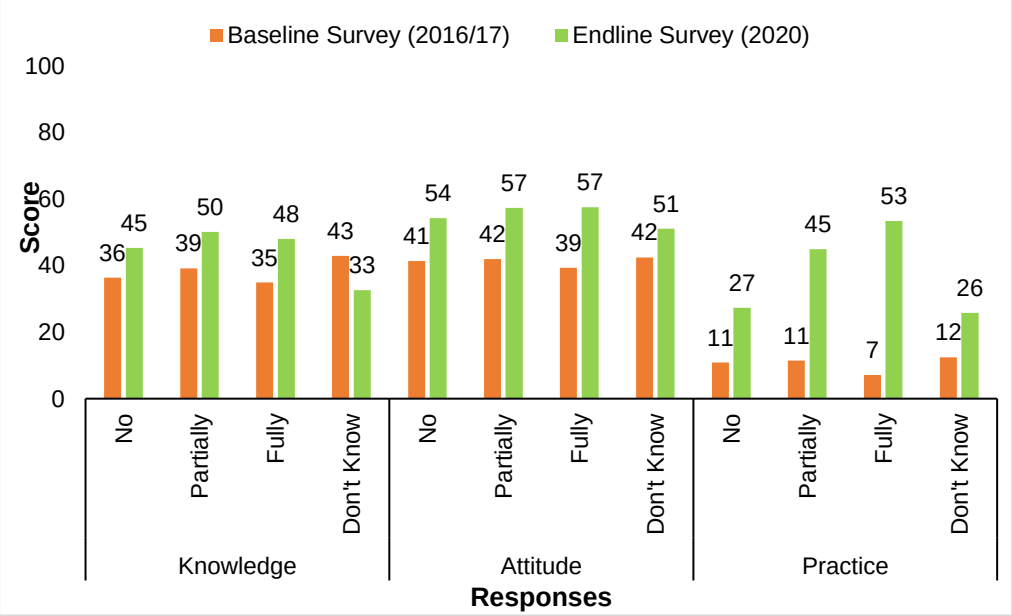


Figure 23. KAP score and Status of trained masons used while constructing houses

Community people getting information through House-Owners Orientation

CHAPTER - 4: DISCUSSION

The Baliyo Ghar Program was conceptualized and implemented to respond to the huge need of trained human resources required for large-scale reconstruction post Gorkha earthquake destruction. The program strived to carry out multi-disciplinary training and orientation programs towards the disaster resilient reconstruction. The goal of the program was to enhance the reconstruction rate through owner driven approaches such as trainings, awareness, demonstration and technical support on code compliance. The program was implemented in the four most affected districts Dolakha, Dhading, Nuwakot and Kathmandu. In these four districts, the program had covered 23 wards of 3 Urban Municipalities (UM) and 43 wards of 12 Rural Municipalities (RM), 66 wards of 15 municipalities in total. Similarly, in terms of number of earthquake housing reconstruction beneficiaries, Baliyo Ghar had provided direct technical assistance to 61,444 out of total 274,910 beneficiaries in the four districts. In total, 16.6% of the wards and 21.74% of the listed beneficiaries of the 4 districts have been covered with blanket technical support through Baliyo Ghar Program. The program primarily imparted awareness, knowledge and skills regarding disaster resilient construction techniques to earthquake affected communities in four most affected districts in Nepal.

Of the three intermediate results (IR) of Baliyo Ghar program i.e.., IR1- Improved policy and standardization of training, guidelines and manuals for disaster resilient construction technologies; IR2- Enhanced local capacity to apply disaster resilient construction methods and techniques and IR 3- Increased awareness on disaster resilient construction in Nepal, to achieve the third result, the awareness level of the community was increased through different program activities such as: orientations, door to door technical assistance, information desk, demonstration model, media campaigns etc.

Baliyo Ghar program also assisted Government of Nepal for the formulation of reconstruction related policies and its field implementation. Apart from the capacity building programs for different stakeholders, Baliyo Ghar Program conducted large number of orientation and interaction programs targeted towards a wide range of stakeholders, house owners, masons, engineers, local authorities etc. The purpose of the program was to enhance awareness and capacity of earthquake affected beneficiaries regarding reconstruction policies and earthquake resistant construction technologies. During the program implementation period Baliyo Ghar program oriented 1,46,559 people within the program districts through 6,893 orientation events. These orientation programs addressed the governments grant facilitation process, and the safer construction techniques adhering the national building code compliance.

Beyond these Baliyo Ghar awareness raising and capacity building activities, the National Reconstruction Authority (NRA) program also focused on providing strategic guidance to identifying and addressing the priorities for recovery and reconstruction on earthquake affected areas. The NRA implemented reconstruction activities through local government offices in coordination with non-governmental organizations, all of which would have worked towards enhancing understanding of safer building construction. The reconstruction cash grant was also intended as an incentive to build back better and was tied to the requirements of the Building Code and the use of the earthquake resistant technologies during the reconstruction

The average KAP score increased from 30 (out of 100) in the baseline to 50 in the endline reflecting that the set target (60% increase from the baseline value i.e., 30+18= 48) for the indicator “increase in the risk perception score of the communities” has been achieved. Each component of KAP score i.e., knowledge, attitude and practice score were found to be increased during endline survey as compared to the baseline. The average knowledge score increased from 36 out of 100 to 48, attitude score from 41 out of 100 to 57, and practice score which was 11 out of 100 increased to 46 out of 100.

The large damage during the 2015 Gorkha earthquake was in SMM (Stone and Mud Mortar Masonry) typology which contributed significant economic and human losses. SMM typology was the most common construction typology in the country. The contribution of SMM housing typology to the overall damage was more than 60 percent in badly affected rural areas such as Dolakha, Dhading, Nuwakot and Sindhupalchowk (HRRP, 2018).

The Gorkha earthquake had damaged most of the houses in the program area. More than half (58%) of the respondents were living in temporary homes during the baseline survey, only 36% had stone masonry house and 4% houses with pillar structures that survived. The reconstruction of SMM type was higher in Dhading, Dolakha and Nuwakot followed by Brick Masonry in Cement Mortar (BMC) in comparison to other types of building. As during the end line survey, most of the houses had been reconstructed and majority of the respondents (85.9%) mentioned that their house was stone masonry, 12.3% Pillar houses and 0.5% wooden frame structures.

Of the participants involved in both the surveys, 51% female and 49% male in baseline study and 47% female and 53% male in endline study. In both surveys, higher percentage of respondents were from Janajati (45%, 43.8%) followed by Brahmin/Chhetri, Newars and Dalits. In both Surveys (Baseline and Endline), for majority of the respondents (>60%) agriculture was the main occupation with other diverse types of occupation such as business, mason and around 9% housewives. Majority of the respondents surveyed more than 60% belonged to income group less than 20,000(i.e., less than 200 USD as their monthly income). The monthly income of the respondents was less than ten thousand Nepali rupees (<100USD, as mentioned by 32% respondents) and in between ten thousand to twenty thousand Nepali Rupees (100-200 USD, mentioned by 32.1% and 28%) during both studies.

During the focus group discussions conducted with around 83 houseowners and masons in different events, it was observed that most of the participants were full reconstruction beneficiaries. 2015 Gorkha earthquake had completely destroyed their houses. The reconstruction of the houses was done with the locally available construction materials following the guideline published by National Reconstruction Authority.

The reconstruction had not been easy, the houseowners when asked about the challenges they faced during reconstruction, most of the participants highlighted -financial challenges including high cost of construction materials, delay in receiving government tranche; lack of awareness- they didn't know how to and where to about the systems and process set for reconstruction; lack of trained human resources at the initial stages, and availability of construction materials as the major challenges faced in the initial days of reconstruction.

Most respondents in the program communities stated they had not participated in formal awareness programs or have listened/watched awareness programs in radio/television during baseline survey and their knowledge, attitude and practice regarding earthquake risk and earthquake resilient construction was found to be low.

The Baliyo Ghar program provided information and exposure about disaster risk concepts, specifically earthquake risk reduction to all the residents of program communities. Such socio-technical assistance was provided through targeted radio/television programs dedicated to helping residents understand earthquake-resistant reconstruction techniques, community orientation programs and even door-to-door visits by teams of engineers, social workers, and masons that could assist residents of Baliyo Ghar program area in understanding and applying earthquake-resistant construction techniques to their housing reconstruction projects.

Questions related to earthquake-resistant construction techniques asked during endline surveys in all the VDCs/municipalities illuminated how the public awareness campaigns in the Baliyo Ghar communities may have increased knowledge because of direct earthquake experience and post-event massive awareness campaigns.

Houseowners getting information's through the BG program's door-to-door technical assistance at Marpak, Ward 2 -Netrwati RM of Dhading (photo above) and beneficiaries getting information through IEC materials at Magapauwa, Ward 4 of Sailung RM, Dolakha (photo below)

The percentage of people who had participated in the formal awareness program and have listened/watched awareness programs in radio/television have significantly increased from the baseline value and it was observed that KAP score of those who have participated in the formal awareness program and have listened/watched awareness programs in radio/television was found to be higher in both studies.

The respondents were asked if they have information on earthquake and its causes, 71 % of the respondents during baseline survey mentioned that they didn't know about the earthquake and its causes, however the percentage of people not knowing the causes of earthquake decreased to 49 % in endline survey. Similarly, when asked what they think about the vulnerability of their community, 69% felt their community is vulnerable which decreased to 24.3% during the endline survey. And when asked for the reasons of risk and vulnerability they mentioned that it was because of weak houses, weak infrastructures, lack of open space, lack of knowledge on earthquake safety and lack of earthquake preparedness.

Majority of respondents (70%) answered they have not heard about the National Building Code at the baseline because there was little discussion of it and less government as well as non-government efforts had been made to educate residents. Whereas, in endline survey similar percentage, 69 % of the respondents answered that they are aware (either fully or little) about the National Building code, this was likely a direct result of the initiation of the housing reconstruction program after the baseline survey.

During the endline survey, a modest number of respondents could identify the appropriate size for reinforced concrete columns and beams. Minimum column and beam size is an important aspect of earthquake-resistant reinforced concrete construction. When columns are too small relative to beams, the column can become a weak point in the reinforced concrete frame structure. Failure of columns can lead to catastrophic collapse of an entire building, which can cause high rates of death and injury to occupants. Thus, Nepal's building code specifies a minimum size for columns as12 inches x 12 inches. However, the common practice of the column and beam size was 9 inches x 9 inches before the earthquake, but that increased to 12 inches x 12 inches for columns and 9 inches x 14 inches for beams.

Although the exposure of residents to the program activities and awareness campaign has likely increased their familiarity with the updated dimensions. However, only around one fourth of the respondents answered the exact detail, this might be because reinforced concrete is not the dominant building typology. The 2011 census shows that more than 80% of the buildings in those area is masonry and even during the endline survey 85.9% mentioned that their house was stone masonry along with 12.3% pillar houses and 0.5% wooden frame structures.

The residents had significantly more knowledge of earthquake-resistant masonry construction. During the endline survey, majority of the respondents

(82.4%) answered that we must put bands, and most of them (96.6%) knew that the bands should be kept everywhere. This number had increased significantly from the baseline survey. Placement of bands is considered as one of the most important methods of increasing the seismic resistance of masonry buildings.

Not only the knowledge of the residents had increased but change in practice was also observed. Out of the respondents interviewed, 36% respondents in the baseline survey and 86 % respondents of endline survey had masonry houses. Among those, nearly 90% of the respondents during the endline survey mentioned that they have put bands while reconstructing their house and those bands were kept everywhere as specified for earthquake resistant construction; the number was only 25.1% during the baseline survey.

Out of the respondents interviewed, 4% respondents in the baseline survey and 12.3 % respondents in endline survey had RC Frame houses. Respondents having RC Frame houses were asked about the size of the pillar they have used in their houses. Nearly 68% of the respondents during endline survey mentioned that they have used the correct size (12*12 inches) of pillar. The percentage of the respondents who used the correct pillar size in their house has increased significantly, it was only 26.1% during the baseline study. Similarly, increase in the percentage of respondents who have started using the standard size of the beam was also observed. The percentage increased from 26.6% to 41.3% from baseline to endline

Respondents also demonstrated having good knowledge about the detailed requirements for making Timber frame building earthquake resistant such as bracing, timber joints and locks during the endline study. Very low (0.5 %) of respondents of endline survey had timber frame houses. And among them a modest number of respondents mentioned that they have placed timber joint, and locks and bracing was done in their timber frame houses.

The Baliyo Ghar program areas - Dhading, Dolakha and Nuwakot have experienced extensive damage of masonry houses due to Gorkha earthquake 2015, which may have made them more curious to know the earthquake-resistant construction of those houses. Most of the buildings reconstructed in those areas were masonry buildings and residents would have reconstructed them under the reconstruction program that made bands compulsory without which they would not get grant tranches from the government. This may have made the people more aware of the use of bands in the masonry buildings.

91% of the respondents during baseline survey had mentioned that they have not used trained mason while constructing their house. However, during the endline survey more than 85% mentioned that they have involved trained mason (either fully or partially) while constructing their houses. Further analysis was done to find if there is any relation between level of KAP score and use of trained mason. It was observed that those with higher KAP scores tend to use trained masons while constructing their house. “Attitude” of the respondents seemed to be more deciding factor than their “knowledge” for the use of trained masons in construction.

Respondents from the program area responded with strong commitment to earthquake-resistant construction, even if it were to cost significantly more. Almost 60% of the respondents were willing to invest double the cost, 19% even 3 times the cost in the end line survey, these percentage had significantly increased from the baseline survey. Surely, their experience of extensive earthquake damage contributed to their desire for housing that could withstand seismic shaking. However, by indicating a strong willingness to pay for earthquake-resistant construction, their responses seem to also provide evidence of a belief in efficacy of earthquake resistant construction technology. This understanding of earthquake-resistant technology and willingness to pay for it in future construction suggests that their exposure to a concerted public awareness campaign of media, orientation programs, and door-to-door visits helped build their understanding and belief in better construction practices. The social mobilizers translated and presented the technical message of building code and earthquake resistant construction techniques into a simpler, understandable manner.

These activities within the reconstruction program seemed to help convince respondents of the importance and effectiveness of the earthquake resistant construction, evidenced in their higher knowledge rates and higher willingness to pay more money for the safe construction practices.

Also, during the focus group discussions, participants highlighted that they have received information on earthquake resilient construction practices, causes of earthquake, safety measures to be adopted for minimizing the earthquake risk etc. Besides that, information related to the tranche distribution, criteria and design provided by the NRA were also disseminated by different stakeholders. Different stakeholders working in the field of reconstruction like local governments, I/NGO's, NRA field engineers provided necessary information and support during the reconstruction.

According to houseowners, they received the information mainly from Baliyo Ghar program team during the trainings, orientation programs and door to door assistances. Participants mentioned that Radio/TV program and notices from local government is reachable for large group of people. However, considering the effectiveness among all the awareness raising activities, most of the houseowners during FGDs highlighted door to door technical assistance and individual meetings for information were the most effective, as there were possibilities of good interactions between information providers and receivers.

One of the house owners mentioned "We received various information from the local government and Baliyo Ghar Program about the reconstruction process. I got to know about the governments process of tranche distribution how to get that and what are the things to pay attention to while building my house."

Men had higher KAP scores than women in both surveys. Independent t-test was performed between KAP and Gender in both surveys. The p-value for knowledge, attitude and practice was $p<0.00$ in both case which shows that there is significant relationship between KAP score and gender. Among the ethnic

groups of the community, it was observed that Brahmin/Chhetri had higher KAP score in both the surveys followed by Newar and Janajati. Dalit and others minority group was with the lowest KAP score in the baseline survey which seemed to have increased significantly during the endline survey. However, Brahmin and Chhetri are still the highest KAP scorers. ANOVA test was performed between KAP and ethnicity. In both surveys, the p-value (0.00) indicates the rejection of null hypothesis which means that the knowledge, attitude and practice score of respondents was significantly affected by ethnicity, with p-value of 0.00. The Older age group (65 and above) were found to have lower KAP score compared to the age group between 25- 55 years. Higher education level was associated with higher scores of desired knowledge, attitudes, and practices. Older age and lower educational level remained as risk factors on low attitude toward earthquake. In addition, low practice was significantly linked to lower levels of education, low knowledge. The KAP score of people in government job, NGOs/INGOs, business was found to be higher in both the cases while Housewives had the lowest KAP scores. Significant change in the KAP score of Masons was observed over the years. The higher income level was associated with higher scores of desired knowledge, attitudes, and practice. KAP score of those who have participated in the formal awareness program and have listened/watched awareness programs in radio/television was found to be higher in both studies.

Demographic characteristics of respondents such as gender, ethnicity, age group, education level, occupation, income level, participation in formal awareness program and status of listening/watching awareness program was found to have statistically significant association in between knowledge, attitude and practice scores obtained by the respondents in both baseline and endline surveys.

Women respondents were mostly involved in agriculture or were housewives and with low education level and hence the KAP score of the women was lower than that of male respondents. Similarly, Dalit and others minority group, older age, people with low education, and low income were with the lowest KAP score in the baseline survey. Being acquainted with this fact, Baliyo Ghar program, implemented GESI inclusive approaches and strategies while designing the program activities.

Women including the vulnerable and marginalized population were supported with socio technical assistance. Special packages and programs were designed to specifically include those groups. Special consideration and exposure to socio-technical assistance through targeted radio/television programming dedicated to helping residents understand earthquake-resistant reconstruction techniques, community orientation programs and door-to-door visits from teams of engineers, social workers, and masons facilitated those groups in understanding and applying earthquake-resistant construction techniques in their homes.

Baliyo Ghar program thus, has contributed to change the perception of people towards earthquake safe constructions.

Reconstruction Scenario, Dhading, ©NSET

CHAPTER - 5: CONCLUSION

Homeowners' knowledge of earthquake-resistant construction techniques and their adoption of these techniques in the construction of their own homes is an important contributor to reducing seismic risk in a country like Nepal where there are high levels of informal construction. The 7.8Mw Gorkha earthquake that shook the central region of Nepal in 2015 had devastating effects on the private housing sector in Nepal. In the aftermath of the disaster, the entire country - the government and non-government organizations have immersed in post-disaster recovery, a notion not new to the world. In supporting the Nepal Government's goal of "Building Back Better" led by the National Reconstruction Authority (NRA), NSET implemented the Baliyo Ghar Program as a key part of USAID/Nepal's reconstruction portfolio launched after the 2015 Gorkha earthquake. The program imparted knowledge, skills and awareness about earthquake resistant building technology to empower and support homeowners, allowing them to build back safer. The residents of program areas were exposed to large efforts of recovery and reconstruction process through the efforts of government and other stakeholders.

This study explores residents' knowledge of earthquake-resistant construction technologies in different program communities of Baliyo Ghar program districts. This study presents the analysis results of baseline and endline Risk perception survey of the Baliyo Ghar program implemented on 33 VDCs and 2 Municipalities of Dolakha, Nuwakot and Dhading district of Nepal. Earthquake

risk perception of the population is defined in terms of Knowledge, Attitude and Practice (KAP) on earthquake risk and risk reduction measures.

The average KAP score increased from 30 (out of 100) in the baseline to 50 in the endline reflecting that the set target (60% increase from the baseline value i.e.; 30+18= 48) for the indicator "increase in the risk perception score of the communities" has been achieved. Each component of KAP score i.e., knowledge, attitude and practice score were found to be increased during endline survey as compared to the baseline. The average knowledge score increased from 36 out of 100 to 48, attitude score from 41 out of 100 to 57, and practice score which was 11 out of 100 increased to 46 out of 100. Significant change in KAP score indicated that knowledge, attitude, and practices for earthquake safe construction has been adopted widely by the community people during the reconstruction.

Respondents from the program area responded with strong commitment to earthquake-resistant construction, even if it were to cost significantly more.

It was observed that the KAP score vary by key respondent characteristics. Individual risk perception reflected different characteristics because of sex, age, race, experience, and other factors. Men were more likely to have favourable KAP scores, suggesting the need to target women. And KAP scores were positively associated with education, suggesting directing messages to the less educated.

Baliyo Ghar programs approach of socio-technical assistance along with continuous engagement with local impacted communities and local government within the program area has been instrumental in raising the awareness level of the community and changing their perception and practices towards safer building constructions.

The survey conducted in the two different time periods; the initial phase and towards the end of the Baliyo Ghar program allowed us to explore similarities and differences in knowledge gained about earthquake-resistant construction techniques in ways that leaded towards earthquake safer constructions.

Residents of all the program districts had little training or exposure to earthquake-resistant construction techniques. Few knew much about the National Building Code and accompanying guidelines for house construction, which incorporates these techniques into the design and construction of buildings. Yet, towards the end of the programs, endline survey suggests divergent outcomes in terms of knowledge about earthquake-resistant construction, willingness to pay for it and the adopted practices.

BG team had prioritized door-to-door assistance in the early days, gathering as much information as possible. Similarly, they also sought help from local leaders who were positive about the program. Interactions were held with beneficiaries and local leaders about the reconstruction policies, their implementation mechanism and grant disbursement process through series of

orientation campaigns and placing information and help desks at different locations. The beneficiaries were made aware about the importance and significance of incorporating earthquake resistant elements, and local masons were trained in several levels to enhance their skills which helped them hone their skills as well practice in field. With intensive and focused social mobilization, people started believing in technical assistance provided. Mobile teams conducted door to door campaigns regularly to aware people of the reconstruction strategies and norms as well as the assistance being provided by Baliyo Ghar Program. The blend of socio-technical expertise gained through these teams provides an ideal mechanism to interact with affected communities and provide effective assistance. This form of assistance is fruitful in earthquake-affected areas that have a reasonably low level of technical knowledge and awareness, especially in disseminating information on technical provisions related to safer reconstruction.

Thus, this form of assistance has been fruitful in enhancing reconstruction outcomes, primarily through timely sharing of information at the community and household level itself. A major factor for the success of mobile technical assistance is the combined engagement with two major stakeholders in owner driven construction: house owners and masons. Such assistance provides opportunity to develop broad and consistent knowledge in a community and to interact at the site of construction itself, which allows for the dissemination of theoretical knowledge as well as practical skills. Similarly, when assistance teams are mobilized covering small geographical areas, it also aids in the teams identifying technical and social issues. They can resolve issues that are pertinent to a small area quickly.

This exploration suggests that there are potential benefits of embedding robust public education campaigns within programs designed for shifting building practices in Nepal. While intensive, it appears that these programs of TV/radio broadcasting, community orientations, and door-to-door engagement may have been an important part of an effective strategy for educating people about these construction techniques but also convincing them of the importance and value of the techniques.

The local government and other related stakeholders should therefore allocate more resources towards educating community people for achieving disaster resilient community.

Skill and knowledge transfer to the grass root level is the only solution for becoming safe from future disaster. Safer construction practices will only be achieved by the increased level of awareness of community people, utilization of skills and knowledge obtained by the trained construction workforce and establishment of robust building code implementation system at the local government.

BG staff, briefing the Community people through the information desk that were set in different locations (photo above) and Briefing the community through community orientations, Samundradevi, Ward 6 of Shivapuri RM, Nuwakot (photo below)

Reconstructed house through On-the-Job Training, Kumpur, Dhading

CHAPTER - 6: REFERENCES

Adhikary, J.R. (2016). Barriers to Career Progression: A Study of the Perceptions of Nepali Women Employees.

Anhorn, J., Lennartz, T., & Nusser, M. (2015). Rapid urban growth and earthquake risk in Musikot, Mid-western Hills, Nepal. Erdkunde, 69(4), 307-325.

Aryal, K. R. (2012). The history of disaster incidents and impacts in Nepal 1900-2005.*International Journal of Disaster Risk Science, 3*(3),147-154.

Becker, J.S., Paton, D., Johnston, D. M., Ronan, K. R. & McClure, J. (2017). The role of prior experience in informing and motivating earthquake preparedness. *International Journal of Disaster Risk Reduction*, 22, 179-193.

Bhagat, S., Buddika. H.A.D., Adhikari, R.K., Shrestha, A., Bajracharya, S., Joshi, R., Singh,J ., Maharjan, R., & Wijeyewickrema, A.C., (2018). Damage to Cultural Heritage Structures and Buildings Due to the 2015 Nepal Gorkha Earthquake, Journal of Earthquake Engineering, 22:10, 1861-1880, DOI: 10.1080/13632469.2017.1309608.

Bilham, R., Larson, K. & Freymueller, J. GPS measurements of present-day convergence across the Nepal Himalaya. Nature 386, 61–64 (1997). https://doi.org/10.1038/386061a0

Bothara, J. K., Ingham, J., & Dizhur, D. (2018). Understanding, experience and research on seismic safety of low-strength loadbearing masonry buildings. In *16th Symposium on Earthquake Engineering*, Paper No. Kn2, 1-26.

Dixit, A. (2009). Code to practice: challenges for building code implementation and the further direction of housing earthquake safety. United Nations Centre for Regional Development: Challenges of Building Code Implementation in Nepal. Retrieved on August 5, 2020 at http://www.preventionweb.net/files/10591_HESITokyoPapers.pdf.

Dixit, A., Yatabe. R., Dahal. R., & Bhandary, N. (2013). Initiatives for earthquake disaster risk management in the Kathmandu valley. *Natural Hazards, 69,* 631–654.

Duyne, J. (2006). Housing reconstruction in post-earthquake Gujarat

Dumaru, R., Rodrigues, H., & Varum, H. (2018). Comparative study on the seismic performance assessment of existing buildings with and without retrofit strategies. International Journal of Advanced Structural Engineering, 10(4), 439-464.

Goda, K., Kiyota,T., Pokrel, R., Chiaro, G., Katagiri, T., Sharma.K., & Wilkinson, S.(2015). The 2015 Gorkha Nepal earthquake: insights from earthquake damage survey. https://doi.org/10.3389/fbuil.2015.00008

Government of Nepal (GoN). (2015). Post-disaster needs assessment. National Planning Commission. Kathmandu. Retrieved on August 5, 2020 from https://www.npc.gov.np/images/category/PDNA_volume_BFinalVersion.pdf

Gustafson, P.E. (1998). Gender differences in risk perception: theoretical and methodological perspectives, *Risk Analysis, 18*(6), 805-811.

HEOC (Health Emergency Operation Centre). (2015). "Health Sector Response: Situation Update Report." 201

HRRP (Housing Recovery and Reconstruction Platform) Bulletin. (2018), Nepal.

Kaushik, H., Bevington, J., Jaiswal, K., Lizundia, B., & Shrestha, S. (2016). Buildings, in EERI Earthquake Reconnaissance Team Report: M7.8 Gorkha, Nepal Earthquake on April 25, 2015 and its Aftershocks. Retrieved on July 30, 2020 from http://www.learningfromearthquakes.org/images/LFE_site/ResilienceObservatory/Nepal/Nepal-Gorkha-Earthquake-Report-Reduced.pdf

Knuth, D., Kehl, D., Hulse, L. & Schmidt, S. (2014). Risk perception, experience, and objective risk: a cross-national study with European emergency survivors. *Risk Analysis*, *34*(7), 1286-1298.

Lindell, M. K., & Perry, R. W. (2016). Household adjustment to earthquake hazard. *Environment and Behavior, 32*(4), 461-501.

Lyons, M., & Schilderman, T. (2010). Building back better: Delivering people-centred housing reconstruction at scale. Warwickshire, UK: Practical Action Publishing

Mercer, N. (2002). Developing Dialogues. In G. Wells, & G. Claxton (Eds.) Learning for Life in the C21st: Sociocultural Perspectives on the Future of Education. Oxford: Blackwell. http://dx.doi.org/10.1002/9780470753545.ch11

MoHA (Ministry of Home Affairs). (2009). Nepal Disaster Report: The Hazard and Vulnerability

Mohammad, M. & Bee, L.O. (2016). Critical attributes for proactive engagement of stakeholders in disaster risk management. *International Journal of Disaster Risk Reduction*, *21*, 35-43.

Naeem, G. & Okazaki, K. (2009). Earthquake risk perception of stakeholders involved in housing safety in Pakistan. Retrieved from https://docplayer.net/26856007-Earthquake-risk-perception-of-stake-holders-involved-in-housing-safety-in-pakistan.html.

NRA (National Building Authority). 2016. Rebuilding Nepal.

NUDS (National Urban Development Strategy). 2017. Part A, Main Document. Government of Nepal, Ministry of Urban Development.

NPC (National Planning Commission). 2015. Post Disaster Need Assessment (Vol. A and B). Government of Nepal.

Nordenstedt, H. & Ivanisevic, J. (2010). Values in risk perception: studying the relationship between values and risk perception in three countries. *JAMBA: Journal of Disaster Risk Studies, 3*(1): 335-345.

Okazaki, K., Ilki, A., Ahmad, N., Kandel, R.,& Rahayu, H. (2008). Seismic risk perception of people for safer housing. *Proceedings of the 14th World Conference on Earthquake Engineering.* October 12-17, Beijing, China.

Okazaki, K., & Saito, T. (2012). Seismic risk perception concerning non-engineered houses. *Proceedings of the 15th World Conference on Earthquake Engineering.* Lisbon, Portugal.

Opdyke, A., Javernick-Will, A., & Koschmann, M. (2019). Assessing the impact of household participation on satisfaction and safe design in humanitarian shelter projects. Disasters, 43(4), 926-953.

Parajuli, R.M., Kiyono. J. (2015). Ground Motion Characteristics of the 2015 Gorkha Earthquake, Survey of Damage to Stone Masonry Structures and Structural Field Tests. https://doi.org/10.3389/fbuil.2015.00023

Potter, S., Kreft,P., Milojev, P., Noble, C., Montz, B., Dhellemmes, A., Woods, R. J., & Gauden-Ing, S. (2018). The influence of impact-based severe weather warnings on risk

perceptions and intended protective actions. *International Journal of Disaster Risk Reduction*, https://doi.org/10.1016/j.ijdrr.2018.03.031

Rai, D. C., Goutam, M., Singhal, V., Parool, N., Pradhan, T., & Mitra, K. (2012). Reconnaissance report of the M6.9 Sikkim (India–Nepal border) Earthquake of 18 September 2011. Geomatics, Natural Hazards and Risk, 3(2), 99-111.

Schacter, D. L., Gilbert, D. T., & Wegner, D. M. (2011). Psychology. In *Worth Publication* (Second).

Slovic, P., Fischhoff, B. & Lichtenstein, S. (1982), Why study risk perception? *Risk Analysis*, *2*, 83-93. doi:10.1111/j.1539-6924.1982.tb01369.x

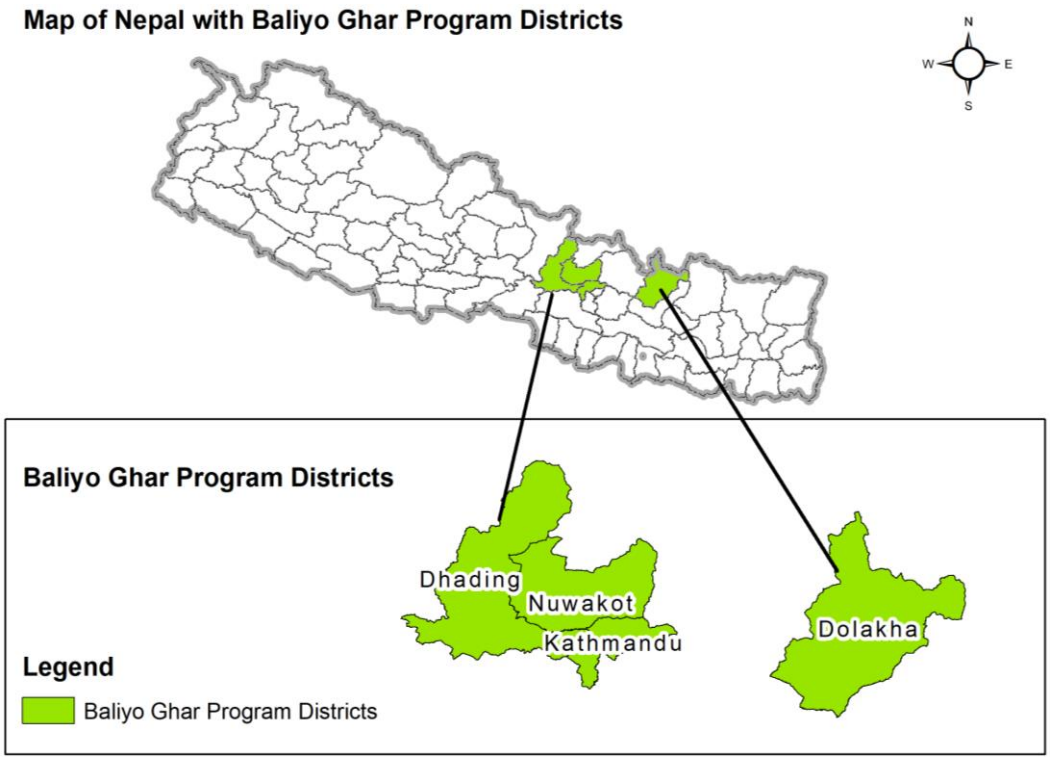
Tian, L., Yao, P., & Jiang, S. J. (2014). Perception of earthquake risk: a study of the earthquake insurance pilot area in China. *Natural hazards*, *74*(3), 1595-1611.

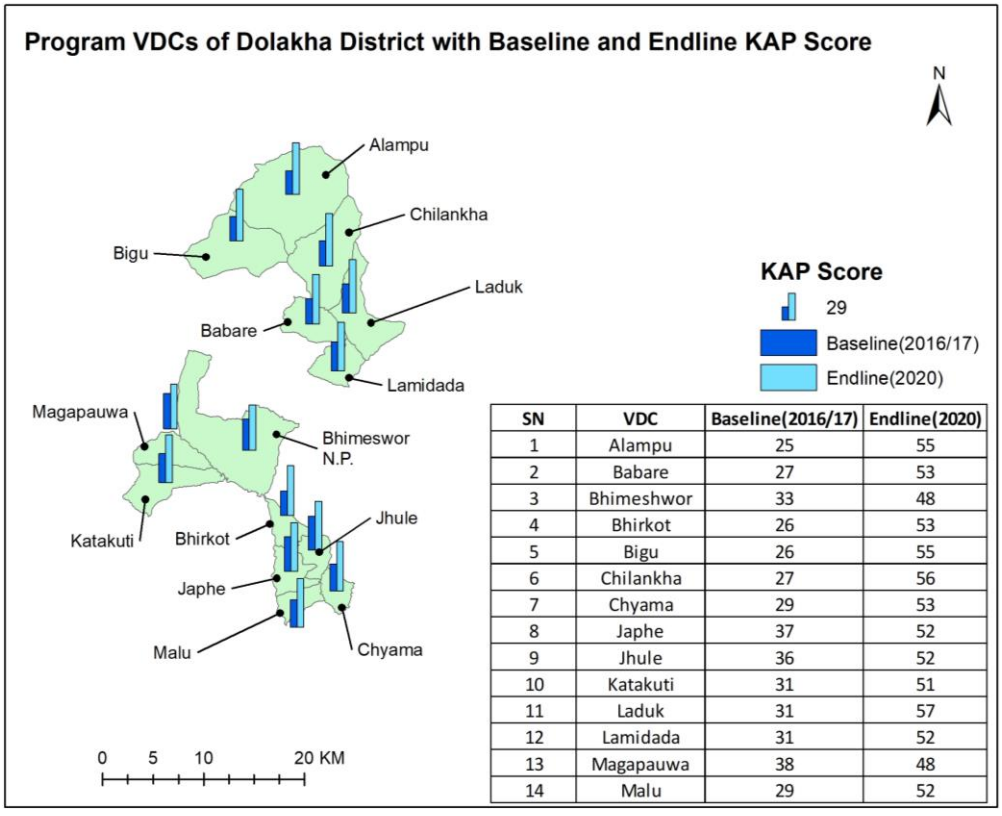
Venable, C., Javernick-Will, A., & Liel, A. B. (2020). Perceptions of post-disaster housing safety in future typhoons and earthquakes. *Sustainability*, *12*(9), 3837. https://doi.org/10.3390/su12093837

Xu, D., Qing, C., Deng, X., Yong, Z., Zhou, W. & Ma, Z. (2020). Disaster risk perception, sense of pace, evacuation willingness, and relocation willingness of rural households in earthquake-stricken areas: evidence from Sichuan Province, China. *Int. J. Environ. Res. Public Health 2020, 17*(2), 602, doi: 10.3390/ijerph17020602

ANNEXES

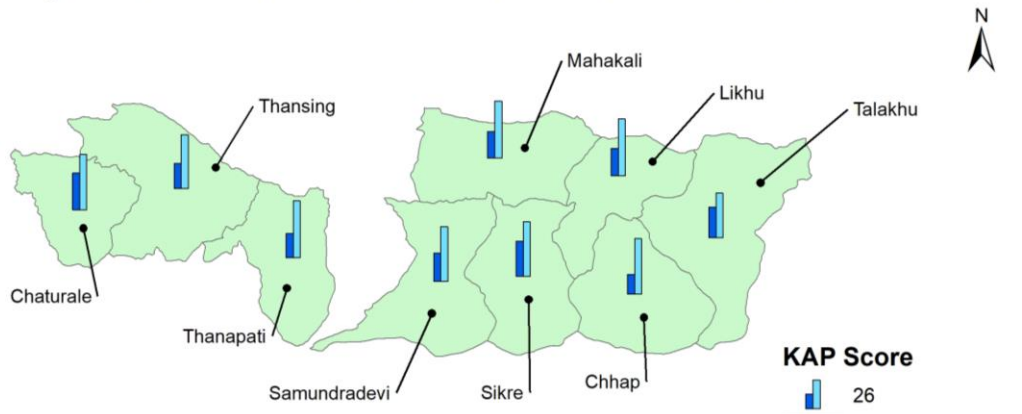
ANNEX 1. MAPS PRESENTING SURVEY WARDS AND KAP SCORE





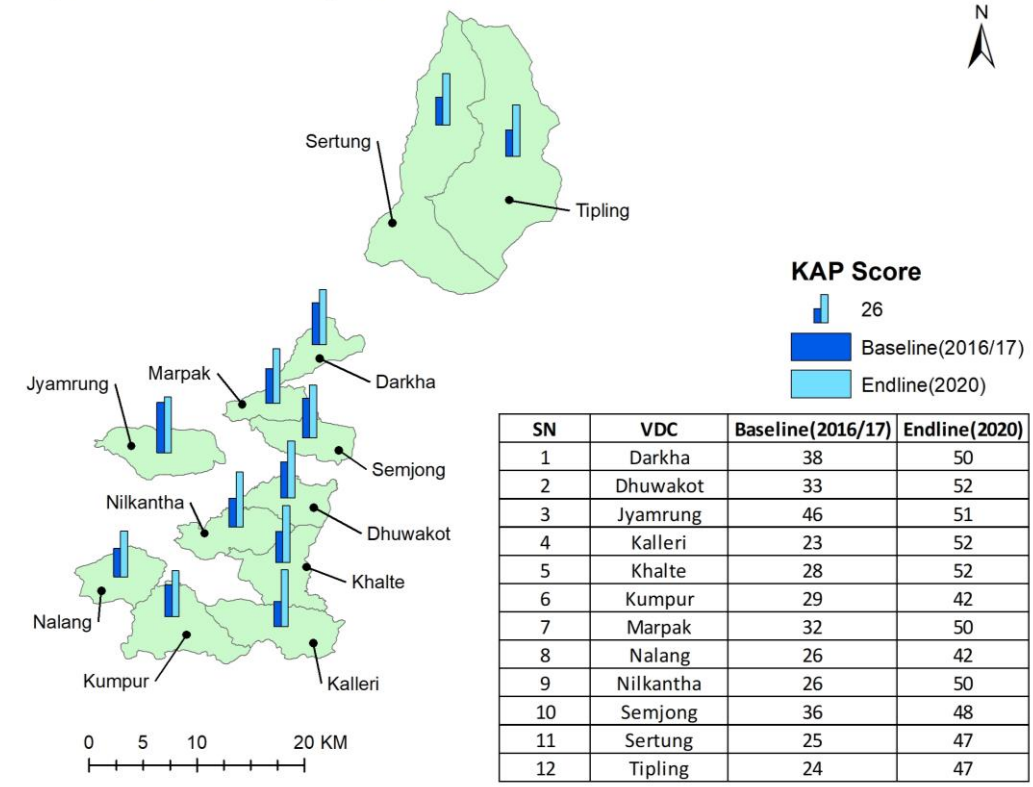
SN	VDC	Baseline(2016/17)	Endline(2020)
1	Alampu	25	55
2	Babare	27	53
3	Bhimeshwor	33	48
4	Bhirkot	26	53
5	Bigu	26	55
6	Chilankha	27	56
7	Chyama	29	53
8	Japhe	37	52
9	Jhule	36	52
10	Katakuti	31	51
11	Laduk	31	57
12	Lamidada	31	52
13	Magapauwa	38	48
14	Malu	29	52

Program VDCs of Nuwakot District with Baseline and Endline KAP Score



SN	VDC	Baseline(2016/17)	Endline(2020)
1	Chaturale	34	51
2	Chhap	18	51
3	Likhu	25	52
4	Mahakali	24	52
5	Samundradevi	26	50
6	Sikre	32	50
7	Talakhu	28	41
8	Thanapati	22	52
9	Thansing	23	49

Program VDCs of Dhading District with Baseline and Endline KAP Score



SN	VDC	Baseline(2016/17)	Endline(2020)
1	Darkha	38	50
2	Dhuwakot	33	52
3	Jyamrung	46	51
4	Kalleri	23	52
5	Khalte	28	52
6	Kumpur	29	42
7	Marpak	32	50
8	Nalang	26	42
9	Nilkantha	26	50
10	Semjong	36	48
11	Sertung	25	47
12	Tipling	24	47

ANNEX 2. SURVEY QUESTIONNAIRE USED FOR BASELINE SURVEY

बलियो घर कार्यक्रम (Baliyo Ghar)

भूकम्पीय जोखिम तथा सुरक्षित निमाण सम्बन्धी आधारभूत सर्भेक्षण फाराम

यो सर्वेक्षण बलियो घर कार्यक्रम अन्तर्गत, यो नगरपालिका/गा.वि.स. तथा भूकम्प प्रविधि राष्ट्रिय समाज-नेपालद्वारा संयुक्त रुपमा गरिएको हो । यस सर्वेक्षणको मुख्य उद्देश्य समुदायमा भूकम्पीय जोखिम तथा सुरक्षित निर्माण सम्बन्धी के-कस्तो ज्ञान छ र के-कस्ता कार्यक्रमहरु सञ्चालन गरेर समुदायलाई भूकम्पीय जोखिमबाट सुरक्षित पार्न सकिन्छ भनेर पहिचान गर्नु हो । यो सर्भेक्षणबाट प्राप्त सूचनाहरु अरु कुनै प्रयोजनका लागि प्रयोग गरिने छैन । तपाईको नाम तथा जवाफहरु गोप्य राखिनेछन् र कुनै पनि जवाफलाई उत्तरदातासँग गाँसेर हेरिने छैन । तसर्थ यो सर्भेक्षणमा सहभागी हुँदा तपाई कुनै जोखिममा पर्नुहुने छैन। अमेरिकी सहायता नियोग (USAID) को सहयोगमा NSET ले बलियो घर कार्यक्रम मार्फत विभिन्न जिल्लाहरुमा प्राविधिक सहयोग पु-याउँदै आएको छ ।

अन्तर्वाताको विवरण

फाराम नम्बर: _____ पाना नं.: _____ मिति: .....

जिल्ला _____ गा बि स _____

वडा नम्बर: _____ टोल: _____

प्रश्नकर्ताको नाम: _____ तपाई यस सर्भेक्षणमा सहभागी हुन चाहनुहुन्छ ?

घर नम्बर वा घरको अन्य पहिचान _____ चाहन्छु ☐ चाहन्न ☐

क) भूकम्पीय जोखिम सम्बन्धी ज्ञान तथा अनुभव

१ **तपाईं अथवा तपाईंको परिवारले २०७२ बैशाख १२ को भूकम्पलाई अनुभव गर्नुभयो ?**

☐ गर्‍यौं ☐ गरेनौं

यदि गर्नुभयो भने, त्यतिबेला तपाईं कहाँ हुनुन्थयो ?

☐ घर बाहिर ☐ घर भित्र

यदि घर भित्र हुनुहुन्थ्यो भने कता हुनुहुन्थयो ?

☐ भुईतलामा ☐ माथिल्लो तलामा

घर भित्र हुनुहुन्थ्यो भने तपाईंले के गर्नुभयो ?

☐ घर बाहिर भागें ☐ घरको भित्री गाह्रोतिर बसें ☐ टेबल/खाट मुनि सुरक्षित भएर बसें

☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बसें ☐ घरको ढोका समातेर बसें ☐ झ्यालबाट बाहिर हाम्फालें ☐ केही पनि गरिन ☐ अन्य.....

	यदि घर बाहिर हुनुहुन्थ्यो भने तपाईं कहाँ जानुभयो ? ☐ खुल्ला ठाउँ ☐ कुनै पोल समातेर बसें ☐ घरको गाह्रो समातेर बसे ☐ पर्खालमा आड लगाएर बसें ☐ घर भित्र गए ☐ केही पनि गरिन ☐ अन्य.....
२	**विगतका अन्य कुनै भूकम्प अनुभव गर्नु भएको छ ?** ☐ छ ☐ छैन छ भने कहिले (कुन सालमा) ? ☐ १९९० साल ☐२०४५ साल ☐२०६८ साल ☐अन्य.....
३	**भूकम्पको बेला घरभित्र, भुईतल्लामा, हुनुहुन्छ भने ९घरको बाहिर खुल्ला स्थान भएको अवस्थामा० के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐ घरको ढोका समातेर बस्न ☐ केही पनि नगर्ने ☐ थाहा छैन ☐ अन्य..... **भूकम्पको बेला घरभित्र, भूईतल्लामा, हुनुहुन्छ भने (घरको बाहिर खुल्ला स्थान नभएको अवस्थामा) के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐घरको ढोका समातेर बस्ने ☐ झ्यालबाट बाहिर हाम्फाल्ने ☐ केही पनि नगर्ने ☐ थाहा छैन ☐ अन्य.....
४	**भूकम्पको बेला घरभित्र, माथिल्लो तल्लामा हुनुहुन्छ भने (बाहिर खुल्ला स्थान नभएको अवस्थामा) के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐ झ्यालबाट बाहिर हाम्फाल्ने ☐ थाहा छैन ☐ केही पनि नगर्ने ☐ अन्य.....
५	**भूकम्पको बेला यदि घर बाहिर हुनुहुन्छ भने, के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ खुल्ला ठाँउमा जाने ☐ कुनै पोल समातेर बस्ने ☐ घरको गाह्रो समातेर बस्ने ☐ घरभित्र जाने ☐ पर्खालमा आड लगाएर बस्न ☐ अन्य.....
६	**तपाईंलाई भूकम्प र यसका कारणहरु बारे कति जानकारी छ ?**

	☐ केही जानकारी छ ☐ केही पनि जानकारी छैन ☐ अरुलाई बुझाउन सक्ने जानकारी छ
७	**तपाईलाई आफ्नो समुदाय भविष्यमा समेत भूकम्पको जोखिममा छ जस्तो लाग्छ ?** ☐ छ ☐ छैन ☐ थाहा छैन ☐ अनुत्तरित **छ भने कुन कुन मुख्य कारणले जोखिममा छ भन्ने लाग्छ ?** ☐ कमजोर घरहरुको कारणले ☐ भूकम्प सम्बन्धी ज्ञानको कमीले ☐ भूकम्पीय पूर्वतयारीको अभावको कारणले ☐ अन्य कमजोर भौतिक संरचनाको कारणले ☐ सुरक्षित खुल्ला स्थानको अभावको कारणले ☐ थाहा छैन ☐ अन्य.....
८	**भविष्यमा यहाँ भूकम्प आउन सक्छ होला ?** ☐ सक्छ ☐ सक्दैन ☐ थाहा छैन
९	**यदि सक्छ भने, अब अर्को भुकम्प कहिले आउँछ होला ?** ☐ जहिलेसुकै ☐ पाँच बर्षभन्दा कम समयमा ☐ पाँच बर्षमा ☐ दश बर्षमा ☐ सयबर्षको समयमा ☐ सयबर्ष भन्दा बढीको समयमा ☐ थाहा छैन ☐ अनुत्तरित ☐ अन्य
१०	**भूकम्पको कारणले अन्य विपद पनि आउने सम्भावना हुन्छ जस्तो लाग्छ ?** ☐ लाग्छ ☐ लाग्दैन ☐ थाहा छैन ***यदि छ भने, के हुन सक्छ जस्तो लाग्छ ?*** ☐ पहिरो ☐ बाढी ☐ महामारी ☐ आगलागी ☐ हुरी बतास ☐ चटयाङ्ग ☐ अन्य.....
	ख) भूकम्पको प्रभाव - (**गोरखा भूकम्प, २०७२ बैशाख १२**)
११	**भूकम्पमा परिवारको कोही घाइते हुनु भएको छ ?** ☐ छ ☐ छैन **छ भने कति जना ?** .....
१२	**भूकम्पबाट परिवारमा कसैको मृत्यु भएको छ ?** ☐ छ ☐ छैन

	छ भने कति जना ?.....
१३	**भूकम्पले गर्दा तपाईंको घरमा कति क्षति भएको छ ?** ☐ पूर्ण रुपमा क्षतिग्रस्त ☐ आंशिक क्षति ☐ खासै क्षति नभएको
१४	**तपाईंको घर नेपाल सरकारले खटाएको प्राविधिकले गरेको सर्भेक्षणमा परेको छ ?** ☐ छ ☐ छैन ☐ थाहा छैन **सरकारले दिने आवास अनुदान पाउने लाभग्राहीको सूचीमा तपाई पर्नुभएको छ ?** ☐ छ ☐ छैन ☐ थाहा छैन **यदि छ भने अब बनाउने घर कस्तो बनाउने सोच्नु भएको छ ?** ☐ पहिलेको जस्तै ☐ बलियो ☐ थाहा छैन **कुन सामाग्रीले बनाउने सोच्नु भएको छ ?** ☐ ढुङ्गा माटोको ☐ पिलरवाला ☐ काठको ☐ ढुङ्गा र काठको ☐ टिनै टिनको (जस्ता पाता) ☐ काठको र टिनको ☐ अन्य .....

ग) सुरक्षित निर्माण	
१५	**तपाईंको विचारमा आफ्नो घर भूकम्पबाट कतिको सुरक्षित छ जस्तो लाग्छ ?** ☐ सुरक्षित छ ☐ सुरक्षित छैन ☐ निश्चित भन्न सक्दिन ☐ थाहा छैन **छैन भने सुरक्षित बनाउने बारेमा सोच्नु भएको छ ?** ☐ छ ☐ छैन ☐ सोच्नै पर्छ
१६	**घरलाई भूकम्पबाट सुरक्षित बनाउने प्रविधिबारे तपाईलाई थाहा छ ?** ☐ थाहा छैन ☐ अलिअलि थाहा छ ☐ थाहा छ ☐ धेरै थाहा छ
१७	**तपाईको आफनो घर निर्माणमा कोही प्राविधिकको सल्लाह लिनुभएको छ ?** ☐ छैन ☐ छ ☐ थाहा छैन **छ भने कतिको संलग्नता छ ?** ☐ नक्सा बनाउन मात्र ☐ आंशिक मात्रामा छ ☐ पूर्ण संलग्नता छ ☐ थाहा छैन
१८	**आफनो घर निर्माणमा तालिम लिएका डकर्मीको संलग्नता छ कि छैन ?** ☐ छैन ☐ आंशिक मात्रामा छ ☐ पूर्ण संलग्नता छ ☐ थाहा छैन
१९	**तपाईंको विचारमा कस्तो खाले घर भूकम्पबाट सुरक्षित हुन्छ जस्तो लाग्छ ?** ☐ ढुडगा माटोको ☐ पिलरवाला ☐ काठको ☐ ढुङ्गा र काठको ☐ टिनै टिनको (जस्ता पाता) ☐ काठको र टिनको ☐ सबैखाले ☐ अन्य .....
२०	**तपाईंको विचारमा घरलाई भूकम्पबाट सुरक्षित /भूकम्प प्रतिरोधी बनाउन कति थप खर्च लाग्ला ?**

	☐ ३ गुणा बढी लाग्छ ☐ दोब्बर नै लाग्छ ☐ २० प्रतिशत भन्दा धेरै ☐ ५ प्रतिशत ☐ खासै खर्च लाग्दैन ☐ थाहा छैन
२१	**भूकम्प प्रतिरोधी भवनको निम्ति तपाई अहिले कति प्रतिशतसम्म थप खर्च गर्न सक्नुहुन्छ ?** ☐ सक्दिन ☐ १-५ प्रतिशत ☐ ६-१० प्रतिशत ☐ ११-१५ प्रतिशत ☐ १६-२० प्रतिशत ☐ २० प्रतिशत भन्दा धेरै ☐ थाहा छैन
२२	**तपाईलाई नेपालको भवन निर्माण संहिता तथा पुनर्निर्माणका लागि जारी भएको सुरक्षित निर्माण सम्बन्धी निर्देशिका मापदण्डहरुको बारेमा थाहा छ ?** ☐ सुनेकै छैन ☐ अलि अलि थाहा छ ☐ पूर्ण रुपमा जानकार छु
२३	**तपाईंको विचारमा पिलरवाला घरलाई भूकम्प प्रतिरोधी / बलियो बनाउन के गर्नपर्छ जस्तो लाग्छ ?** **पिलरको साइज** ☐ १२ इन्च×१२ इन्च ☐ ९इन्च ×१२ इन्च ☐ ९ इन्च ×९ इन्च ☐ अन्य..... ☐ थाहा **छैन** **बिमको साइज** ☐ ९इन्च ×१४ इन्च ☐ १२ इन्च ×१४ इन्च ☐ अन्य..... ☐ थाहा **छैन**
२४	**तपाईंको विचारमा गारोवाला घरलाई भूकम्प प्रतिरोधी / बलियो बनाउन के गर्नपर्छ जस्तो लाग्छ ?** ☐ ब्याण्ड राख्नुपर्छ/पट्टि लगाउनु पर्छ ☐गारो मोटो /लामो बनाउनु पर्छ ☐ गारो राम्रोसग लगाउनु पर्छ ☐ थाहा छैन **कुन कुन ठाउँमा ब्याण्ड लगाउनु पर्छ जस्तो लाग्छ ?** ☐ जगमा मात्र ☐ जग र डि पि सी तहमा मात्र ☐ झयाल मुनि / माथि मात्र ☐ छाना / चोटाको तहमा मात्र ☐ सबै ठाउँमा
	तपाईंको विचारमा काठको फ्रेमवाला घरलाई भूकम्प प्रतिरोधी / बलियो बनाउन के गर्नपर्छ जस्तो लाग्छ ? ☐ छड्के तान लगाउने ९द्यचबअष्लन) ☐ काठकै जोनी बनाई काठकै चुकुल लगाउने ☐ थाहा छैन ☐ अन्य .....
२५	**तपाईको घर कुन प्रकार को हो** ☐ पिलर ☐ गारोवाला ☐ काठको फ्रेमवाला ☐ अस्थायी आवास **तपाईले आफनो घरलाई बलियो बनाउन के र्गनुभएको छ ?** **यदि पिलरवाला घर भएमा** पिलरको साइज ☐ १२ इन्च ×१२ इन्च ☐ ९ इन्च ×१२ इन्च ☐ ९ इन्च ×९ इन्च ☐ अन्य..... ☐ थाहा छैन ☐ केहि पनि गरेको छैन बिमको साइज ☐ ९ इन्च ×१४ इन्च ☐ १२ इन्च ×१४ इन्च ☐ अन्य..... ☐ थाहा छैन ☐ केहि पनि गरेको छैन **यदि गारोवाला घर भएमा** ☐ ब्याण्ड राखेको छु/पट्टि लगाएको छु ☐गारो मोटो /लामो बनाएको छु ☐ गारो राम्रोसग लगाएको छु ☐ थाहा छैन ☐ केहि पनि गरेको छैन **कुन कुन ठाउँमा ब्याण्ड लगाउनु भएको छ ?**

	☐ जगमा मात्र ☐ जग र डि पि सी तहमा मात्र ☐ झयाल मुनि / माथि मात्र ☐ छाना / चोटाको तहमा मात्र ☐ सबै ठाउँमा **यदि काठको फ्रेमवाला घर भएमा** ☐ छड्के तान लगाएको छु ९द्यचबअष्लन) ☐ काठकै जोनी बनाई काठकै चुकुल लगाएको छु ☐ केहि पनि गरेको छैन ☐ थाहा छैन ☐ अन्य .....
२६	**तपाईको गाउँ/टोलमा भूकम्पीय सुरक्षा उपाय अपनाएर घरहरु बनाइएका छन ?** ☐ अहिले सम्म छैन ☐ केही बन्न थालेका छन् ☐ धेरै बनि सकेका छन् ☐ थाहा छैन **तपाईको गाउँ/टोलमा घर निर्माणमा प्राविधिकको सल्लाह लिएका/संलग्नता छ कि छैन ?** ☐ केही घरहरुमा मात्र ☐ धेरै घरहरुमा ☐ छैन ☐ थाहा छैन **तपाईको गाउँ/टोलमा घर निर्माणमा तालिम लिएका डकर्मीको संलग्नता छ कि छैन ?** ☐ केही घरहरुमा मात्र ☐ धेरै घरहरुमा ☐ छैन ☐ थाहा छैन
२७	**तपाईको गाउँ/टोलमा भूकम्पबाट सुरक्षित घर बनाउन तालिम प्राप्त डकर्मीहरु उपलब्ध छन् ?** ☐ छ ☐ छैन ☐ थाहा छैन
२८	**तपाईले अब आफनो घर बनाउदा तालिम प्राप्त डकर्मीहरु लगाउन चाहनु हुन्छ कि हुदैन ?** ☐ लगाउछु ☐ लगाउदिन ☐ लगाएर पनि काम छैन ☐ सोचेकै छैन ☐ थाहा छैन
२९	**तालिम प्राप्त डकर्मीहरु लगाउँदा कतिसम्म बढी ज्याला दिन तयार हुनुहुन्छ ?** ☐ सक्दिन ☐ ५ प्रतिशत ☐ १० प्रतिशत ☐ १५ प्रतिशत भन्दा धेरै ☐ जति लागेपनि दिन तयार छु ☐ थाहा छैन
	घ) भूकम्पीय पूर्वतयारी
३०	**तपाईं कहिल्यै कुनै भूकम्प /सुरक्षित निर्माण सम्बन्धी चेतनामूलक कार्यक्रममा सहभागी हुनु भएको छ ?** ☐ छ ☐ छैन ☐ थाहा छैन **छ भने कस्तो कार्यक्रममा सहभागी हुनु भएको छ ?** ☐ तालिम कार्यक्रम ☐ अभिमुखीकरण कार्यक्रम ☐ छलफल कार्यक्रम ☐ विद्यालयको कार्यक्रम ☐ घर दैलो कार्यक्रम ☐ भूकम्प सुरक्षा दिवस ☐ अन्य **त्यो कार्यक्रम भूकम्प भन्दा अघि थियो कि पछि थियो ?** ☐ भूकम्प अघि ☐ भूकम्प पछि **कार्यक्रम कुन संस्थाले गरेको थियो ?** ....
३१	**तपाई वा तपाईंको घरपरिवारका सदस्यहरुले भूकम्प तथा अन्य विपद् व्यवस्थापन सम्बन्धी कुनै तालिम प्राप्त गरेका छन् ?** ☐ छन् ☐ छैनन् ☐ थाहा छैन **छन् भने कुन किसिमको तालिम ?** ☐ विपद व्यवस्थापन ☐ प्राथमिक उपचार ☐ उद्धारकर्ता ☐ सुरक्षित/भूकम्प प्रतिरोधी भवन निर्माण ☐ अन्य..... **तालिम कुन संस्थाले दिएको थियो ?** .....

ङ) भूकम्पीय जोखिम न्यूनीकरणको लागि जिम्मेवारी	
३२	**समुदायलाई भूकम्पीय जोखिमबाट सुरक्षित राख्नको लागि कस्को बढी हात हुन्छ ?** ☐ स्वयं ☐ इन्जिनियरहरु ☐ डकर्मीहरु ☐ नगरपालिका/गा.वि.स. ☐ समुदाय ☐ गैरसरकारी संस्था ☐ थाहा छैन
३३	**घरलाई सुरक्षित बनाउनको लागि कसको सबभन्दा ठूलो भूमिका हुन्छ जस्तो लाग्छ ?** ☐ आफ्नो ☐ नगरपालिका/गा.वि.स. ☐ सरकार ☐ सघंसंस्था ९ल्इरक्ल्न्इ० ☐ अन्य.....
३४	**भूकम्पबाट सुरक्षित घर निर्माणका लागि भवन निर्माण संहिताको कार्यान्वयन कसले गर्दछ ?** ☐ शहरी विकास तथा भवन निर्माण विभाग ☐ जिल्ला बिकास समिति ☐ नगरपालिका/गा.वि.स. ☐ थाहा छैन
च) जानकारीको श्रोत	
३५	**तपाईले रेडियो, टि.भी. वा पत्रपत्रिकाहरुमा भूकम्पीय सचेतना सम्बन्धी कार्यक्रम कहिल्यै सुन्नु वा हेर्नुभएको छ ?** ☐ छ ☐ छैन ☐ थाहा छैन
३६	**भूकम्प प्रतिरोधी भवन निर्माणको बारेमा जानकारी प्रदान गर्ने नमुना घरको ९मोडल० हेर्नुभएको छ ?** ☐ छ ☐ छैन ☐ थाहा छैन
३७	**तपाईको समुदायमा भूकम्पीय सचेतना र भूकम्प प्रतिरोधी भवन निर्माणको बारेमा जानकारीहरु पुऱ्याउने प्रभावशाली माध्यम कुन हुन सक्छ ? १– ६ सम्मको मापनमा कुनलाइ कति अंकमा राख्न सकिएला (१ पहिलो प्राथमिकता, ६ कम प्राथमिकता)** टि.भी ..... रेडियो..... पत्रपत्रिका ..... ईन्टरनेट ..... पुस्तक/पुस्तिका ..... नमुना धर ..... होर्डिङ्ग बोड ..... अन्य.....

३८ सुरक्षित निर्माण का लागि तपाईंले भोग्नु परेको मुख्य व्यवधानहरु के के हुन?

☐ स्रोत साधन खर्चको अभाव ☐ प्रविधी र प्राविधिक ज्ञानको कमी ☐ तालिम प्राप्त जनशक्तिको अभाव
☐ अन्य थप महत्वपुर्ण विषयहरु ☐ सामुदायिक एकताको अभाव ☐ थाहा छैन ☐ अन्य,..... .....

३९ गत सालको भूकम्पमा स्थानीय सरकारी अधिकारीहरु तथा राजनीतिकर्मी नेताहरुले गरेको सहयोग १–५ सम्मको मापनमा कसरी मापन गर्न सकिन्छ होला ?(१ पटक्कै सहयोग छैन, ५ अति नै सहयोगी)

पटक्कै सहयोग छैन	१	२	३	४	५	अति नै सहयोगी	थाहा छैन

४०) स्थानीय सरकारी अधिकारीहरु तथा राजनीतिक नेताहरुले भूकम्पीय सुरक्षा अभिवृद्धि/जोखिम न्युनीकरणका लागि गर्ने सक्ने सहयोगलाई १–५ सम्मको मापनमा कति कसरी राख्न सकिएला ? (१ पटक्कै सहयोग छैन, ५ अति नै सहयोगी)

सहयोगको आशा पटक्कै छैन	१	२	३	४	५	अति नै सहयोगी हुनेछन् भन्ने विश्वास छ	थाहा छैन

	छ) व्यक्तिगत विवरण
१	**के म तपाईको नाम थाहा पाउन सक्छु ?** नाम ..... ☐ भन्न चाहन्न
२	**जाति** ☐ दलित ☐ मुस्लिम ☐ ब्राम्हण/क्षेत्री ☐ नेवार ☐ जनजाति ☐ अन्य
३	**लिङ्ग** ☐ पुरुष ☐ महिला ☐ अन्य
४	**अपाङ्गता** ☐ भएको ☐ नभएको
५	**तपाईको परिवारमा कति सदस्यहरु हुनुहुन्छ ?** ..... **जना**
६	**तपाईको वैवाहिक स्थिति ?** ☐ विवाहित ☐ अविवाहित ☐ पारपाचुके ☐ एकल
७	**तपाईको उमेर कुन समुह भित्र पर्छ ?** ☐ ? १५ ☐ १५-१९ ☐ २०-२४ ☐ २५-२९ ☐ ३०-३४ ☐ ३५-४५ ☐ ४६-५५ ☐ ५६-६५ ☐ ६५ भन्दा माथि
८	**तपाईले कुन तह सम्मको औपचारिक शिक्षा पूरा गर्नुभएको छ ?** ☐ निरक्षर ☐ साक्षर ☐ प्राथमिक शिक्षा ☐ माध्यमिक शिक्षा ☐ उच्च माध्यमिक शिक्षा ☐ स्नात्तक वा सो भन्दा माथि
९	**घरमा बसोबासको अवस्था के हो ?** ☐ घरधनी आफैं ☐ बहालमा बस्ने ☐ नातेदार ☐ अन्य .....
१०	**तपाई आफै घरमुली हो ?** ☐ हो ☐ होइन **घर बनाउनका लागि तथा घरको अन्य कुराको निर्णय कसले लिने गर्दछ ?** ☐ आफै ☐ श्रीमान ☐ श्रीमती ☐ ससुरा ☐ सासु ☐ बुवा ☐ आमा ☐ दाजु ☐ अन्य ..... **परिवारमा कुनै पनि निर्णय लिनका लागि परिवारका अन्य सदस्यहरु सँग छलफल /समावेश गरिन्छ ?** ☐ गरिन्छ ☐ गरिदैन
११	**तपाई के काम गर्नुहुन्छ ?** ☐ कृषक ☐ सरकारी कर्मचारी ☐ विद्यार्थी ☐ राजनीतिज्ञ ☐ दैनिक ज्यालादारी ☐ डकर्मी ☐ निजी संस्था ☐ गृहिणी ☐ बेरोजगार ☐ परामर्शदाता

	☐ व्यवसायी ☐ सघं संस्थामाकार्यरत ☐ समाजसेवा ☐ अन्य.....
१२	**हामी तपाईंको आम्दानी र भूकम्पीय जोखिमको अवधारणाको के कस्तो सम्बन्ध छ भनेर जान्न इच्छुक छौं । त्यसैले तल उल्लेखित मध्ये तपाईको परिवारको मासिक आय कुन खण्डमा पर्छ ?** ☐ छैन ☐ ? १०,००० ☐ १०,००१-२०,००० ☐ २०,००१-३०,००० ☐ ३०,००१-५०,००० ☐ ५०,००१-१००,००० ☐ श्र १००,००० ☐ भन्न चाहन्न ☐ थाहा छैन
१३	**तपाईको परिवारमा डकर्मीको पेशा गर्ने परिवारका सदस्य कोही हुनुहुन्छ ?** ☐ छ ☐ छैन **छ भने कति जना हुनुहुन्छ ?** महिला ..... पुरुष ..... **उहाँले भूकम्प प्रतिरोधी भवन निर्माणको तालिम लिनुभएको छ ?** ☐ छ ☐ छैन
१४	**तपाईको परिवारमा तालिम लिएर डकर्मीको पेशामा लाग्न इच्छुक परिवारका सदस्य कोही हुनहुन्छ ?** ☐ छ ☐ छैन **छ भने कति जना हुनुहुन्छ ?** महिला ..... पुरुष .....
१५	**भौगोलिक दुरी स तपाइको घरबाट गा.वि.स./नगरपालिका कार्यालय कति टाढा छ ?** कि मी .....(अन्दाजी) हिडेर लाग्ने समय .....मिनेट ..... घण्टा ..... दिन
१६	**के तपाईलाई यो कार्यक्रमको समूहले आवश्यक थप जानकारीको लागि फेरी पनि सम्पर्क गर्न सक्छन् ?** ☐ सक्छन् ☐ सक्दैनन् **सक्छन् भने तपाईलाई सम्पर्क गर्ने उचित माध्यम के हो ?** घरको फोन ☐ मोबाइल: .....
	सर्भेक्षणको निष्कर्ष
	अन्तमा, तपाईका अन्य केही सुझाव छन् कि ? ....

तपाईंको समयको लागि धन्यवाद !

ज : उत्तरदाताको पृष्ठभूमि बारे केही थप जानकारी (अवलोकन गरि भर्ने)

आर्थिक स्थिति	उच्च	मध्यम	न्यून		
बसोबासको अवस्था	स्थायी आवास	अस्थायी आवास			
अस्थायी आवास भए	छाप्रो / त्रिपाल	जस्ताले बारेको घर	काठै काठको घर	सामुदायिक भवन	अरुको घर
घर निर्माणको प्रकार सामाग्री	☐ परम्परागत कच्ची	☐ पक्की गारो	☐ पक्की	☐ अन्य	
घरको तला	☐ एक तले	☐ दुई तले	☐ तीन तले	☐ तीन तले भन्दा बढी	
घरको छानाको प्रकार	☐ कच्ची (फुस /पराल/छ्वाली	☐ टाइल/झिङ्गटी	☐ टिन/जस्ता पाता	☐ ढङ्गा/स्लेट	☐ ढलान छत
	☐ काठ	☐ माटो			

फोटोः ☐ जि.पि.एस : ☐

ANNEX 3. SURVEY QUESTIONNAIRE USED FOR ENDLINE SURVEY

बलियो घर कार्यक्रम

यो सर्वेक्षण बलियो घर कार्यक्रम क्षेत्रमा समुदायको भूकम्पीय जोखीम सम्वन्धी अवधारणाको स्तर वुझ्नको लागि तयार गरिएको हो ।

सर्वेक्षणमा १० देखि १५ मिनेट सम्मको समय लाग्नेछ । तपाईवाट प्राप्त हुने सुचनाको विश्लेषणवाट भविष्यको लागी वलियो घर कार्यक्रम तथा अन्य पुनर्निमाण कार्यक्रम कार्यान्वयनलाई थप प्रभावकारी वनाउन मद्दत मिल्ने छ । तसर्थ तपाईवाट स्पष्ट र सत्य उत्तरको लागी अनुरोध गर्दछौ ।

यो सर्वेक्षणवाट प्राप्त सूचनाहरु अन्य कुनै प्रयोजनको लागि प्रयोग गरिने छैन । तपाइले दिनुभएका सूचना तथा जानकारी लक्षित उदेश्यको लागि मात्र प्रयोग हुनेछ । तपाईका उत्तरहरु गोप्य र सुरक्षित राखिनेछ । यस सर्वेक्षणमा सहभागी हुनु भएवापत तपाईलाई कुनै तवरमा हाम्रो तर्फवाट कुनै हानी नहुने विश्वास राख्दछौ ।

यस सर्वेक्षणमा तपाईको सहभागीता स्वऐच्छिक हुनेछ । कुनै दुविधा भएमा सहभागीताको लागी वाध्यात्मक हुनुहुन्न । सर्वेक्षणको क्रममा कुनै असुविधा महशूस भएमा तपाई सर्वेक्षणवाट वाहिरीन र उत्तर नदिन स्वतन्त्र हुनुहुन्छ ।

सर्वेक्षणको सम्वन्धमा थप कुनै जिज्ञासा, प्रश्न वा गुनासो भएमा, NSET कार्यालयको फोन नम्वर ०१-५५९१०००
मा सम्पर्क गर्न सक्नुहुनेछ ।

जोखिम प्रति समुदायको धारणा तथा व्यवहार सर्वेक्षण

सर्वेक्षणको विवरण

फाराम नम्बर: _____ मिति: _____

जिल्ला: _____ सावित नगरपालिका/गाविस: _____

सावित वडा नम्बर: _____ टोल: _____

सर्वेक्षकको नाम: _____ जि.पि.एस: _____

तपाई यस सर्भेक्षणमा सहभागी हुन चाहनुहुन्छ ?
_____ चाहन्छु ☐

घर नम्वर वा घरको अन्य पहिचान
चाहन्न ☐

(यदि "चाहान्न" भनेको खण्डमा सर्वेक्षण टुंग्याउनु पर्नेछ ।)

क) व्यक्तिगत विवरण	
१	**के म तपाईको नाम थाहा पाउन सक्छु ?** नाम ..... ☐ भन्न चाहन्न
२	**जाति** ☐ दलित ☐ मुस्लिम ☐ ब्राम्हण/क्षेत्री ☐ नेवार ☐ जनजाति ☐ अन्य
३	**लिङ्ग** ☐ पुरुष ☐ महिला ☐ अन्य
४	**अपाङ्गता** ☐ भएको ☐ नभएको **यदि भएको भए, सरकारवाट कुन रंगको परिचय पत्र पाउनु भएको छ ?** ☐ रातो ☐ नीलो ☐ कुनै पनि कार्ड पाएको छैन
५	**तपाईको परिवारमा कति सदस्यहरु हुनुहुन्छ ?** ..... **जना** *(परिवार भन्नाले एकै चूलो प्रयोग गर्ने पारिवारिक संख्या भनेर बुझ्नुपर्नेछ।)*
६	**तपाईको वैवाहिक स्थिति ?** ☐ विवाहित ☐ अविवाहित ☐ पारपाचुके ☐ एकल
७	**तपाईको उमेर कुन समुह भित्र पर्छ ?** ☐ १५-१९ ☐ २०-२४ ☐ २५-२९ ☐ ३०-३४ ☐ ३५-४५ ☐ ४६-५५ ☐ ५६-६५ ☐ ६५ भन्दा माथि
८	**तपाईले कुन तह सम्मको अनऔपचारिक / औपचारिक शिक्षा पूरा गर्नुभएको छ ?** ☐ अक्षर चिन्दिन (निरक्षर) ☐ अक्षर चिन्छु मात्र (साक्षर) ☐ प्राथमिक शिक्षा ☐ माध्यमिक शिक्षा ☐ उच्च माध्यमिक शिक्षा ☐ स्नात्तक वा सो भन्दा माथि
९	**तपाई आफै घरमुली हो ?** ☐ हो ☐ होइन यदि होईन भने, **तपाईको घरमुलीसंगको नाता के हो ?** *(जस्तै घरमूली उत्तरदाताको बुवा हो भने यहा उल्लेख गर्नुपर्ने नाता 'बुवा' हुनेछ।)* ..... **घर बनाउनका लागि तथा घरको अन्य कुराको निर्णय कसले लिने गर्दछ ?** ☐ आफै ☐ श्रीमान ☐ श्रीमती ☐ ससुरा ☐ सासु ☐ बुवा ☐ आमा ☐ दाजु ☐ अन्य..... **परिवारमा कुनै पनि निर्णय लिनका लागि परिवारका अन्य सदस्यहरु सँग छलफल /समावेश गरिन्छ ?** ☐ गरिन्छ ☐ गरिदैन
१०	**तपाईको प्रमुख पेशा के हो ?**

	☐ कृषक ☐ सरकारी कर्मचारी ☐ विद्यार्थी ☐ राजनीतिज्ञ ☐ दैनिक ज्यालादारी ☐ डकर्मी ☐ व्यापार व्यवसाय ☐ गृहिणी ☐ बेरोजगार ☐ परामर्शदाता ☐ सघं,संस्थामा कार्यरत ☐ समाजसेवा ☐ अन्य.....
११	**तल उल्लेखित मध्ये तपाईको परिवारको मासिक आय कुन खण्डमा पर्छ ?** ☐ छैन ☐ १०,००० भन्दा कम ☐ १०,००१-२०,००० ☐ २०,००१-३०,००० ☐ ३०,००१-५०,००० ☐ ५०,००१-१००,००० ☐ १००,००० भन्दा माथी ☐ थाहा छैन ☐ भन्न चाहान्न
१२	**तपाईको परिवारमा डकर्मीको पेशा गर्ने परिवारका सदस्य कोही हुनुहुन्छ ?** ☐ छ ☐ छैन **छ भने कति जना हुनुहुन्छ ?** महिला ....., पुरुष ..... **उहाँले भूकम्प प्रतिरोधी भवन निर्माणको तालिम लिनुभएको छ ?** ☐ छ ☐ छैन
१३	**तपाईको परिवारमा तालिम लिएर डकर्मीको पेशामा लाग्न इच्छुक परिवारका सदस्य कोही हुनहुन्छ ?** ☐ छ ☐ छैन **छ भने कति जना हुनुहुन्छ ?** महिला ....., पुरुष .....
१४	**भौगोलिक दुरी स तपाइको घरबाट वडा कार्यालय कति टाढा छ ?** *(कृपया लागू नहुनेमा शून्य '०' उल्लेख गरिदिनुहोस् ।)* कि मी .....(अन्दाजी) हिडेर लाग्ने समय .....मिनेट ..... घण्टा ..... दिन

ख) भूकम्पीय जोखिमको ज्ञान सम्बन्धी प्रश्नावली	
१	**विगतमा तपाईले निम्न कुन कुन भूकम्प अनुभव गर्नु भएको छ ?** *(बहुउत्तर छनौट गर्न सक्नुहुनेछ ।)* ☐ १९९० सालको भूकम्प ☐२०४५ सालको भूकम्प ☐२०६८ सालको भूकम्प ☐२०७२ सालको भूकम्प ☐अन्य.....
२	**भूकम्पको बेला तपाई घरभित्र, भुईतल्लामा, हुनुहुन्छ भने ९यदि घर बाहिर खुल्ला स्थान भएको अवस्थामा० के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने

	☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐ घरको ढोका समातेर बस्ने ☐ झ्यालबाट बाहिर हाम्फाल्ने ☐ केही पनि नगर्ने ☐ थाहा छैन ☐ अन्य..... **भूकम्पको बेला तपाई घरभित्र, भूईतल्लामा, हुनुहुन्छ भने ९यदि घर बाहिर खुल्ला स्थान नभएको अवस्थामा० के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐घरको ढोका समातेर बस्ने ☐ झ्यालबाट बाहिर हाम्फाल्ने ☐ केही पनि नगर्ने ☐ थाहा छैन ☐ अन्य.....
३	**भूकम्पको बेला घरभित्र, माथिल्लो तल्लामा हुनुहुन्छ भने ९यदि घर बाहिर खुल्ला स्थान नभएको अवस्थामा० के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ घर बाहिर भाग्ने ☐ घरको भित्रि गाह्रोतिर बस्ने ☐ टेबल/खाट मुनि सुरक्षित भएर बस्ने ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बस्ने ☐ झ्यालबाट बाहिर हाम्फाल्ने ☐ थाहा छैन ☐ केही पनि नगर्ने ☐ अन्य.....
४	**भूकम्पको बेला यदि घर बाहिर हुनुहुन्छ भने, के गर्नु सुरक्षित हो जस्तो लाग्छ ?** ☐ खुल्ला ठाँउमा जाने ☐ कुनै पोल समातेर बस्ने ☐ घरको गाह्रो समातेर बस्ने ☐ घरभित्र जाने ☐ पर्खालमा आड लगाएर बस्ने ☐ अन्य.....
५	**भूकम्प आउनुको मुख्य कारण के हो ?** ☐ कछुवाले काँध फेरेर ☐ पृथ्वीको ठूला चट्टानका चाक्लाहरूको चालको कारणले ☐ ग्रह नक्षत्रको कारणले ☐ समुद्रको पानी पृथ्वीको भित्री तातो भागमा गई वाफ भएर बाहिर निस्कंदा
६	**तपाईलाई आफ्नो समुदाय भूकम्पको जोखिममा छ जस्तो लाग्छ ?** ☐ छ ☐ छैन ☐ थाहा छैन **छ भने कुन कुन मुख्य कारणले जोखिममा छ भन्ने लाग्छ ?** *(कृपया प्राथमिकरण गरिदिनुहोस । १ पहिलो प्राथमिकता, ६ कम प्राथमिकता)* ☐ कमजोर घरहरुको कारणले ☐ भूकम्प सम्बन्धी ज्ञानको कमीले ☐ भूकम्पीय पूर्वतयारीको अभावको कारणले ☐ अन्य कमजोर भौतिक संरचनाको कारणले ☐ सुरक्षित खुल्ला स्थानको अभावको कारणले
७	**तपाईलाई नेपालको भवन निर्माण संहिता सम्बन्धी मापदण्डहरुको बारेमा थाहा छ ?** ☐ सुनेकै छैन ☐ अलि अलि थाहा छ ☐ पूर्ण रुपमा जानकार छु

८	**तपाईंको विचारमा पिलरवाला घरमा भूकम्प प्रतिरोधी बनाउन पिलर र बिमको साइज कति हुनुपर्छ जस्तो लाग्छ ?** *(यो प्रश्न शहरी वसोवास भएको स्थानको लागी मात्र सोध्नु पर्नेछ ।)* **पिलरको साइज** ☐ १२ इन्च×१२ इन्च ☐ ९इन्च ×१२ इन्च ☐ ९ इन्च ×९ इन्च ☐ थाहा **छैन** **बिमको साइज** ☐ ९इन्च ×१४ इन्च ☐ १२ इन्च ×१४ इन्च ☐ थाहा छैन
९	**तपाईंको विचारमा गारोवाला घरलाई भूकम्प प्रतिरोधी / बलियो बनाउन के गर्नपर्छ जस्तो लाग्छ ?** *(यो प्रश्न ग्रामीण वसोवास भएको स्थानको लागी मात्र सोध्नु पर्नेछ ।)* ☐ ब्याण्ड राख्नुपर्छ/पट्टि लगाउनु पर्छ ☐गारो मोटो /लामो बनाउनु पर्छ ☐ गारो राम्रोसग लगाउनु पर्छ ☐ थाहा छैन **कुन कुन ठाउँमा ब्याण्ड लगाउनु पर्छ जस्तो लाग्छ ?** ☐ जगमा मात्र ☐ जग र डि पि सी तहमा मात्र ☐ झयाल मुनि/माथि मात्र ☐ छाना/चोटाको तहमा मात्र ☐ सबै ठाउँमा
१०	**तपाईंको विचारमा काठको फ्रेमवाला घरलाई भूकम्प प्रतिरोधी / बलियो बनाउन के गर्नपर्छ जस्तो लाग्छ ?** ☐ छड्के तान लगाउने ९द्यचबअष्लन) ☐ काठकै जोनी बनाई काठकै चुकुल लगाउने ☐ थाहा छैन ☐ अन्य .....

ग) भूकम्पीय जोखिमको अवधारणा सम्बन्धी प्रश्नावली

१	**तपाईंको विचारमा आफ्नो घर भूकम्पबाट कतिको सुरक्षित छ जस्तो लाग्छ ?** ☐ सुरक्षित छ ☐ सुरक्षित छैन ☐ निश्चित भन्न सक्दिन **छैन भने सुरक्षित बनाउने बारेमा सोच्नु भएको छ ?** ☐ छ ☐ छैन ☐ सोच्नै पर्छ
२	**तपाईको विचारमा, के गर्दाखेरी भूकम्पवाट सुरक्षित घर निर्माण गर्न सकिन्छ जस्तो लाग्छ ?** *(वहुउत्तर छनौट गर्न सक्नुहुनेछ ।)* ☐ प्राविधिकको सल्लाह लिएर ☐ तालिम प्राप्त डकर्मी लगाएर ☐ स्थानिय तहमा स्वीकृती लिएर घर वनाउदा ☐ आफू चेतनशील भएर
३	**तपाईंको विचारमा कस्तो खाले घर भूकम्पबाट सुरक्षित हुन्छ जस्तो लाग्छ ?** *(वहुउत्तर छनौट गर्न सक्नुहुनेछ ।)* ☐ ढुडगा माटोको ☐ पिलरवाला ☐ काठको ☐ ढुङ्गा र काठको ☐ टिनै टिनको (जस्ता पाता) ☐ काठको र टिनका ☐ अन्य .....
४	**समुदायलाई भूकम्पीय जोखिमबाट सुरक्षित राख्नको लागि कस्को बढी भूमिका हुन्छ ?** *(कृपया प्राथमिकरण गरिदिनुहोस । १ पहिलो प्राथमिकता, ६ कम प्राथमिकता)* ☐ स्वयंम ☐ इन्जिनियरहरु ☐ डकर्मीहरु ☐ नगरपालिका/ गाउंपालिका ☐ समुदाय ☐ गैरसरकारी संस्था

५	**तपाईंको विचारमा घरलाई सुरक्षित बनाउनको लागि कसको सबभन्दा ठूलो भूमिका हुन्छ जस्तो लाग्छ ?** *(कृपया प्राथमिकरण गरिदिनुहोस । १ पहिलो प्राथमिकता, ३ कम प्राथमिकता)* ☐ नगरपालिका/गा.वि.स. ☐ स्वयंम ☐ सघंसंस्था ९ल्न्इरक्ल्न्इ०
६	**तपाईको समुदायमा भूकम्पीय सचेतना र भूकम्प प्रतिरोधी भवन निर्माणको बारेमा जानकारीहरु पुऱ्याउने प्रभावशाली माध्यम कुन हुन सक्छ ?** *(कृपया प्राथमिकरण गरिदिनुहोस । १ पहिलो प्राथमिकता, ६ कम प्राथमिकता)* टि.भी/रेडियो..... घरदैलो कार्यक्रम..... पत्रपत्रिका/पुस्तक/पुस्तिका ..... ईन्टरनेट ..... नमुना घर ..... सूचना पाटी .....
७	**भविष्यमा नया घर वनाउनु पर्दा कस्तो घर वनाउने सोच्नु भएको छ ?** ☐ ढुङ्गा माटोको ☐ पिलरवाला ☐ काठको ☐ ढुङ्गा र काठको ☐ टिनै टिनको (जस्ता पाता) ☐ काठको र टिनको ☐ अन्य .....
८	**सुरक्षित निर्माणका लागि तपाईंले भोग्नु परेको मुख्य व्यवधानहरु के के हुन?** *(वहुउत्तर छनौट गर्न सक्नुहुनेछ ।)* ☐ स्रोत साधन खर्चको अभाव ☐ प्रविधी र प्राविधिक ज्ञानको कमी ☐ तालिम प्राप्त जनशक्तिको अभाव ☐ सामुदायिक एकताको अभाव ☐ अन्य,.....
९	**तपाईंको विचारमा घरलाई भूकम्पबाट सुरक्षित/भूकम्प प्रतिरोधी बनाउन कति थप खर्च लाग्ला/लाग्दो रहेछ ?** ☐ ३ गुणा बढी लाग्छ ☐ दोब्बर नै लाग्छ ☐ २० प्रतिशत भन्दा धेरै ☐ ५ प्रतिशत ☐ खासै खर्च लाग्दैन ☐ थाहा छैन

घ) भूकम्पीय जोखिमको व्यवहार सम्बन्धी प्रश्नावली

१	**तपाईंले २०७२ बैशाख १२ को भूकम्पलाई अनुभव गर्नुभयो ?** ☐ गरियो ☐ गरिएन **यदि गर्नुभयो भने, त्यतिबेला तपाईं कहाँ हुनुन्थयो ?** ☐ घर बाहिर ☐ घर भित्र **यदि घर भित्र हुनुहुन्थ्यो भने कता हुनुहुन्थयो ?** ☐ भुईतलामा ☐ माथिल्लो तलामा **घर भित्र हुनुहुन्थ्यो भने तपाईंले के गर्नुभयो ?** ☐ घर बाहिर भागें ☐ घरको भित्री गाह्रोतिर बसें ☐ टेबल/खाट मुनि सुरक्षित भएर बसें ☐ घरभित्रको खुल्ला ठाउमा टाउको छोपेर बसें ☐ घरको ढोका समातेर बसें ☐ झ्यालबाट बाहिर हाम्फालें ☐ केही पनि गरिन ☐ अन्य..... **यदि घर बाहिर हुनुहुन्थ्यो भने तपाईं कहाँ जानुभयो ?**

	☐ खुल्ला ठाउँ ☐ कुनै पोल समातेर बसें ☐ घरको गाह्रो समातेर बसे ☐ पर्खालमा आड लगाएर बसें ☐ घर भित्र गए ☐ केही पनि गरिन ☐ अन्य.....
२	**तपाईको घर कुन प्रकार को हो** ☐ पिलर ☐ गारोवाला ☐ काठको फ्रेमवाला **तपाईले आफनो घरलाई बलियो बनाउन के गर्नुभएको छ ?** **यदि पिलरवाला घर भएमा** पिलरको साइज ☐ १२ इन्च ×१२ इन्च ☐ ९ इन्च ×१२ इन्च ☐ ९ इन्च ×९ इन्च ☐ थाहा छैन ☐ अन्य बिमको साइज ☐ ९ इन्च ×१४ इन्च ☐ १२ इन्च ×१४ इन्च ☐ थाहा छैन ☐ अन्य **यदि गारोवाला घर भएमा** ☐ ब्याण्ड राखेको छु/पट्टि लगाएको छु ☐गारो मोटो /लामो बनाएको छु ☐ गारो राम्रोसग लगाएको छु ☐ थाहा छैन **कुन कुन ठाउँमा ब्याण्ड लगाउनु भएको छ ?** ☐ जगमा मात्र ☐ जग र डि पि सी तहमा मात्र ☐ झयाल मुनि / माथि मात्र ☐ छाना / चोटाको तहमा मात्र ☐ सबै ठाउँमा **यदि काठको फ्रेमवाला घर भएमा** ☐ छड्के तान लगाएको छु ९द्यचबअष्लन) ☐ काठकै जोनी बनाई काठकै चुकुल लगाएको छु ☐ थाहा छैन ☐ अन्य .....
३	**तपाईले आफनो घर निर्माणमा कोही प्राविधिकको संलग्नता गराउनु भएको छ ?** *(थाहा छैन भन्नाले उत्तरदातालाई यस प्रश्नको विषयवस्तु बारे केहि जानकारी वा ज्ञान नभएको भनि बुझ्नपर्नेछ । उदाहरणको लागी उत्तरदाता आफ्नो घर बनाउंदा प्रत्यक्ष संलग्न नभएको हुन सक्छ । जसकारण उत्तरदातालाई आफ्नो घर निर्माणको क्रममा प्राविधीकको संलग्नता भए पनि थाहा नभएको हुनसक्छ ।)* ☐ छैन ☐ छ ☐ थाहा छैन **यदि छ भने के मा संलग्नता छ ?** *(बहुउत्तर दिन सक्नु हुनेछ ।)* ☐ नक्सा बनाउन ☐ घर निर्माणको सुपरिवेक्षणमा ☐ सर सल्लाहको लागी ☐ थाहा छैन **के तपाईले घर निर्माण गर्दा सम्बन्धित नगरपालिका, गाउपालिकावाट स्वीकृती लिनुभएको छ?** ☐ छैन ☐ छ ☐ थाहा छैन **यदि छ भने, के नगरपालिका, गांउपालिका ईन्जिनीयरवाट घर निर्माणकोक्रममा निरक्षण गरेको थियो ?** ☐ छैन ☐ छ ☐ थाहा छैन
४	**आफनो घर निर्माणमा तालिम लिएका डकर्मीको संलग्नता छ कि छैन ?** ☐ छैन ☐ आंशिक मात्रामा छ ☐ पूर्ण संलग्नता छ ☐ थाहा छैन ***आंशिक वा पूर्ण संलग्नता भएमा,*** **तालिम प्राप्त डकर्मीहरु लगाउँदा चलन चल्ती भन्दा कतिसम्म बढी ज्याला दिनु भयो?** ☐ दिईएन ☐ ५ देखि १० प्रतिशत ☐ १५ प्रतिशत भन्दा धेरै ☐ थाहा छैन
५	**तपाईं कहिल्यै कुनै भूकम्प /सुरक्षित निर्माण सम्बन्धी चेतनामूलक कार्यक्रममा सहभागी हुनु भएको छ ?** ☐ छ ☐ छैन **छ भने कस्तो कार्यक्रममा सहभागी हुनु भएको छ ?***(बहु उत्तर छनौट गर्न सक्नुहुनेछ ।)* ☐ तालिम कार्यक्रम ☐ अभिमुखीकरण कार्यक्रम ☐ छलफल कार्यक्रम ☐ विद्यालयको कार्यक्रम ☐ घर दैलो कार्यक्रम ☐ भूकम्प सुरक्षा दिवस ☐ अन्य

	त्यो कार्यक्रम २०७२ बैशाख १२ को भूकम्प भन्दा अघि थियो कि पछि थियो ? ☐ भूकम्प अघि ☐ भूकम्प पछि **कार्यक्रम कुन कुन संस्थाले गरेको थियो ?** *(यदि धेरै संस्थाहरु भएमा ', कमा' राख्दै संस्थाको नामहरु उल्लेख गरिदिनुहोस् ।)* ....
६	**तपाईले रेडियो, टि.भी. वा पत्रपत्रिकाहरुमा भूकम्पीय सचेतना सम्बन्धी कार्यक्रम कहिल्यै सुन्ने वा हेर्ने गर्नु भएको छ ?** ☐ सधै सुन्ने वा हेर्ने गर्छु ☐ कहिले कांहि सुन्ने वा हेर्ने गर्छु ☐ थाहा छैन
७	**भूकम्प प्रतिरोधी भवन निर्माणको बारेमा जानकारी प्रदान गर्ने नमुना घरको ९मोडल० हेर्नुभएको छ ?** ☐ छ ☐ छैन

ङ) अन्य सन्दर्भ प्रश्ननावली	
१	**२०७२ वैशाख १२ र सो पश्चातको पराकम्पनहरुमा तपाईको परिवारको कोही घाईते हुनु भएको थियो?** ☐ थियो ☐ थिएन **थियो भने, कति जना ?** .....
२	**२०७२ वैशाख १२ र सो पश्चातको पराकम्पनहरुमा तपाईको परिवारको कसैको मृत्यु भएको थियो ?** ☐ थियो ☐ थिएन **थियो भने, कति जना ?** .....
३	**तपाई वा तपाईको परिवार पुन निर्माण लाभग्राहीको सूचीमा हुनुहुन्छ?** ☐ छ ☐ छैन **यदि छ भने, के तपाईको घरको पुननिर्माण सकियो ?** ☐ सकियो ☐ निर्माणाधीन अवस्था ☐ शुरु नै गरेको छैन
४	**तपाई वा तपाईंको घरपरिवारका सदस्यहरुले भूकम्प तथा अन्य विपद् व्यवस्थापन सम्बन्धी कुनै तालिम प्राप्त गरेका छन् ?** ☐ छन् ☐ छैनन् **छन् भने कुन किसिमको तालिम ?** ☐ विपद व्यवस्थापन ☐ प्राथमिक उपचार ☐ उद्धारकर्ता ☐ सुरक्षित/भूकम्प प्रतिरोधी भवन निर्माण ☐ अन्य..... **तालिम कुन कुन संस्थाले दिएको थियो ?** *(यदि धेरै संस्थाहरु भएमा', कमा' राख्दै संस्थाको नामहरु उल्लेख गरिदिनुहोस् ।)* .....

५	**पुननिर्माणमा स्थानीय सरकारी अधिकारीहरु तथा राजनीतिकर्मी नेताहरुले गरेको सहयोग १–५ सम्मको मापनमा तपाई कति अंक दिनुहुन्छ? ?** *(१ पटक्कै सहयोग छैन, २ खासै सहयोग छैन, ३ तथस्ट, ४ सहयोगी, ५ अति नै सहयोगी)* पटक्कै सहयोग छैन | १ | २ | ३ | ४ | ५ | अति नै सहयोगी
६	**स्थानीय सरकारी अधिकारीहरु तथा राजनीतिक नेताहरुले भूकम्पीय सुरक्षा अभिवृद्धि/जोखिम न्युनीकरणका लागि गर्ने सक्ने सहयोगलाई १–५ सम्मको मापनमा तपाई कति अंक दिनुहुन्छ? ?** *(१ पटक्कै सहयोग छैन, २ खासै सहयोग छैन, ३ तथस्ट, ४ सहयोगी, ५ अति नै सहयोगी)* पटक्कै छैन | १ | २ | ३ | ४ | ५ | अति नै सहयोगी

सर्भेक्षणको निष्कर्ष	
	अन्तमा, तपाईका अन्य केही सुझाव छन् कि ?

तपाईंको समयको लागि धन्यवाद !

ANNEX 4. RISK PERCEPTION MATRIX USED IN BASELINE SURVEY 2016/17

Knowledge				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
1	Do you have knowledge about earthquake and its causes?	Have some information	0.5	5
		No, I don't have	0	
		I can explain it to other	1	
2	In your Opinion, what kind of houses can be made earthquake safe?	Stone in Mud	0.25	8
		RC Frame	0.25	
		Timber Frame	0.25	
		Stone and Timber frame	0.25	
		Corrugated	0.25	
		Timber Frame and Corrugated	0.25	
		Any kind	1	
		Others	0.25	
3	Do you have any idea on earthquake safe construction techniques?	I don't know	0	7
		I have very little knowledge on it	0.25	
		I know	0.5	
		I know a lot about it	1	
4(a)	What is the safe action if you were inside the building in ground floor and there is open space out side	Run outside	1	7
		Lean against the inner walls	0.5	
		Under the table/ bed	0.5	
		Duck cover and hold	0.5	
		Hold the door	0.5	
		Do nothing	0	
		Don't Know	0	
		Others	0	
4(b)	What is the safe action if you were inside the building in ground floor and there is no open space out side	Run outside	0	7
		Lean against the inner walls	1	
		Under the table/ bed	1	
		Duck cover and hold	1	
		Hold the door	0.5	
		Jump out of the window	0	
		Do nothing	0	
		Don't Know	0	
		Others	0	
4(c)	What is the safe action if you were inside the building in top floor and there is no open space out side	Run outside	0	7
		Lean against the inner walls	1	
		Under the table/ bed	1	
		Duck cover and hold	1	
		Jump out of the window	0	
		Do nothing	0	
		Don't Know	0	
		Others	0	
5		Open space	1	7

Knowledge				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
	What is the safe action if you were outside the building	Hold the pole	0	
		Hold the wall	0	
		Run inside	0	
		Lean against the walls	0	
		Others	0	
6(a)	Pillar size for making RC frame building earthquake resistant	12 inch by 12 inch	1	11
		9 inch by 12 inch	0	
		9 inch by 9 inch	0	
		Others	0	
		Don't Know	0	
6(b)	Beam size for making RC frame building earthquake resistant	9 inch by 14 inch	1	9
		12 inch by 14 inch	0	
		Others	0	
		Don't Know	0	
7	What is done in masonry buildings to make it earthquake resistant	Must put bands	1	11
		Long and big walls	0	
		Walls must be strong	0	
		Don't Know	0	
8	In which places band are kept	In Foundation level	0.25	10
		In foundation and DPC level	0.25	
		Above and below the window	0.25	
		Roof Band	0.25	
		Everywhere	1	
9	What is done in Timber frame building to make it earthquake resistant	Bracing	1	9
		Timber joints and Locks	0.5	
		Don't Know	0	
		Others	0	

Attitude				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
1	If you are making house, how are you going to make it?	Same as Previous	0	10
		Strong	1	
		Don't know	0	
2	In your opinion, how safe is your house from earthquake?	It is safe	0.5	7
		It is not safe	1	
		Not sure	0.5	
		Don't know	0	
3	If not, have you thought about making it safe?	Yes	1	10
		No	0	
		Have to think about it	0.5	
4		I can't	0	17

Attitude				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
	For earthquake resistance building how much are you willing to pay	1-5 Percent	0.25	
		6-10 Percent	0.5	
		11-15 Percent	0.5	
		16-20 Percent	0.75	
		More than 20 Percent	1	
		Don't know	0	
5	Now, do you want to put trained mason while making home?	Yes	1	17
		No	0	
		No need	0	
		Haven't thought	0	
		Don't know	0	
6	How much more are you willing to give for trained masons	I can't	0	18
		5 % more	0.25	
		10% more	0.5	
		15% more	0.75	
		Ready to give any cost	1	
		Don't know	0	
7	Who has the primary responsibility of making your house safe from earthquake	Myself	1	11
		Ward	0	
		Municipality	0	
		Governmental	0	
		Others	0	
8	Who has the major responsibility to make the community safe from earthquake risk?	Myself	1	10
		Engineers	0.3	
		Masons	0.3	
		Municipality	0.3	
		Community	0.3	
		Non-Governmental Organization	0.3	
		Don't Know	0	

Practice				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
1(a)	If you were inside building during Gorkha earthquake, what did you do?	Ran outside	0.5	17
		Stayed in inner walls	1	
		Under table/ Bed	1	
		Did Duck cover and hold in open space	1	
		Hold the door	0.5	
		Jump out of window	0	
		Did Nothing	0	
		Others	0	
1(b)		Went to open space	1	

Practice				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
	If you were Outside the building during Gorkha earthquake, what did you do?	Hold the Poles	0	
		Hold the walls of house	0	
		Leaned against the wall	0	
		Ran inside the house	0	
		Did Nothing	0	
		Others	0	
2	Have taken technical support and suggestions in making home	Yes	1	12
		No	0	
		Don't know	0	
3	Have you taken trained mason while making home?	No	0	16
		Partial Involvement	0.5	
		Full involvement	1	
		Don't know	0	
4	Participated in Awareness programs	Yes	1	11
		No	0	
		Don't know	0	
5(a)	What have you done to make your RC frame house earthquake safe? (Pillar size)	12 inch by 12 inch	1	8
		9 inch by 12 inch	0	
		9 inch by 9 inch	0	
		Others	0	
		Don't Know	0	
		Nothing	0	
5(b)	What have you done to make your RC frame house earthquake safe? (Beam size)	9 inch by 14 inch	1	7
		12 inch by 14 inch	0	
		Others	0	
		Don't Know	0	
		Nothing	0	
6(a)	What have you done to make your Masonry house earthquake safe?	Have put Bands	1	10
		Long and big walls	0	
		Walls are build strong	0	
		Don't Know	0	
		Nothing	0	
6(b)	Where have you kept the bands?	In Foundation level	0.25	10
		In foundation and DPC level	0.25	
		Above and below the window	0.25	
		Roof Band	0.25	
		Everywhere	1	
7	What have to done in your timber frame house to make it earthquake resistant?	Bracing	1	10
		Timber joints and Locks	1	
		Nothing	0	

Practice				
S.N.	Questions	Options	Score	Average Weightage
		Don't know	0	
		Others	0	

ANNEX 5. RISK PERCEPTION MATRIX USED IN ENDLINE SURVEY 2020

Knowledge				
S.N.	Questions	Options	Score	Average Weightage
1(a)	What is the safe action if you were inside the building, in ground floor and there is open space outside during earthquake?	Run outside	1	7
		Lean against the inner walls	0.5	
		Under the table/ bed	0.5	
		Duck cover and hold in open space inside the house	0.5	
		Hold the door	0.5	
		Jump out from the window	0	
		Do nothing	0	
		Don't Know	0	
		Others	0	
1(b)	What is the safe action if you were inside the building, in ground floor and there is no open space outside during earthquake?	Run outside	0	7
		Lean against the inner walls	1	
		Under the table/ bed	1	
		Duck cover and hold in open space inside the house	1	
		Hold the door	0.5	
		Jump out from the window	0	
		Do nothing	0	
		Don't Know	0	
		Others	0	
1(c)	What is the safe action if you were inside the building in top floor and there is no open space outside during Earthquake?	Run outside	0	7
		Lean against the inner walls	1	
		Under the table/ bed	1	
		Duck cover and hold in open space inside the house	1	
		Hold the door	1	
		Jump out from the window	0	
		Do nothing	0	
		Don't Know	0	

Knowledge				
S.N.	**Questions**	**Options**	**Score**	**Average Weightage**
		Others	0	
2	What is the safe action if you were outside the building during Earthquake?	Move to Open space	1	7
		Hold the pole	0	
		Hold the wall	0	
		Run inside	0	
		Lean against the walls	0	
		Others	0	
3	Do you have knowledge about main cause's earthquake?	Tortoise shoulder shifting	0	6
		Internal motion of Rocks	1	
		Due to Astrological effect	0	
		Vaporization of the sea water after reaching in the inner hot core of Earth	0	
4	Do you know the Nepal building construction guidelines**?**	Not Heard	0	8
		Little knowledge	0.25	
		Fully aware	1	
5(a)	Pillar size for making RC frame building earthquake resistant	12 inch by 12 inch	1	11
		9 inch by 12 inch	0	
		9 inch by 9 inch	0	
		Don't Know	0	
5(b)	Beam for making RC frame building earthquake resistant	9 inch by 14 inch	1	9
		12 inch by 14 inch	0	
		Don't Know	0	
6(a)	In your opinion, What should be done in masonry buildings to make it earthquake resistant**?**	Must put bands	1	11
		Long and big walls	0	
		Walls must be strong	0	
		Don't Know	0	
6(b)	In which places band are kept **<**	only Foundation level	0.25	10
		In foundation and DPC level	0.25	
		Above and below the window	0.25	
		Roof Band	0.25	
		Everywhere	1	
7	In your opinion, What should done in Timber frame building to make it earthquake resistant**?**	Bracing	1	9
		Timber joints and Locks	0.5	
		Don't Know	0	
		Others	0	
8		Stone Masonry	0.1429	8

Knowledge				
S.N.	Questions	Options	Score	Average Weightage
	In your opinion, what type of house will be safe during earthquake? (MCQ)	House with Pillars	0.1429	
		Wooden house	0.1429	
		Stone and wooden	0.1429	
		House with tin	0.1429	
		House with tin and wood	0.1429	
		Others	0.1429	

Attitude				
S.N	Questions	Options	Score	Average Weightage
1	In your opinion, how safe is your house from earthquake?	It is safe	1	12
		It is not safe	0.5	
		Not sure	0	
2	If not, will you about to build it safer	Yes	1	16
		No	0	
		Have to think about it	0	
3	In your opinion, what should be done for the earthquake resistant house construction? (MCQ)	Technical Support	0.25	16
		Involvement of trained masons	0.25	
		Take approval from Local government	0.25	
		Self-aware	0.25	
4	Who has the major responsibility to make the community safe from earthquake risk? (Ranking Scale Question)	Self	1	16
		Engineers	0.3	
		Masons	0.3	
		Local Government	0.5	
		Community	1	
		Non-Governmental Organization	0.3	
5	In your opinion, Who has the primary responsibility of making your house safe from earthquake? (Ranking Scale Question)	Municipality/LG	0.5	17
		Self	1	
		NGO/INGO	0.5	
6	In your opinion, how much cost will be added while making earthquake resistant house?	3 times more	1	23
		two times more	1	
		more than 20 %	0.5	
		5% more	0.5	
		Negligible	0	
		don't know	0	

Practices				
S.N	**Questions**	**Options**	**Score**	**Average Weightage**
1	If you were inside building during Gorkha earthquake, what did you do?	Ran outside	0.5	16
		Stayed in inner walls	1	
		Under the table/ bed	1	
		Duck cover and hold in open space inside the house	1	
		Hold the door	0.5	
		Jump out from the window	0	
		Did nothing	0	
		Others	0	
2	If you were outside the building during Gorkha earthquake, what did you do?	Went to open space	1	
		Hold the Poles	0	
		Hold the walls of house	0	
		Leaned against the wall	0	
		Ran inside the house	0	
		Did Nothing	0	
		Others	0	
3	Size of pillars for RC frame house to make earthquake resistant house	12 inch by 12 inch	1	8
		9 inch by 12 inch	0	
		9 inch by 9 inch	0	
		Don't Know	0	
4	Size of beam for earthquake resistant house(RC Frame)	9 inch by 14 inch	1	7
		12 inch by 14 inch	0	
		Don't Know	0	
5	For Stone masonary house to make earthquake resistant	Have Put Bands	1	10
		Long and big walls	0	
		Walls are built strong	0	
		Don't Know	0	
6	Where have you kept the bands?	In Foundation level	0.25	10
		In foundation and DPC level	0.25	
		Above and below the window	0.25	
		Roof Band	0.25	
		Everywhere	1	
7	What have to done in your timber frame house to make it earthquake resistant?	Bracing	1	10
		Timber joints and Locks	1	
		Don't know	0	
		Others	0	

Practices				
S.N	**Questions**	**Options**	**Score**	**Average Weightage**
8	Have you taken technical support and suggestions form technician while making home?	Yes	1	12
		No	0	
		Don't Know	0	
9	Used of trained mason while making home	No	0	16
		Partial Involvement	0.5	
		Full Involvement	1	
		Don't know	0	
10	Have you ever participated in Awareness programs related to Earthquake?	Yes	1	11
		No	0	

ANNEX 6. SAMPLE DISTRIBUTION IN PROGRAM VDCS/MUNICIPALITIES

S.N.	District	Wards (Then VDC/Mun.)	Number of Household	Baseline survey 2016/17		Endline survey 2020	
				Number of Samples	% of sample HH within VDC/Mun	Number of Samples	% of sample HH within VDC/Mun
1	Nuwakot	Chaturale	708	253	35.7	85	12
2		Chhap	448	213	47.5	79	17.7
3		Likhu	557	238	42.7	82	14.7
4		Mahakali	788	263	33.4	86	10.9
5		Samundradevi	700	253	36.1	85	12.1
6		Sikre	370	196	53	76	20.6
7		Talakhu	688	251	36.5	84	12.3
8		Thanapati	626	244	39	83	13.3
9		Thansing	1,388	307	22.1	90	6.5
Nuwakot Total			12,543	2,218	18	750	6
1	Dhading	Darkha	1,121	291	26	89	7.9
2		Dhuwakot	1,063	282	26.5	88	8.3
3		Jyamrung	1,653	314	19	91	5.5
4		Kalleri	1,921	320	16.7	91	4.8
5		Khalte	1,566	310	19.8	91	5.8
6		Kumpur	2,122	342	16.1	92	4.3
7		Marpak	849	266	31.3	86	10.2
8		Nalang	1,876	320	17.1	91	4.9
9		Nilkantha Mun.	9,702	425	4.4	95	1
10		Semjong	847	266	31.4	86	10.2
11		Sertung	817	259	31.7	86	10.5
12		Tipling	464	211	45.5	80	17.2
Dhading Total			24,001	3,606	15	1,066	4.4
1	Dolakha	Alampu	413	204	49.4	78	18.9
2		Babare	794	267	33.6	86	10.8
3		Bhimeswor Mun.	6076	366	6	95	1.6
4		Bhirkot	602	241	40	83	13.8
5		Bigu	406	205	50.5	78	19.2
6		Chilankha	661	250	37.8	84	12.7
7		Chyama	607	242	39.9	83	13.7
8		Japhe	824	270	32.8	86	10.4
9		Jhule	547	230	42	82	15
10		Katakuti	955	280	29.3	87	9.1
11		Laduk	928	280	30.2	87	9.4
12		Lamidada	1045	292	27.9	88	8.4
13		Magapauwa	780	292	37.4	86	11
14		Malu	584	238	40.8	83	14.1
Dolakha Total			15222	3657	24	1186	7.8

ANNEX 7. SOCIO-DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

Demographic Variable	Category	Baseline Survey 2016/17		Endine survey 2020	
		Number	Percent (%)	Number	Percent (%)
Gender	Male	4,798	48.7	1636	53.2
	Female	5,058	51.3	1437	46.8
Ethnicity	Other	45	0.5	9	0.3
	Dalit	995	10.1	274	8.9
	B/C	3	0.1	1,102	35.9
	Newar	3,463	35.1	305	9.9
	Janajati	1,032	10.5	1,383	45
Marital status	Married	4,318	43.8	2,792	90.9
	Unmarried	8,385	85.1	155	5
	Divorce	683	6.9	4	0.1
	Single	66	0.7	122	4
Age group	15-19	461	4.7	57	1.9
	20-24	700	7.1	195	6.3
	25-29	770	7.8	250	8.1
	30-34	910	9.2	263	8.6
	35-45	2,069	21	657	21.4
	46-55	1,985	20.1	621	20.2
	56-65	1,530	15.5	539	17.5
	Above 65	1,400	14.2	491	16
Education level	Illiterate	3,368	34.2	530	17.2
	Literate	3,038	30.8	1307	42.5
	Primary education	1,425	14.5	632	20.6
	Secondary	1,318	13.4	393	12.8
	Higher secondary	550	5.6	168	5.5
	Bachelor and above	157	1.6	43	1.4
Occupation	Other	368	3.7	101	3.3
	Agriculture	5,921	60.1	2,055	66.9
	Government job	292	3	58	1.9
	Student	483	4.9	71	2.3
	Politician	31	0.3	7	0.2
	Daily wages	172	1.7	53	1.7
	Mason	728	7.4	208	6.8
	Private organisation	26	0.3	21	0.7
	House wife	933	9.5	166	5.4
	Unemployed	100	1	50	1.6
	Business	673	6.8	275	8.9
	Social work	84	0.9	7	0.2
Income	No income	1,126	11.4	364	11.8
	< 10000	3,106	31.5	983	32
	10001 - 20000	3,159	32.1	859	28
	20001 - 30000	1,164	11.8	361	11.7
	30001 - 50000	593	6	165	5.4
	50001 - 100000	143	1.5	53	1.7
	>100000	56	0.6	15	0.5
	Don't want to say	140	1.4	34	1.1
	Don't know	369	3.7	239	7.8
Disability	Yes	283	2.9	33	1.1
	No	9,573	97.1	3040	98.9

Demographic Variable	Category	Baseline Survey 2016/17		Endine survey 2020	
		Number	Percent (%)	Number	Percent (%)
Family member	One	275	2.8	77	2.5
	Two	757	7.7	218	7.1
	Three	936	9.5	300	9.8
	Four	1825	18.5	659	21.4
	Five	1961	19.9	579	18.8
	Six	1497	15.2	481	15.7
	Seven	982	10	308	10
	Eight	559	5.7	128	4.2
	Nine	361	3.7	126	4.1
	Ten	251	2.5	60	2
	Above 10	452	4.5	137	4.5
Nuwakot	Chaturale VDC	253	9.8	89	11.7
	Chhap VDC	213	8.2	79	10.4
	Likhu VDC	238	9.2	82	10.8
	Mahakali VDC	263	10.1	87	11.4
	Samundradevi VDC	253	9.8	85	11.2
	SikreVDC	196	7.6	79	10.4
	Talakhu VDC	251	9.7	84	11.1
	Thanapati VDC	244	9.4	84	11.1
	Thansing VDC	307	11.8	91	12
Dhading	Darkha VDC	291	8.1	92	8.3
	Dhuwakot VDC	282	7.8	88	7.9
	Jyamrung VDC	314	8.7	91	8.2
	Kalleri VDC	320	8.9	93	8.4
	Khalte VDC	310	8.6	91	8.2
	Kumpur VDC	342	9.5	93	8.4
	Marpak VDC	266	7.4	93	8.4
	Nalang VDC	320	8.9	100	9
	Nilkantha Municipality	425	11.8	110	9.9
	Semjong VDC	266	7.4	91	8.2
	Sertung VDC	259	7.2	85	7.7
	Tipling VDC	211	5.9	82	7.4
Dolakha	Alampu VDC	204	5.6	82	6.8
	Babare VDC	267	7.3	86	7.1
	Bhimeswor Municipality	366	10	95	7.9
	Bhirkot VDC	241	6.6	83	6.9
	Bigu VDC	205	5.6	79	6.6
	Chilankha VDC	250	6.8	84	7
	Chyama VDC	242	6.6	83	6.9
	Japhe VDC	270	7.4	90	7.5
	Jhule VDC	230	6.3	83	6.9
	Katakuti VDC	280	7.7	88	7.3
	Laduk VDC	280	7.7	89	7.4
	Lamidada VDC	292	8	91	7.6
	Magapauwa VDC	292	8	86	7.1
	Malu VDC	238	6.5	85	7.1

Community back to their normal life after reconstruction at Shivapuri RM of Nuwakot (Photos above) and community after completion of reconstruction at Alampu, Ward 6 of Bigu RM, Dolakha (photo below)

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NSET
Earthquake Safe Communities in Nepal

National Society for Earthquake Technology-Nepal (NSET)

About NSET

National Society for Earthquake Technology-Nepal (NSET) was founded on June 18, 1993, with the vision "Earthquake Safe Communities in Nepal by 2020". NSET was conceptualized with main objective "to foster the advancement of science and practice of earthquake engineering and technology for mitigating the earthquake risk and increasing the seismic safety, and to enhance professionalism, professional engineering and scientific ethics. Bringing “substantial change in the application of technology to the many facets of earthquake disaster management for saving the lives of the people” has remained the guiding philosophy of NSET ever since its inception.

Today, NSET is considered as one of the major contributors in the field of earthquake risk management. Its seismic risk reduction approaches are now being replicated beyond the borders of Nepal. Consolidating the experience, knowledge, learning in disaster vulnerability reduction and preparedness to policy drafting and strategy development, and working with variety of stakeholders for more than two and half decades, NSET has now realized the need and decided, as stipulated by global thoughts, to expand its scope and works to managing multi-hazard situations, climate change adaptation and risk management, and integration of this synthesis of DRM and CRM into economic development efforts.

Vision

“Disaster Resilient Communities in Nepal by 2050”

Mission: “To contribute in enhancement of disaster resilience of the communities through development and implementation of appropriate technologies, inclusive and collaborative approaches in order to minimize and manage disaster risks.”

Strategic Objectives

SO1: Develop and implement integrated and inclusive interventions related to Multi- Hazard Disaster and Climate Risk Management through development and enhancement of understanding, capabilities and resources of communities in Nepal and region

SO2: Assist in Institutionalization and Integration of validated understanding, approaches and technologies related to Disaster and Climate Risk Management into the laws, regulations, policies, initiatives and mechanisms in order to strengthen Disaster Risk Governance in Nepal.

SO3: Devise and integrate innovative, cost- effective and appropriate methods and measures in order to increase involvement and investment of public and private sector in Disaster and Climate Risk Management

SO4: Develop and promote effective and inclusive collaboration in order to enhance and scale-up innovation and R&D in the area of Disaster Risk Management.

SO5: Be a dynamic, sustainable and learning organization through enhancement of capabilities, networks and collaborations.

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