CHAPTER I

INTRODUCTION

1.1 Background of the Study

Nepal experienced a catastrophic earthquake of magnitude 7.6 on 25 April 2015, followed by more than 300 aftershocks. This was one of the worst earthquakes in recent history. It led to wide spread devastation in Nepal, affecting 31 of the country's 75 districts (NPC, 2015) and more than 8 million people. Close to 9,000 people died, 22,220 were injured, and over 100,000 people were completely or partially displaced. The earthquake caused extensive damage to physical and economic infrastructure, including many thousands of houses, schools, hospitals, government office, roads, irrigation canals, and markets. An estimated 2.2% of forest cover in the affected areas was lost, mainly pine forest and sub-temperate forest (MoSTE, 2015). More than 500,000 private houses were completely destroyed. The earthquake induced at least 2,780 landslides and many ground cracks in 31 districts, significantly damaging settlements, infrastructure, agricultural land, forests and water resources; the frequency of landslides was three times greater than that before the earthquake. A large avalanche in Langtang valley destroyed Langtang village and flattened nearby forest. The moraine dams of three glacial lakes were further destabilized and are now reported to be dangerous (Byers, 2015). Water sources changed in some areas, with reduced or no flows in some, and new sources starting to flow in others. Freshwater ecosystems in the Koshi and Gandaki basins were affected by increased amounts of sediment, and a few rivers were temporarily blocked by landslides. Risk of downstream flooding is increased due to deposition of large amounts of sediment. The total value of the damage and loss caused by the earthquake in estimated to be USD 7 billion, which is equivalent to about a third of Nepal's gross domestic product. The total loss in the agricultural sector, which is the main source of livelihood in most of the earthquake-affected areas, is estimated at around NPR 28.4 billion (MoSTE, 2015). Tourism has also been negatively affected, with much tourism infrastructure damaged or destroyed and tourism numbers dropping drastically. The earthquake has affected the overall economic situation in the production and service sectors, such as agriculture, livestock, tourism, trade, industry and environment.

The earthquake has devastated the lives and livelihoods of mountain people. The lives and livelihoods of 5.4 million people in the 14 most severely affected districts, representing over two-thirds of the 8 million people residing in the 31 affected districts, were the hardest hit, with the exception of the Kathmandu valley, these severely affected districts are essentially rural mountains and hills where subsistence agricultural is the main livelihood activity. The disaster impact on agriculture-based livelihood and food security is particularly worrying as it has damaged people's houses, as well as their productive resources, employment sources, and means of living. Mountain communities living in poorly accessible areas with difficult and fragile terrain and limited livelihood options are among the most poor and vulnerable. The earthquake has exacerbated the livelihood conditions of these rural households, which were already poor and vulnerable prior to the earthquake.

The divested earthquake of Nepal in 25 April 2015 made Nuwakot district as one of the seven and severely and 14 most affected districts. Out of the total 61 previous Village Development Committees (Rural Municipalities), 47 were seriously and 14 were moderately affected. The earthquake destroyed 93% houses, killed over 900 and injured 1300 people. By the time earthquake happened, RSDC had already started ‘livelihood related project’ for the poorest of the poor 1750 HHs at Chaughada, Suryamati, Thanapati and Sunkhani previous VDCs. Hence, RSDC, in collaboration with MI, provided winter relief support to those all HHs. MI also did multi-sectoral assessment in RSDC working areas and did pre-consensus with previous District Development Committee (DDC) of Nuwakot with the aim to contribute to the earthquake rehabilitation purpose, reduce vulnerabilities and strengthen resilience of earthquake affected and prone population in Nuwakot. The Pre-Consensus included four components; i) Shelter re-construction, ii) WASH, iii) DRR, and iv) Health.

The research work has been mainly focused on analyzing the mitigation practice of the earthquake in resilience community and the challenges in the government. Such problems are the obstacle going forward with the development of the society and country as a whole. The listed are the problems caused by the devastating earthquake.

This study has measured disaster preparedness using some indicators like food reserve, housing, livelihood diversification, and knowledge of safety measures during earthquake. Similarly, for measuring post disaster response, the indicators like health, food, water accessibility and speed of constructing temporary shelters have been used.

1.2 Statement of the Problem

The rapid environmental assessment (REA) conducted by GoV after MoSTE (2015) identifies the major environmental issues associated with the earthquake and recommends appropriate actions to be undertaken by the GON, civil society, private sector, and people recovering from the disaster. This study identified that forest, water resources, sanitation, landscape etc. are highly affected. Among those area impacts on water resources are very severe and need immediate planning. PA cording to the Department of Water Supply and Sanitation and district level Water Supply and Sanitation offices' estimation, out of a total 11,288 water supply systems in the 14 most-affected districts, 1,570 sustained major damages, while in the 17 moderately affected districts, 747 sustained major damage, and 1,761 were partially damaged. Similarly, landslides destroyed water supply sources in all the affected districts. Freshwater sources for drinking water supply disappeared or were greatly reduced in parts of Dolkha, Gorkha, Nuwakot and Rasuwa districts. In some places the water level in tube wells was affected and the water changed color. In urban areas, damage to sewage systems and drinking water supply systems contaminated water in some places. Furthermore, in places where water sources dried up after the earthquake, women and girls had to walk longer distances to fetch water for household purposes especially in rural area. The REA team reported conflicts in use of water in the post-disaster setting arising out of caste discrimination, despite the existence of the strong Caste-Based Discrimination and Untouchability (Crime and Offences) Act, 2011 which prohibits such discriminatory practices against Dalits. In addition, ground and surface water is likely to have been polluted by hazardous chemicals in locations near or downstream from damaged laboratories, factories and cottage industries that released harmful substances into the environment. Changes in water sources were reported in several districts. Some springs dried up, or flow reduced or increased. In other places new springs appeared where there had been none before. Water level in wells changed in

some places, indicating changes in water table levels. Water quality was affected in some places. Changes in water sources have been significant impacts for local rural water supplies, and may result in conflicts between communities, or between communities and wildlife. Hundreds of thousands of people have been forced to look for alternative sources of drinking water, without knowing the quality of new sources. Although the rapid environmental assessment of MoSTE (2015) has tried to collect the information on loss and damages from earthquake on water resources on broad, but detail local level impacts on water resources are still lacking. There are very few to non-visible study on copping measures on such situation in this context. In this regard the qualitative and quantitative information with respect to extent of impacts on water resources due to overwhelming earthquakes has been missing. In addition, this study aims to learn the impacts of earthquakes in the water resources and identify the local copping strategies to develop further adaptation approaches and planning. After completion of this study following question is answered and analyzed in order to draw relevant conclusion.

1.3 Research Questions

The research questions are:

1) What is economic activity adopted by households after earthquake with before earthquake status in study area?
2) What is the economic impact of earthquake on the household level in study area?
3) What is the role and presence of government to minimize the effect of earthquake?

1.4 Objectives of the Study

The study is expected to find out the process to mitigate the effects of devastating Earthquake on resilient community i.e. their living standards, loss of their property, human destruction, livestock and their psychologically preparedness if any situation arises of minimum destruction or loss. The general objective of this study is to assess the impacts of earthquakes on water resources and local copping approaches used. The specific objectives are as follow:

- To compare economic activity adopted by households after earthquake with before earthquake status in study area.
- To access the economic impact of earthquake on the household level.
- To identify the role and presence of government to minimize the effect of earthquake.

1.5 Importance of the Study

Water is recognized as one of the most important basic needs of the people provision of safe drinking water in adequate quantities in the present requirements of the people. Public water supplies are in operation to meet the changing requirements of the consumers. Subsequently, the quality of drinking water has become a prominent issue in these days. The government policies are to ensure sustainability and ownership by the users groups, particularly in the rural areas. This study is importance to contribute to local annual planning for adopting and recovery from the effects of earthquakes. Potential for district level planning process and selecting must robust copping measures for this area. More over this study will also be a benchmark for reconstruction and rebuilding after earthquakes of Nuwakot district.

1.6 Limitation of the Study

This thesis has acknowledged the differential vulnerability of the people to natural hazards by gender, age, and disability, and correspondingly their different level of coping strategies. However, these issues are beyond the scope of this research keeping in consideration to the objective and the length of the thesis. The other pitfall may be that I could not get any secondary data about the remittance in the study area from the Central Bureau of Statistics, Government of Nepal. Otherwise, the comparison of secondary and primary data could be made to increase the validity of the research. The researcher lacks the in depth knowledge of Geological sciences and is focused upon the rescue and relief mission only regarding earthquake on water sources.

CHAPTER II

REVIEW OF LITERATURE

2.1 Disaster Introduction

Disaster is a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk (UNISDR, 2017). Disasters can be classified into two basic categories based on their cause. Natural disasters and manmade disasters are these two basic categories. Natural disasters are the disasters caused by natural forces whereas manmade disasters are caused by activities of human beings (Pediaa, 2017). Disasters in developing countries like Nepal frequently result in higher death rates and destruction than similar disasters in developed nations. Because developing countries often lack adequate resources for disaster preparedness and response, children in those countries are especially vulnerable (Naliaka, Moses & Muthwii, 2015).

When disaster occurs, it not only accounts loss of assets and life but also affects the livelihood options. Earthquakes happen suddenly and are immensely destructive. They not only destroy entire societal production and infrastructure systems but also seriously interfere with daily life and reduce opportunities to earn income in earthquake-affected areas (Wei, Su, Qi & Sun, 2016).

It is expected that improving the income allocation and transformation level and expanding livelihood methods is an effective way for rural households to decrease livelihood vulnerability in an area with frequent occurrences of strong earthquakes (Wei et al, 2016).

Natural disasters are increasing on recent years; Natural disasters are not rare events. In the last decade, there have been around 4,000 disasters causing considerable economic and human losses documented worldwide (Guha-Sapir, 2014). Especially in rural areas, the concept of household access to food is complicated by the fact that households often

produce both food and non-food items for their own use and also obtain food and non-food items by exchanging household production and labor. Households in different locations obtain their incomes in an infinite combination of ways. For example, “livestock production” may involve cattle, goats, sheep, camels, pigs, poultry, rabbits, guinea pigs, etc, or any combination of these. Similarly, paid employment may involve seasonal day labor, seasonal migrant work within the country or in another country, or some combination of these (Searman, Clarke, Boudreau & Holt, 2000).

2.1.1 Factors and Elements for Community Resilience

Resiliency, or resilience, is commonly explained and studied in context of a two dimensional construct concerning the exposure of adversity and the positive adjustment outcomes of that adversity. Researchers increasingly view resilience not as a fixed attribute but as an alterable set of processes that can be fostered and cultivated (Masten, 2001). The interactive processes between the individual and environment and between risk and protective factors are the crucial underpinnings of developing resilience. A protective factor generally describes the circumstances that moderate the effects of risks and enhance adaptation. Researchers explained that protective factors –both internal and external-may buffer, intercept, or even prevent risk (Werner, 1982).The more protective factors that are present in a community’s life, the more likely they are to display resilience.

Resilience is important because it is the human capacity to face, overcome and be strengthened by or even transformed by the adversities of life. Developing this capacity relies on protective factors within individuals as well as in the family and community. Positive relation-ships and environments that support healthy cognitive, social, emotional, and physical development provide the foundation for community to develop the resources and skills they need to cope and adapt to adversity throughout community cycle and the rest of their lives. Families and communities have a great influence on a person's ability to be resilient. Community who demonstrate resilience come from families and communities that provide caring and support, hold high expectations, and encourage community's participation. When adults provide responsive care to infants,

toddlers, and preschoolers, children learn to trust others. When children are held to high expectations by their parents or other caregivers, children begin to believe in themselves and realize that they are capable. When adults encourage children to participate in the family or classroom by giving them responsibilities and offering them choices about their environment, young children feel a sense of belonging and competence (Pizzolongo and Hunter, 2011).

Gilligan (2004) who writes in his manual for child and youth care workers: “While resilience may previously have been seen as residing in the person as a fixed trait, it is now more usefully considered as a variable quality that derives from a process of repeated interactions between a person and favorable features of the surrounding context in a person’s life. The degree of resilience displayed by a person in a certain context may be said to be related to the extent to which that context has elements that nurture this resilience.

Resilience (derived from the Latin resalire, to spring back) has become an important term in the language of many disciplines ranging from psychology to ecology. Unfortunately, there is no commonly accepted definition of resilience that is used across all disciplines. The purpose of this note is to analyze the more widely used definitions in terms of their core concepts. Resilience is the process of adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress. It means "bouncing back" from difficult experiences.

Mitigation is deciding on which actions to take before, during, and after the next disaster to reduce human and financial consequences later by analyzing, reducing, and insuring against risk.

Disaster management is a mammoth task, which not confined to any specific location; neither do they disappear as quickly as they appear. As such, proper management is important to optimize efficiency of planning and response. Collaborative efforts at the governmental, private and community levels are required, due to limited resources. This level of collaboration requires a coordinated and organized effort to be

mitigated against, prepared for, responded to, and recovered from emergencies and their effects in the shortest possible time. On the other hand, disaster mitigation is for reducing or minimizing an impact of a hazard or disaster. In essence, disaster management is a looping process. As shown in Figure 1, the end of one phase is usually representing the beginning of another, although one phase of the cycle does not compulsorily have to be completed in order for the next to take place. Most of the time, several phases take place simultaneously. In order to increase the community preparedness, create pattern warnings, reduce vulnerability and/or prevent future disasters, it is imperative to have timely decision making during each phase of the disaster management cycle. Comprehensive disaster management cycle consists of the shaping of public policies and plans that either addresses the causes of disasters or mitigates their effects on people, property, and infrastructure. The mitigation and preparedness phases occur as improvements are made in anticipation of an event. A community's ability to mitigate against and prepare for a disaster is tremendously improve by embracing development. As the event unfolds, disaster managers become involved in the immediate response and long-term recovery phases. The diagram below shows the Disaster Management Cycle.

2.1.2 Earthquake in the World

Earthquake is one of the most devastating natural disasters on earth. Earthquake effects can cover hundreds of thousands of square kilometers; cause damage to structures or infrastructures facilities, result in loss of life and injury to hundreds of thousands of people, and disrupt the social and economic functioning of the affected area. Usually the effects will rise significantly as results of increasing in population and structures or infrastructure facilities. Although it is impossible to prevent earthquake from occurring, it is possible to mitigate the effects and to reduce loss of life, injuries and damage. The worst earthquake disaster in the modern years occurred in North Sumatra at Banda Aceh. The great Sumatran earthquake occurred on the 26th December 2004, measuring at 9.3 on the Richter Scale, had created tsunami that killed 283,100 people from surrounding countries, including Malaysia with 68 people died. With this incidence, Malaysia need to be prepared to confront with such disasters, which not only originate from our country

but also from countries near by. Beside tsunami, earthquakes can create many more disasters such as liquefaction, landslides, earth ruptures and most prominently ground vibration. The ground vibration can cause structural collapse, loss of lives and property damages. Research in the field of earthquake engineering is still required even in the country with low to moderate seismic activity level such as Malaysia. Lessons learned from the 1985 Mexican earthquake and the 1957 San Francisco earthquake phenomena have shown that earthquake can have significant effects although at longer distance due to long period component of shear waves. Hence, the earthquake engineering research is needed in order to predict the possibility of earthquake in the future that can cause damages to the buildings and structures as well as to find the solution for mitigating the effects. The researches done by the author involve investigation and solution of the problems created by damaging earthquakes. The research work covers the seismic hazard assessment, vulnerability and risk studies of structures and infrastructures, practical application of new innovative products for earthquake disaster solutions, such as new types of base isolators, dampers, sensors and intelligent system in monitoring and managing earthquake-resistant structures and facilities (Wei et al, 2016).

The Great Gujarat Earthquake in India in January 2001 revealed the vulnerability of "non-earthquake-proof" cities and villages. In 1934, an earthquake of magnitude 8.4 caused serious damages to 60% of the buildings in the Kathmandu Valley. It is a cause for great concern that the next great earthquake may strike Nepal at any time, after almost 70 years of silence. The Kathmandu Valley is the exclusive centre of Nepal for politics, the economy, and society, with a large population of more or less 1.5 million. Once a great earthquake occurs, Kathmandu suffered immense losses of life and property and will be unlikely to be able to function as the capital of Nepal. Current natural disaster management and the present legal framework focus mainly on rural water-induced disasters and give inadequate attention to earthquake disasters in the highly urbanised Kathmandu Valley. A major earthquake in the Valley's urban areas will result in tragic disaster.

Disaster Risk Management in Nepal only in recent times that the people as well as the government have been aware of the potential risk and have been active in disaster

risk mitigation. The Udaypur earthquake of 1988 was a major awakening for the country as well as for the people.

In Nepal after the earthquake people were upset and found their lives uncertain. Organization runs different program more than relief work. Provide cash for work and other direct and indirect financial support to keep them active and return on their daily works. As the reconstruction works is going on, the labor need is most and it is challenging to the villages which is already in deficit of manpower due to out flow of human resources. But we can assume that new member entry on labor market for wages increases, the people may have chosen different or additional alternative income sources whatever be the pushing and pulling factor.

“The earthquake had a serious impact on the livelihoods of rural farmers as massive damage and losses occurred to crop lands, physical infrastructure, polyhouses, livestock shelters, agricultural tools, equipment, and machinery”(Chapagain & Raizada, 2017).
The term resilience was first used in the physical sciences to denote the behavior of a spring. In the 1970’s and 1980’s, resilience was adapted by the ecological and psychological communities to describe somewhat different phenomena.

- In psychology, the term was used to describe groups that did not change behavior in spite of adversity (e.g. Werner)
- In ecology, the term was used to describe ecosystems that continued a system's capacity to absorb and recover from the occurrence of a hazardous event; reflective of a society's ability to cope and to continue to cope in the future (Timmerman, 1981)
- Intentional action to enhance the personal and collective capacity of its citizens and institutions to respond to, and influence the course of social and economic change,(Center for Community Enterprise, 2000)
- The capability to bounce back and to use physical and economic resources effectively to aid recovery following exposure to hazards (Paton, 2001)
- The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure, (UN/ISDR, 2005)

A focus on resilience means putting greater emphasis on what communities can do for themselves and how to strengthen their capacities, rather than concentrating on their vulnerability to disaster or environmental shocks and stresses, or their needs in an emergency.

2.1.3 Mitigation Practice

According to initial estimates arrived at during the Post-Disaster Needs Assessment (PDNA), NPR 669 billion would be required to reconstruct damaged properties and infrastructure and to support recovery in affected sectors of the economy.

Launching a large-scale recovery programme following a major disaster takes a commitment of financial and human resources and a concerted multi-pronged effort to address short-term requirements, develop a policy and institutional framework, design a financing strategy, and put implementation arrangements in place.

In the past year, the Government of Nepal (GoN), local governments, and Nepali society have successfully launched such a recovery programme, by first, carrying out numerous activities aimed at re-establishing a sense of normalcy in earthquakeaffected areas. Many transportation routes and essential services have been restored, unsafe conditions created by the earthquake have been mitigated, and the basic needs of households have been supported. The financial resources for these urgent interventions have been mobilised by the public and private sectors, both domestically and with the generous support of Nepalese living abroad and key international development partners.

At the same time, a system to coordinate and finance medium- and long-term recovery has been put in place with the establishment of the National Reconstruction Authority (NRA) and National Reconstruction Fund in late 2015 and with the approval of its governance structure soon after.

The Post-Disaster Recovery Framework (PDRF) was prepared under the leadership of the NRA, in consultation with key stakeholders, to provide a systematic, structured and prioritized framework for implementing recovery and reconstruction.

It is a common framework meant to serve all of government, as well as national and international partners and other recovery stakeholders, including the affected population.

The PDRF lays out strategic recovery objectives and summarises in an integrated manner the policy decisions, institutional arrangements, financing and financial management strategies, as well as implementation and monitoring systems that are being put in place to plan and manage recovery and reconstruction. It also sets out sector priorities that will contribute to the achievement of the strategic recovery objectives.

The PDNA prepared in 2015, led by the National Planning Commission (NPC), forms the basis for the PDRF, with strategies, priorities and financial requirements updated as required.

Sector plans have been prepared by sector teams led by the respective line ministries and with the support of relevant development partners and coordination by the NRA. Sector plans will be used to guide, plan and estimate resource requirements for recovery and reconstruction activities at the sector level. Sector plans will also be developed into tools to monitor progress against targets on an ongoing basis.

Validation workshops for the PDRF were organised with government ministries and agencies, development partners, nongovernmental organizations (NGOs) and civil society organizations (CSOs). District level PDRF consultations were undertaken in the most affected districts to clarify district level recovery and reconstruction priorities, and to identify implementation challenges and ongoing local recovery and reconstruction efforts.

In addition, a separate set of Sector Plans outlines recovery and reconstruction priorities, together with estimated financial requirements per sector.

These plans are living documents, to be updated periodically. Monitoring frameworks and indicators will be incorporated into them, against which results can be measured in an ongoing basis.

The PDRF will help ensure that recovery is resilient and supports the development agenda of the country. The involvement of development partners and stakeholders has created opportunities to highlight key challenges and constraints and to emphasise the need to align the priorities and programmes of key stakeholders. The result of the PDRF process—carried out to date and continued over time—should be a more effective and efficient recovery effort.

Despite several challenges since its inception in December 2015, the NRA has made progress in several fronts, which are elaborated below.

Disaster Resilient Community Support Project (DRCSP) Nuwakot was designed to support the earthquake rehabilitation and reconstruction process and strengthen resilience of earthquake-affected and prone communities in 6 Rural Municipalities in Nuwakot District. Four components; shelter, water supply, sanitation and hygiene (WASH), disaster risk management (DRR) and Health were designed to meet the objective of the project. After the project agreement mid December of 2016. RSDC started staff recruitment, office establishment and staff orientation activities. In the same time, series of negotiations with shelter communities at Aapchaur and Phuyaldanda were taking place since they were not interested with the stone-mud-mortar designed house model which was proposed by the project based on the MI's agreement with National Reconstruction Authority (NRA) and Social Welfare Council (SWC), Nepal. Finally, local people's demands were respected with the terms and conditions that they required to follow the norms of government on shelter reconstruction.

As per detail implementation plan (DIP), field activities were started with shelter baseline survey, report sharing and preparing strategy for shelter construction and payments. Correspondingly, activities like; HP construction, 1st tranche of shelter refund, baseline for WASH, DRR were started side by side. Some activities were suggested to adjust with changed local structure, hence, halted for some months. 1st tranche refund process went well only after four months and immediately after tripartite agreement in district, 2nd tranche payment started. Till May last of 2018, 45 households (HHs) received 3rd tranche, 191HHs and 198HHs received 2nd and 1st tranche respectively. Around 193

houses were constructing in deferent levels. In the same way, both the HP buildings were completed and handover to respective HPs and Wards. Likewise, basic health equipment support was provided after need analysis and prioritization. Water sources and supply systems were finalized with the help of respective Ward Chairpersons. By 3rd week of last May, all 12 water supply system (WSS) rehabiition activities were completed and also handed over to respective water user group committees (WUG/Cs). Also project successfully completed hygiene promotion activities making more than 3400 people aware of the hygiene behavior. Similarly, project also supported to prepare local disaster and climate resilience plan (LDCRP) for three Rural Municipalities (RMs) in project working areas which were handed over along with basic DRR equipments. Except fulfilling shelter target and latrine support, all the planned activities were completed with coordinated effort from individual beneficiary to community, Ward, RM and district (DPAC) level stakeholders.

The two devastating earthquakes of 25 April and 12 May 2015 have been dreadful disaster. After the devastating earthquake on April 25, 2015, Aapchaur village of then previous Chaughada Rural Municipality. The village is inhabitant by marginalized ethnic or indigenous Rai 'Danuwar' communities. About 232 houses of the same community were totally collapsed. 12 persons were dead and several were injured. The destruction of livestock, food grain and other properties were not counted. People were shocked and despaired.

Currently Nepal lacks the necessary mechanisms for sustainable disaster management. It is clear that the following steps must be taken to improve the capacity for disaster management in Nepal:

- Establish a strong legal base for a comprehensive risk management system.
- Create sustainable mechanisms for inter-governmental and inter-institutional coordination.
- Ensure that the Tenth Five-Year Plan, currently in preparation, includes plans and funding for firm disaster mitigation measures.
- Promote and strengthen self-governance of local bodies for risk management.

- Promote public awareness on self-protection against earthquake disasters and outreach to targeted groups.

2.2 Policy Review

Development of policies and guidelines: The Reconstruction and Rehabilitation Policy 2072 (2016) provides the policy instrument for steering reconstruction and rehabilitation. The organizational structure of the National Reconstruction Authority (NRA) and the implementation modality and approaches has been finalized. These policies and guidelines clarify the roles and responsibilities of different institutions working on reconstruction and rehabilitation. The Advisory Council, Steering Committee and the Executive Committee of the NRA are now in place. The Council of Ministers has approved guidelines for the following interventions:

- Housing grant distribution
- Environmental impact assessment
- Land acquisition and land registration
- Public procurement
- Reconstruction regulation
- Land registration
- Working with non-governmental organizations

Reaching this point before the first anniversary of the earthquake is a significant accomplishment, particularly when measured against other large-scale recovery programmes around the world.

The Post-Disaster Recovery Framework (PDRF) was prepared under the leadership of the NRA, in consultation with key stakeholders, to provide a systematic, structured and prioritized framework for implementing recovery and reconstruction. It is a common framework meant to serve all of government, as well as national and international partners and other recovery stakeholders, including the affected population. The PDRF lays out strategic recovery objectives and summarises in an integrated manner the policy

decisions, institutional arrangements, financing and financial management strategies, as well as implementation and monitoring systems that are being put in place to plan and manage recovery and reconstruction. It also sets out sector priorities that will contribute to the achievement of the strategic recovery objectives.

2.3 Empirical Review

Based on Pre-Consensus, Nepal Government's mandatory limitation for I/NGO needed to go at least for 250 HHs, and finally based on demand list, RSDC and MI agreed on providing technical and financial support to 255 HHs for shelter re-construction at previous Chaughada VDC, Ward no. 4 (current Panchakanya RM, Ward no. 1), Aapchaur. About 120 houses of the project proposed area for shelter reconstruction was totally collapsed. 12 persons were dead and several were injured. The destruction of livestock, food grain and other properties were not counted. Even after more than one and half year, more than 95% people were living in the temporary shelter made up of teen-sheet in its roof and wall. The village was majorly inhabited by socially and economically marginalized ethnic 'Rai' community.

Based on multi-sectoral assessment (2015), Pre-Consensus (2016), RSDC existed all previous VDCs were finalized for WASH and DRR support. It was because many drinking water sources were damaged by the earthquake and local people were using water from temporary sources which generated during monsoon and dry during winter. During rainy season, they used water from small streams and creeks; however, most of the permanent water sources were either dried or changed its original place. In many places, pipelines were also damage. Similarly, there was no practice of purifying drinking water in most of the HHs. Only small numbers of HHs used to drink boiled water. More-over, though most of the people were found trained wth hand-washing for the activities like; after going to toilet, while preparing food etc., however, only one-third people were found practicing in day-to-day life. Likewise, half of the sanitation system was completely destroyed and many household used unimproved, temporary latrines (bore latrines) made with bamboo and covered with tarpaulins. In the case of latrine support,

RSDC proposed to provide it in shelter re-construction area considering the fact that at least, every HHs would have latrine constructed along with the their new houses.

Similar to the WASH condition, most of the HHs in project proposed area found not prepared with any disaster. Many people also didn't know how to protect their family and belongings. Hence, they did not seem prepared even for winter nor rainy or any other disaster or natural hazards such as; landslides, flooding, lightening and so on. DRR committees, though existed, were not functional. Hence, RSDC proposed to help for vulnerability mapping of previous VDC, capacitate DRR committees, make them functional, so that, the local people could make a detail plan of possible disaster and vulnerabilities before, during and after any disaster happens.

In regards to health, Bhalche HP was 50% damaged, but structure material was not re-usable. The damaged building was located in back side of previous VDC building in a very narrow space. HP was providing its service from previous VDC building. In the case of Okharpauwa HP, there is no previously built HP. HP activities were carried our through Lion's Club Health Service Centre for a half decade. HP and its management committee was not sure on the handover of Lion's Club building in the name of HP. Both Bhalche and Okharpauwa HPs and its respective management committees were found interested to build HPs, however, they were looking for land at least, to construct pre-fab model HPs so that, they could provide proper health service for 15 to 20 years to their respective Rural Municipalities. In addition, project also proposed to provide basic health equipment to health facilities (HFs) in all working areas with the expectation to facilitate health facilities for better services.

A study (UNDP /BCPR), (2004) ranked Nepal, in terms of relative vulnerability to earthquakes, as the eleventh most at risk country in the world, and thirtieth with respect to floods. Another report (World Bank, 2005) classifies Nepal as one of the global 'hot-spots' for natural disasters. The Des Inventor database in Nepal prepared for 1971-2003, shows the trend of one disaster event with two resultant deaths occurring every day over this period.

Among the major hazards, floods and landslides are the most recurrent in Nepal, claiming on an average of about 211 lives annually in the past ten years. A devastating earthquake does not occur frequently, and hence its impact is not reflected in any statistics. However, should it occur, the damage could be of very large extent amounting to a significant proportion of the national GDP. The life loss from a strong earthquake in Kathmandu valley is estimated to be about 40,000 along with injury cases to the tune of 90,000 and almost all of the lifelines and critical facilities such as hospitals damaged at 50%. Among all the natural hazards, epidemics usually take the largest human toll in the country every year.

Wang et al. (2004) studied groundwater changes after the 1999 Chi-Chi earthquake of 7.5 magnitude in central Taiwan and characterized the responses into four different types: rise then a consistent decline of groundwater level, a fall then a continuous groundwater level rise, a drop then slow decline, a rise then stay the same for a time before slowly declining. These different types of responses varied based on what material they occurred on.

Binashkari Bhukampa ma Nepali Sena, (Nepalese Army in Destructive Earthquake), Bhadrakali, Army Headquarters 2015 is officially published by Nepalese Army. The book encompasses the overall operational planning and conduction of operations. The book has provided various data. The book had mentioned the prevailing difficulties. Here it had focused upon the necessity of implementation of “National Strategy for Disaster Risk-2066”. It is well known fact foreign forces had helped a lot to subside the situation emerged after the earthquake. The book had provided data on Logistic plan and operations from pg no 18-25. Finally the book had provided relevant recommendations. It had shown the necessity of coordination between planners and forces. It had drawn attention of the government on air capability of Nepalese Army. Similarly necessity of capability enhancement of prevailing Airport , the presumption of damages and resources allotment, threshold for relief materials, necessity for coordination between military and non-military rescue teams, Centre for Coordination and Control of Relief Materials, pro-coordination, reception Centre and Code of Conduct for foreign rescue and relief materials also have been suggested.

Jagadal Booklet, Chhauni, Jagadal Battalion, 2015 (Unpublished document) is a booklet with compilation of prepared data. The report was submitted to Army Headquarters on 14 June 2015. The booklet was prepared on the basis of situation reports and data collected by the commanders and soldiers actually working on field. The coordination was also done with various other organizations for data collection. The book provides detailed data on the temporary settlement camp, rescue and relief operations, and joint operations launched along with NDRF forces, capabilities and work of IDF Camp, list of temporary houses made, data on casualties, data of work done by FOB's and data on distribution of relief materials. Since the data prepared were from the field itself the data can be trusted.

Nepal National Weekly of Kantipur Publications at Subidhanagar and HIMAL Weekly Magazine of Himal Media, Lalitpur are two most popular weekly magazines in Nepal. The updates, reports and analysis provided by these magazines help in understanding the various aspects of society during the earthquake. Various articles by expertise will help to know the phenomenon. For e.g. in an article "Kamjor Bhugarva ma Raajdhani" (Capital in weak Geology) by Rawal R, 14-19, the writer had given pictorial representation and comparison of various formations inside Kathmandu valley and compared the risky places with the view of earthquake damages.

In an article "Yeshari bane Jyanmara Ghar" (This way life taking houses were made), published in HIMAL by Bohara, 20-29, the writer had mentioned how the rules and regulations have been discarded and the standards have been compromised.

The places of mass destruction, monsoon and problem faced by people, economic aid, the competitive policy of India and the USA and various other aspects of earthquakes have been mentioned in various articles. The articles were necessary to know the people's psychology after the earthquake.

Regarding the phenomenon of seismicity and earthquake in Himalayan belts an article "Active faulting across the Himalaya and its significance in the collision tectonics", by Nakata T and Kumaharo Y web, had explained the general phenomenon on how earthquake occurs in the Himalayan belt. This had also explained the active faults in this

region and Nepal. The pressure building in the fault and chances of earthquake is explained in scientific manner.

Bilham (2004) in his research work “Earthquakes in India and the Himalaya: Tectonics Geodesy and History”, 2004, web, had explained the vulnerability of Himalayan belt in terms of earthquake hazards. The article had explained how big scale earthquakes had occurred in the past. The pattern it had shown is very important to study the basics of earthquake phenomenon in Nepal. The known history of earthquake in Nepal is also given thus this will form the base for study of further studies in history of the earthquake in Nepal.

An internet article “A Quick Report on the Gorkha (Nepal) Earthquake and its Geo-Engineering Aspects”, by Aydan O and Ulusay R, (2015), web had given the reason for occurrence of 25 Apr 2015 earthquake. The explanation on the phenomenon of how earthquake occurs in this belt is also given. The article has given general characteristics of the earthquake. It has shown the formations inside Kathmandu Valley and also has tried to explain the vulnerability in Kalimati (Lacustrine facies) formations. The Geo-Engineering aspects and hazards triggered by the earthquake also have been explained. The Liquefactions, mass movements like Slope failures, flood and damages also have been given.

Nepalko Mahabhukampa1990 Saal by Ja. Ba. Ra. Brahma S was written after the Great Bihar Earthquake of 1934. The book explains the damages, rescues, the general situation after the earthquake and lessons learnt. At pg no 108 it’s been mentioned that less the storey safer will be the house from earthquake hazard.

Same has been propagated in various media after the earthquake of 25 Apr 2015. Although the construction materials and environmental situation is different then and now still the focus of the book upon strong foundations are still relevant. For e.g. the book had suggested not to make houses by the bank of river since the soil is weak and thus houses constructed would be vulnerable. This is the only detailed representation of the earthquake history in Nepal. Thus this book is important historically in Nepal.

Jensen (2014) mentioned that in California, a 6.0 earthquake occurred in Napa County August 24, 2014 at 3:20 am. For at least two weeks after the quake, the Napa River and many of its tributaries showed an increased flow. Some areas experienced rapid change in the amount of water in the river, while others noticed changes that took up to three days to appear after the earthquake. Some wells were not able to get any water, while some others saw an increase in the water they could pump.

Above reviews of studies focused on impact by maximum consumption of water and climate change to water resources. Changes in water quantity and quality due to earthquake are expected to affect agriculture system, stability, access, ecosystem and utilization which are also expected to lead to decrease sustainability and increase vulnerability of poor rural farmers.

CHAPTER III

RESEARCH METHODOLOGY

Research in sociology is where the real action takes place. The research need to be equipped as a set of methods that has to be followed as a guiding principal in scientific study. It gives guidance to researches. Exploratory as well as descriptive research design has been adopted in this study. In this study all the information has been gathered from quantitative and qualitative field study technique.

3.1 Selection of Study Area

As per Government of Nepal statistics, fourteen districts were completely damaged by the earthquake out of 39 earthquake affected districts. For the study of comparison of economic activities, Nuwakot district, one of the most effected district is taken as study sites This study was conducted during November 2018 in the community of Nuwakot district. Participatory approach has been adopted during the process which demands the research team to live in the village and in the people's home to understand the core of the problems. The daily life of the villagers was closely observed to see how people were conducting their affairs after the earthquake.

Mixed method of data collection has been adopted, where both the qualitative and quantitative research are integrated within a single project (Bryman, 2008). The qualitative methods like face to face interview and focus group interview, and quantitative methods like surveys were employed for the data collection. This method was followed as the research questions demand both in-depth analysis and testing the hypothesis, which would not be possible by choosing only one of them. Further, mixed method triangulates and gives more validity, credibility, and comprehensiveness, by offsetting the weakness and drawing on the strength of both.

3.2 Research Design

This study is descriptive research design. It has used both qualitative as well as quantities techniques depending on the nature and source of data and information available. The

research ethics is seriously considered during the data collection process. It is difficult because the interviews has been conducted during those tragedy hours, when many people are living in temporary residence due to damage to their houses, and in deep shock due to the loss of their dear and near ones in the earthquake. The respondents were told in the beginning that those interview is solely for academic purposes, rather than the relief distribution. Whenever any outsiders came to the village, the villagers were expect some relief items including food and clothes which is quite understandable due to the intensity of the disaster.

3.3 Nature and Sources of Data

Both primary and secondary data were collected. Primary data has been taken through observation, interviews, household surveys, case study, and focus group discussion techniques. Secondary sources of data has been collected from journals, articles, rural municipality record, website, etc. This research is primarily depend on primary information but the secondary data is equally valuable to this study.

3.4 Universe and Sample Size

The entire Chaughada village has been selected for the field study. With limited resources such as budget, time, manpower, etc. systematic random sampling method has been used for the selection of the household. There are 232 households in ward no.1 of study area. These all household are considered as the universe for the study. Twenty five (10.77%) household from ward no. 1 were selected as a sample through simple random sampling method.

3.5 Data Collection Tools and Techniques

For this study, both primary and secondary data has been collected as per requirement. Primary data has been mainly based on local community recall basis and few direct field observation has been made to explore the copping measures and their effectiveness. Secondary data has been mainly exploring literature related to post earthquake study.

3.5.1 Interview Schedule

The questionnaire has been deployed among the selected households, who are chosen through randomly. Household has been represented every ethnic group, old age women, men, children and youth. Major objective of this household is to find out the major impacts on economic activities, their means and how severe is the damage. Similarly, how people adopted to such difficult time to cope with drinking water scarcity. Twenty five (10.77%) out of 232 households were taken interview through interview schedule.

3.5.2 Key Informant Interview (KII)

Key Informant Interview includes people who are involved in construction of those short term measures, people responsible for managing in that time etc. Similarly, those who are leading social activities are met to gather as much information as possible. Main objective of the KII has been validating the information collected through households. Ten key informants were included as KII including secretary of rural municipality, teacher, social worker and people involve in adaptation after earthquakes.

3.5.3 Case Study

Another technique that is used in the study is to obtain the required information regarding the perception and practice of the respondent in qualitative research is case study. Two families representative cases encountered during fieldwork is presented in different boxes in this study.

3.5.4 Community Consultation and Meeting

Series of meeting and consultations has been held with the three persons including officials of Village, local political leader etc. In the consultation, the study team tried to collect information on impacts on water sources, mainly drinking water and irrigation water sources. At the same time, local copping strategies and their effectiveness has been discussed.

3.6 Analysis of Data

Data is analyzed with the help of Microsoft Excel, and statistical software . Questionnaire responses and qualitative information are coded, and transferred to Excel from where they are imported to for the further analysis. Qualitative data is first transcribed in the note copy. After that, different themes are introduced on the basis of repeated quotes of the respondents and then the color coding was applied to figure out the possible trend.

CHAPTER IV

ECONOMIC ACTIVITY ADOPTED BY HOUSEHOLDS AFTER EARTHQUAKE WITH BEFORE EARTHQUAKE

Like the other rural communities the majority of people on Chaughada village also depends on agriculture. Migration of adults towards capital city and abroad, increment on women workload are also some common points of rural communities. After the earthquake, people are forced to loss property and lived on temporary shelter with fear. They depend on relief material from supportive organizations. To engage them on economic activity many organization run several programs like cash for work, meal for work, skill trainings, distribution of different seasoned seeds and techniques for farming, fund support to business. These all activity broaden the scope of work and economic activities. Formally or informally people are capacitated through these intervention. When cash is seen the traditional farming, work and attitude are somehow changes from learnings. Especially after the disaster due to several reasons people may choose different options then before the disaster. But as our rural community itself have got less opportunities and scope of diverse economic field they may not change a lot. But on long run these changes may substantiate and guide the future economic activities.

The Chaughada village itself can be considering as representative to other earthquake affected villages. The analysis of data collected from the field through pre structured questionnaire is presented on this chapter. This chapter mainly deals with the income sources before and after disaster (Earthquake). And try to make insight on which group are mostly affected. The statistical analysis was performed to determine whether the changes observed are statistically significant or not.

4.1. Economic Status of the Chaughada village

This section explain the present economic status of the Chaughada village after the massive earthquake hit. Mainly the analysis from the primary sources through random survey are presented over here.

4.1.1 Demographic Characteristics of Surveyed Households

Altogether 25 respondents were interviewed of which 13 are male and 12 are female. In total 138 populations size is obtained from the sample which gives sex ratio of 0.961 which is near about National figure. Average family size of the study area is obtained as 5.16 ± 1.971 (Mean ± SD) members. Respondents from 30-45 age groups hold majority 40% of the total respondent. Of the total respondent 60% were from BCTN group where Janajati and Dalit were respectively 32 and 8 percent. Almost all belong to Hindu religion (96%).

Table 4.1: Demographic Characteristics of Surveyed HH

Number of Studied Household/Respondent	25
Male	13 (52.0%)
Female	12 (48.0%)
Total Household member	138
Male Population	68 (49%)
Female Population	70 (51%)
Sex ratio (M:F)	0.971
Average HH member (Mean ± SD)	5.16 ± 1.97
Age Group	
15-30	8 (32%)
31-45	10 (40%)
46-60	5 (20%)
61+	2 (8%)
Ethnicity	25
Janajati	15 (60%)
BCTN	8 (32%)
Dalit	2 (8%)
Religion	25
Christianity	1 (4%)
Hindu	24 (96%)
HH having member on abroad	5 (20%)

Source: Field Survey 2018

4.1.2. Sources of Income Adopted by Household Member

The respondents were asked to notify the major sources of income adopted by each household member as primary sources and secondary sources. From the information in 25 HH 59 members are currently involved in at least one income generation activity. Out of which 31(52%) only take the agriculture as main income sources with average earning of Rs 23131. Wage is the second most income generation category for the member, 11 earn through wage as primary sources whereas 6 adopted service, 4 adopted business and 3 are in foreign employees for primary income sources. In secondary sources, additional 22% of are in agriculture as secondary income sources and 7% in house construction skill worker. Highest average yearly earning is received from remittance (i.e Rs 191,615) followed by the service and business.

Table 4.2: Sources of Income Adopted by Household

Sector	Primary Income Sources		Secondary Income Sources	
	No of Individuals	Average Income (NPR) (Mean ± S.D)	No of Individuals	Average Income (NPR) (Mean ± S.D)
Agriculture	31 (52%)	23131 ± 32317	13 (22%)	11775 ± 25036
Business	4 (7%)	92529 ± 96150	1 (0.4%)	60000
Foreign Remittance	3 (6%)	191615 ± 136635		.
Service	6 (10%)	118167 ± 125253	2 (0.8%)	4200 ± 2546.
Sikarmi/Jyami/ Dakarmi	2 (3%)	35500 ± 36953	2 (7%)	51000 ± 17288
Skill work	2 (3%)	38125 ± 59946		
Wage	11 (18%)	49814 ± 67536	2 (3%)	15143 ± 19684

Total	59 (100%)	53142 ± 82364	20 (33%)	21050 ± 28012

Source: Field Survey 2018

4.1.3 Gender Involvement of Income Generation

Out of 25 household members engaged on any income generation activity 39% were female and 61% were the male. Figure 4.1 depicts the gender involvement on the income generation activities of the Chaughada village.

Table 4.3 shows the gender wise involvement in difference income category. From the table it can be seen that 41.67% of female member are in agriculture whereas only 30.76% of male involved on agriculture. This shows the more women in agriculture workforce. In service involvement male and female both are not so different. We can see 15.38% male on remittance whereas only 8.33% female on the category but equal female (16.67%) are in business in comparison to male (7.69%). Wage, Skill work are led by male members.

Table 4.3: Source Wise Gender Involvement on Income Generating Activities.

Source	**After EQ**					
	F	**%**	**M**	**%**	**T**	**%**
Agriculture	5	41.67	4	30.76	9	36
Business	2	16.67	1	7.69	3	12
Foreign	1	8.33	2	15.38	3	12
Service	2	16.67	1	7.70	3	12
Sikarmi/ Jyami/ Dakarmi		0	1	7.70	1	4
Skill work	1	8.33	1	7.70	2	8
Wage	1	8.33	3	23.07	4	16
Total	12	100	13	100	25	100

Source: Field Survey 2018

4.1.4. Sources of Income of Household

Major sources of income in the household is agriculture as 36% of household responded that their household income depended on it where as 12% of the household earns through the wage. 8% household comprises of income from services. The household with

business and remittance are in same number (16%). Table 4.4 shows the information as stated above.

Table 4.4: Sources of Income Adopted by Household

Sources	No. of household	%
Agriculture	9	36
Business	4	16
Remittance	4	16
Service	2	8
Sikarmi/Jyami/Dakarmi	1	4
Skill work	2	8
Wage	3	12
Total	25	100

Source: Field Survey 2018

4.1.5 Number of Income Generating Sources of Family

From the survey we get that 1 household adopted at most 4 income sources. Table 4.5 shows number of income generating sources of family. From the table, we can see only 28% household have only one income generation sources where as 52% household involved on two income generation activity and 16% adopted three sources for family income.

Table 4.5: Number of Income Generating Sources of Family

Number of Income generating sources of family	Number of households	%
One	7	28
Two	13	52

Three	4	16
Four	1	4
Total	25	100

Source: Field Survey 2018

4.1.6. Land Use by the Family

It is expected that the more land are left fallowed on hill areas due to low output of the agricultural land. From the study we can see that 6 and 19 household have left their khet and bari land fallowed. The average (Mean± SD), ownership of the khet and bari land by the household are 3.21 ± 4.56 and 4.37 ± 4.82 Ropani respectively. Table 4.6 provides addition information on land use.

Table 4.6: Land Use on Chaughada village by Household.

Land Type	Owned (Ropani)		Cultivated (Ropani)		Fallowed (Ropani)	
	N	Area (Mean± SD)	N	Area (Mean± SD)	N	Area (Mean± SD)
Khet	18	3.21 ± 4.56	16	3.15 ± 3.27	6	6.06 ± 7.34
Bari	25	4.37 ± 4.82	25	3.59 ± 3.24	19	3.71 ± 3.81
Home Garden	23	1.0 ± 1.02	23	1.0 ± 1.02		

Source: Field Survey 2018

4.1.7 Annual Expanse of the Family

It has been observed that in an average household expenditure in a year is Rs 202913. 86 ± 100167.48. Expenditure in Food occupied the maximum share in HH with Rs 90327.27 ± 58324.46. Secondly expanse on education, health and Festival are similar in amount. These expenditure are the annual expenditure of whole family. Table 4.7 shows the heading wise expanse of the year 2073, after the earthquake.

Table 4.7: Expenditure on Year 2073 BS, After Earthquake.

Expenditure on	N	Expanse in Rs(Mean± SD)
Fooding	25	90327.27 ± 58324.46
Clothes	25	24905.94 ± 23200.08
Education	20	30475.00 ± 31086.44
Health	21	34769.41 ± 31276.86
Festival	25	36430.00 ± 1186.64
Total	25	202913. 86 ± 100167.48

Source: Field Survey 2018

4.1.8 Household Saving and Credit Behavior

The village is just 3 hour from the rural urban area Bidur. And there are number of Bank available but the data shows that only 2 HH reported to save on bank and 1 HH is taking loan from Bank. Only 21 HH out of 25 surveyed HH responded for saving and 4 HH responded for taking loan. 32% HH responded that they save at cooperative where as 36% HH are saving in group where the micro financing is running for saving and credit. After the earthquake almost half HH are in debt. But only 16% of the HH take loan from the registered institution where as most of them take loan from group and individuals. HH taking loan from groups must have taken loan at low amount whereas loan from individual may vary from high to low. Table 4.8 provide glimpse of the result.

Table 4.8: Household Saving and Credit Behavior

Sources	Saving		Credit	
	Responses	%	# HH	%
Bank	2	8	1	4
Cooperative	8	32	2	8
Group	9	36	1	4
Individuals	1	4		0
Others	1	4		0
Total	21	84	4	16

Responded HH	21	4

Source: Field Survey 2018

4.2 Economic Impact of Earthquake on the Household Level

On this section, comparison of economic status of household of Chaughada village on two period, before and after the earthquake is analyzed. Objective of this analysis is to observe whether there was a change on economic status or behavior due the earthquake disaster.

4.2.1. Comparison of Income Sources Depended by the Family Members

Basically agriculture is the main income sources on rural village. All incomes activity of economically active family members is reported. At most two income activity are taken in consideration as primary sources and secondary sources on basis of perception of respondent if an individual's involves on more than one occupation. The table below provides the insight on how many individuals involve on which sector of income before and after the earthquake.

Table 4.9: Income Sources Before and After Earthquake of the Family Members

Sector	Before Earthquake		After Earthquake	
	Primary Income Source	**Secondary Income Source**	**Primary Income Source**	**Secondary Income Source**
Agriculture	13 (52%)	5 (20%)	14 (56%)	6 (24%)
Business	2 (7%)	1 (4%)	3 (12%)	1 (4%)
Foreign Remittance	1 (4%)		2 (8%)	
Service	3 (12%)	1 (4%)	4 (16%)	1 (4%)
Sikarmi/Jyami/Dakarmi	1 (4%)	2 (8%)	1 (4%)	2 (8%)
Skill work	1 (4%)		1 (4%)	

Wage	4 (16%)	1 (4%)	6 (24%)	1 (4%)

Source: Field Survey 2018

From the above table we get that after the earthquake involving member on income activity increases on both primary and secondary economic activities. In total 25 individuals enters to income generating activity after the earthquake from the studied HH. We can observe the increment on each sector, more on agriculture and wage. This must be the result of distribution of different seasoned vegetable and cereal seeds by the different organization and moreover may have lost their regular income sources due earthquake. As construction activity is going on more member enters on wage based income generation too. Also due to the drop down status of HH due to disaster caused more member of household to engage on economic earning activity.

We can see that agriculture dependent HH increases from 13 to 14. Similarly one more HH take business as their main occupation after earthquake. After earthquake 1 more people went abroad for earning. There is no sufficient evidence to take it as effect of earthquake. It seems 1 more people get service after earthquake. After earthquake 2 wage worker increased. We can assume that the earthquake compel more people on job market and also creating opportunities.

4.2.2. Impact of Earthquake on Gender Involvement on Income Generating Activity

Below table is to show the number of increment of individuals on income generating group on gender wise. From the table it can be observed that female number increases from 10 to 11 and Male from 15 to 14. But there is no significant different is observed between male and female number at 5% level of significance.

Table 4.10: Earthquake Impact on Gender Involvement on Income Generation

	Before	**After**	**CHI –TEST**
Female	11 (44%)	12 (48%)	0.0183 ($p>0.05$)
Male	12 (48%)	13 (52%)	
Total	23	25	

Source: Field Survey 2018

Further the involvement is tried to judge on source wise. The table below is prepared to insight how the male and female's income sources weight on each sector are diversifying before and after the massive earthquake.

Table 4.11: Sector Wise Involvement of Male and Female on Pre and Post-Earthquake

	After EQ						Before EQ					
	F	**%**	**M**	**%**	**T**	**%**	**F**	**%**	**M**	**%**	**T**	**%**
Agriculture	10	40	13	52	23	92	11	44	13	52	24	96
Business	2	8	1	4	3	12	1	4	2	8	3	12
Foreign	1	4	3	12	4	16	1	4	2	8	3	12
Service	3	12	3	12	6	24	2	8	4	16	6	24
Sikarmi/Jyami/Dakarmi			1	4	1	4			1	4	1	4
Skill work	1	4	1	4	2	8	1	4	1	4	2	8
Wage	1	4	7	28	8	32			6	24	6	24

Source: Field Survey 2018

From above table more percentage of female are entered on service sector after the earthquake as services sector percentage increases with decrement of agriculture. This might be the due priority given by NGO's on recruitment of female candidate at local level. It increases from 8% to 12% which is adverse to male as it decreases from 16% to 12%. Distinctly Female involvement on agriculture decreases from 44% to 40% but there is no change on overall performance.

4.2.3 Change on Household Income Sources Before and After Earthquake

The sector wise household earning was derived considering the involvement of at least one member on respective sector and observed as in table 4.12 below. After the earthquake overall involvement of HH on each sector increased slightly at household level. We can observe 4-8% increment on each sector with massive increment on wage sector and foreign employment. This may be due to NGOs and other organization and construction priority of an individual. From the table we can say that 24% household member involves on service sector, 16% are on abroad and 12% conduct business. After earthquake different improved seed are distributed by organization so the agriculture sector may have increased. Also flow of guest to Rural Municipalities also increases with number of staffs of GoN and NGO's on different program hence the vegetable and other agri-products are getting market these days.

Table 4.12: Household's Income Sources Before and After Earthquake

Sources	Before		After	
	Number	%	Number	%
Agriculture	24	96	23	92
Business	3	12	3	12
Foreign	3	12	4	16
Service	6	24	6	24
Sikarmi/Jyami/Dakarmi	1	4	1	4
Skill work	2	8	2	8
Wage	6	24	8	32

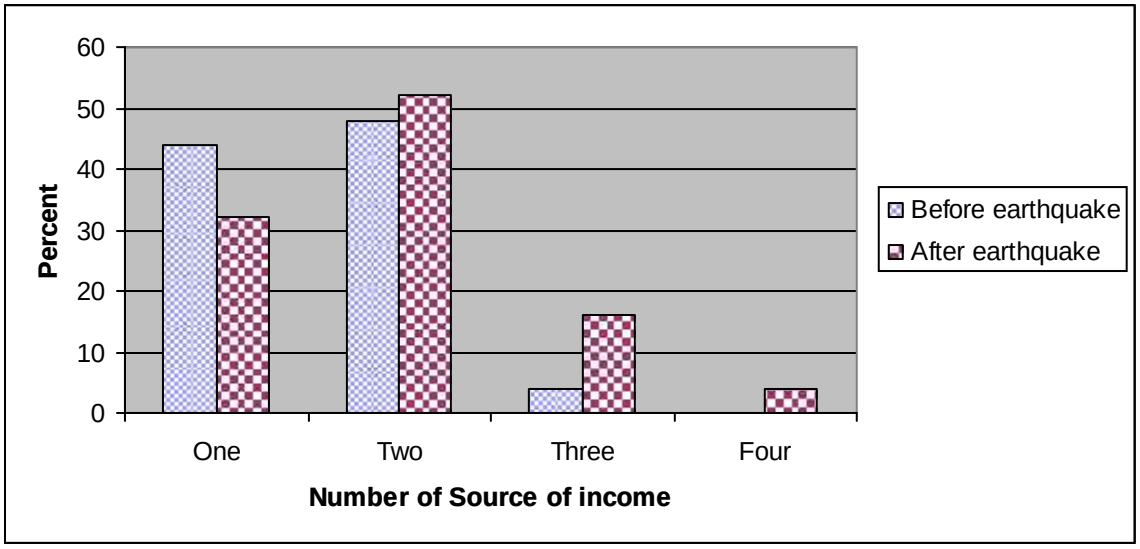
Source: Field Survey 2018

4.2.4. Number of Income Generating Sources Being Household Involved.

Similarly, an attempt is made to observe in how many sectors a household income based before and after the earthquake. From the observation it was clear that before earthquake

44% HH have dependent on single income source and 48% on two sources but after earthquake, 52% involve on 2 sources and 16% on three sources and also 4% on four sources where single source dependent HH reduced to 32%. Hence the disaster provides an opportunity to diversify the income sources. This is also helps to be more resilient towards disaster effects. Figure below shows the change after in the income sources number due earthquake.

Figure 4.1: Number of Income Sources Adopted by HH Before and After EQ



Source: Field Survey 2018

4.2.5. Impact on Income Before and After Earthquake.

The average annual income earning from agriculture by HH who take agriculture as primary source of their income increased from 14339 to 23131. It indicate the agriculture

supported most to recover from the earthquake. The income from the business on local market decline before and after earthquake from 118857 to 92529. There is no such seen changes on service holder average income. Whereas income of Construction worker increases by around 12,000 before and after earthquake. Similarly skill work and wage income also increases on these pre and post-earthquake scenario. And annual income in total also increases on this period. The overall change is significant at 5% level of significance. Thus we can conclude that the annual earnings increase after earthquake.

Table 4.13: Average Income Before and After Earthquake

Sector	After Earthquake		Before Earthquake	
	Primary Source	**Secondary Source**	**Primary Source**	**Secondary Source**
Agriculture	23131 ± 32317	11775 ± 25036	14339 ± 27030	8738 ± 18265
Business	92529 ± 96150	60000 ± 0	118857 ± 113183	23333 ± 27538
Foreign Remittance	191615 ± 136635	0	220182 ± 151213	0
Service	118167 ± 125253	4200 ± 2546	118071 ± 132544	2400 ± 0
Sikarmi/Jyami/Dakarmi	35500 ± 36953	51000 ± 17288	23714 ± 28465	55444 ± 15504
Skill work	38125 ± 59946		36167 ± 45828	

Wage	49814 ± 67536	15143 ± 19684	35672 ± 43841	18571 ± 21715
Total	53142 ± 82364	21050 ± 28012	47764 ± 87281	22313 ± 26697
	T- Value 2.568,p-Value 0.011			

Source: Field Survey 2018

4.2.6. Gender Wise Changes in Income Pre and Post-Earthquake

The table below shows the overall average earning by male and female before and after the earthquake. The male member average income increased from NPR 73254 to NPR 81153. Similarly female earns average NPR 29088 after earthquake which was 18453 before the earthquake. The Paired Sample t Test shows that both male and female average earning is significantly increased on pre and post-earthquake. On testing the significant we can see that Female income are increases significantly (p<.01) where as it is not significant for male and is significant on overall at 5% level of significance.

Table 4.14: Gender Wise Average Income Pre and Post-Earthquake

Gender	**Average income before earthquake (NPR) (Mean ± SD)**	**Average income after earthquake (NPR) (Mean ± SD)**	**Paired Sample t test**
Female	18453 ± 44955	29088 ± 48999	5.215 (p<.000)
Male	73254 ± 93094	81153 ± 96863	1.457 (P>.05)
Total	52093 ± 82419	61049 ± 85481	2.622 (p<.01)

Source: Field Survey 2018

4.2.7. Age Wise Average Income Pre and Post-Earthquake

From the table below we can observe that the average income of individuals above 25 years old to 65 years old increases after the earthquake. Interesting factor is that more

members in each age group enter on job market. Though the number is not seem high. On each age group 2 to 4 more individuals enters on earning group but on age group 16-25 yrs, 7 young adult started earning, as more new member enters the average earning is reduced which is obvious. Persons of age group 36-35 yrs are average earning heavily increases on the period.

Table 4.15: Age Wise Average Income Pre and Post-Earthquake

Age Group	Before earthquake			After Earthquake		
	Valid N	Mean	Std. Deviation	Valid N	Mean	Std. Deviation
Below 15	1	2000.00	.	1	4000.00	.
16-25	6	77931.03	113112.52	13	68702.13	98067.39
26-35	7	62203.39	101624.99	8	66737.70	92574.28
36-45	6	45596.15	81119.50	7	65294.64	91063.45
46-55	4	48028.57	59540.51	5	54716.22	63025.63
56-65	3	36454.17	41758.76	3	39430.43	35673.49
above 66	2	66500.00	116383.42	2	16500.00	18338.09

Source: Field Survey 2018

4.2.8. Land Use Before and After Earthquake

On analysis the table 4.16, there is no significant difference is observed on land use before and after the earthquake. It is a good symptom that almost all Households have been returned its normal pre earthquake situation in case of agriculture but on critically analysis we can observed that HH harvesting on land is less after earthquake. They might have left the area or started non agriculture activity. The average cultivable land also decreases with earthquake.

Table 4.16: Land Use Before and After Earthquake

Land type	Before Earthquake (Ropani)	After Earthquake (Ropani)

	N	Area (Mean± SD)	N	Area (Mean± SD)
Khet Owned	18	3.36 ± 4.60	17	3.21 ± 4.56
Bari Owned	25	4.78 ± 5.10	24	4.37 ± 4.82
HG Owned	24	0.99 ± 1.01	23	1.0 ± 1.02
Khet Cultivated	17	3.22 ± 3.39	16	3.15 ± 3.27
Bari Cultivated	25	4.14 ± 3.79	24	3.59 ± 3.24
Fallowed land khet	2	6.06 ± 7.34	1	6.06 ± 7.34
Fallowed land Bari	5	4.73 ± 4.74	4	3.71 ± 3.81

Source: Field Survey 2018

4.2.9. Income Source Priority Change after Earthquake

After the earthquake, the assumption of changes on income source priority change look incorrect. Only 3 member answered that priority of income source of their family changes after earthquake. Majority of respondent answered that there is no change on their current income source priority due earthquake.

Table 4.17: Income Source Priority Change after Earthquake

	Change	%
Yes	3	12
No	22	88
Total	25	100

Source: Field Survey 2018

4.2.10. Change on Expenditure of Household Before and After Earthquake.

As we observed the effect of earthquake on income activities, similarly expenditure also changes with earthquake. From observation all the expenditure heading along with

overall expenditure is observed to increase. But the reason cannot be said as direct effect of earthquake as recession and other market value may also lead to the increment. The table below shows the detail average expenditure of the household. The expenditure on food and health increases after the earthquake whereas expenditure on clothes decreases. Increment of expenditure on food around 25,000 is remarkable. After the earthquake there is problem on housing and have to stay on cold tin roofed house which have harmed normal health condition hence more expanses occurred.

Table 4.18: Average Expenditure of Household Before and After Earthquake.

Expenditure Heading	**Before**		**After**	
	N	**Expanse (Mean± SD)**	**N**	**Expanse (Mean± SD)**
Fooding	25	75249.06 ± 54616.31	25	90327.27 ± 58324.46
Clothes	25	39787.74 ±47201.14	25	24905.94 ± 23200.08
Education	21	31182.93 ± 32358.48	20	30475.00 ± 31086.44
Health	22	23365.17 ± 25549.84	21	34769.41 ± 31276.86
Festival	25	30485.71 ± 21524.19	25	36430.00 ± 1186.64

Source: Field Survey 2018

4.2.11. Saving and Credit Pattern of HH Before And After Earthquake

Table below concerns with the saving habit of the individuals HH before and after the earthquake. It has been observed that saving and credit pattern are decreased significantly on these years, by 24 to 23 HH and 21 to 20 HH respectively. The cooperative and group are major center for saving. The bank is at distance from the Rural Municipality hence cooperative and group saving have been used for saving. Similarly for loan group and individuals are major center. This shows the economic status of household decreases after earthquakes.

Table 4.19: Saving and Credit Pattern of HH Before and After Earthquake

Sources	Saving				Credit			
	Before		After		Before		After	
	Response	%	Response	%	Response	%	Response	%
Bank	1	4	1	4	1	4	2	8
Cooperative	10	40	7	28	3	12	3	12
Group	4	16	13	52	8	32	7	28
Individuals	5	20	1	4	8	32	6	24
Others	4	3	1	4	1	4	2	8
Total response	25	100	25	100	25	100	25	100
Responded HH	24		23		21		20	

Source: Field Survey 2018

4.3 Current Situation of Community (Situation after 2 years of disaster)

Roshan Danuwar Rai, a local people of Chaughada village said, people are not only normal and resilient now but they are more aware and prepared of earthquake. He also added school have a great role to make the children resilient and so do the culture, cultural festivals and rituals helps them to enjoy their day to day life and help them to build strong and resilient personality in long run. They enjoy their community cultural festivals and rituals which help them to overcome fear. He also added, "Danuwar Rai cultures in Chaughada village create a sense of oneness in all the community members. People are still living in a temporary shelter but no stress is seen in them due to their living condition because there is no drastic change in the housing as they used to live in old and fragile housing now in the temporary shelter, so the living condition is somehow similar. The reconstruction is still going on, due to the help of government.

Following indicator of sense of strong community is found in Chaughada village which are also the elements of resilience

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Table 4.20: Elements of Resilience

Indicator/ element of resilience	Strong Sense of Community/ resilient community
Sense of membership	The active participants proudly display symbols of membership in the community.
Mutual importance	The active participants recognize, cherish and support the contributions of each other
Shared world views	The active participants hold common beliefs and promote shared values important to them
Bonding/Networking	The active participants enjoy one another and look forward to time spent together
Mutual responsibility for the community	The survival and health of the community is a primary concern of all its active participants

Source: Field Survey 2018

4.4 Impacts and Hazards of Earthquake on Water Resources

Due to earthquake there is negative impact of water on water resource. Water resources became polluted due to land slide in some part of the study area. But water resources based on forest had not any damage from earthquake. A source of drinking water has been categorized in three types in research study. First type of sources are those which are in use at present but have no probability of their use for the construction of future plan of drinking water second sources are those which are not in use now but can be used for future plan. Finally, the third type of sources that have been used now and can also be used later for the above said plan.

4.4.1 Collection of Rain-Water

Rain-water is pure-water indeed. If rain-water is stored and circulated in proper manner. It can be of high quality. The following points are to be taken into consideration for the proper storage and circulation of rain-water.

- Water collection roof and gutter should be properly cleaned before the commencement of rainy season.
- Water should be flushed out before its collection for the first 15 minutes of rainfall.
- Water pot for collecting rain-water should be cleaned at least once a year.
- Water spout should be kept closed.
- Water from other sources should not be put in the rain-water pot.
- Water pot should always be kept closed with a lid or net.
- Water spout should only be used to let the water flow out.
- The area around the water pot should always be kept clean.

4.4.2 Water Sources Before and After Earthquake in Study Area

There are various water sources in this Village. They are well, river, tap and rain water harvesting system. The water sources like well, tap and rain water harvesting system has been damaged due earthquakes in 2072. The detail of water resources in study area are as follows:

Table 4.21: Water Sources Before and After Earthquake in Study Area

Type of water resources	Before earthquake		After earthquake	
	Number	Percent	Number	Percent
River	1	4	2	8
Well	6	24	8	32
Tap	15	60	10	40
Rain water harvesting system	3	12	1	4
Total	25	100	21	84

Source: Field Survey, 2018

The Table 4.21 shows the water resources available in study area before and after the earthquake 2072. The study shows that before earthquake there were 50 different sources of water. But after earthquake there are only 21 different sources of water in study area. Most of well, tap water and rain water harvesting system had been damaged due to earthquake. The ultimate effect is there is shortage of water resources in study area.

4.4.3 Impact of Earthquake

According to the data, the study shows that all the respondents are completely displaced by earthquake. Most of the people are 'A' category of earthquake victim. Most of the respondents have not own sources of water. They were depending on public water sources like well, tap and rivers. Due to earthquake these resources were damaged completely. These sources were enough for all family in the study area. Regarding the major impact of earthquake in the study area, their houses were completely damaged; there is lack of drinking water, damage of roads and shortage of foodstuffs.

According to the data (2072/073) of the health-post of this Village, people suffer from the disease such as look-worm, skin-disease, typhoid, respiratory, eye disease etc. At least 71% of the diseases are relation to drinking water and sanitation. Even if the state of sanitation is dissatisfactory, cholera and dysentery has not been seen in this Rural Municipality in the recent years due to involvement of NGOs and INGOs after earthquake.

4.4.4 Recovery of Damage Water Resource

The respondents told that Reconstruction Authority should provide fund for construction of water resources. Like wise local body and government, NGOs, INGOs all provide required fund and budget for construction of damage water resources and all people should work hard and help according to their capacity in study area in order to bring back to original condition.

4.4.5 Local Copping Strategies for the Improvement of Water Resources

All the respondents faced big problems in water scarcity during earthquake time. There was big problem of drinking water in study area. There was very severe of impact of earthquake on water resources in study area.

Table 4.22: Arrangement of Water for Drinking and other Purposes during Earthquake

Arrangement by	No. of household	Percent
Manage by local bodies	7	28
Manage by NGOs and INGOs	18	72
Total	25	100

Source: Field Survey, 2018

The main institution involved for the improvement of water resources after earthquake are local bodies and NGOs and INGOs in the study area.

Due to high investment on rural roads and schools, the Village has not been able to invest on water resource for its improvement. The Table 4.22 shows that 28 percent respondents told that water resources were managed by local bodies after earthquake and 72 percent told that water resources are managed by different NGOs and INGOs during and after earthquake 2072 in the study area.

4.4.6 Available Manpower and Identification of the State of Hazardous

State of sanitation can be improved only if local manpower are mobilized for the implementation if its programmes.

The nation has decided seven bases of the identification of the state of hazardous in sanitation four of them are in relation to the use of safe toilet.

- More than 50% of the children have been afflicted with look-worm.
- Dysentery, typhoid, jaundice and itch are also seen within the time span of a year.
- Excreting faces around the source of pure drinking water.
- Excreting faces within 100 meters distance from the village.

- Having bad state of the health condition of the people due to improper management of garbage.
- Children's Malnutrition has been above the level of the nation.
- Less than 80% of the people wash hands with soap before and after meal.
- Thus, the state of hazardous has been categorized as follows:

i. High hazardous area.

ii. Medium hazardous area.

iii. Low hazardous area.

4.4.7 Indicator of Sanitation

Use of toilet is the main indicator of sanitation, Forming habit for using ordinary toilet can be supposed to be positive in terms of environmental sanitation, but it can't be a full indicator for human health, this is only because, people should have total awareness in ordinary toilets for their daily use and maintenance which may not be possible in the weak rural circumstances after earthquake. Therefore, in order to reduce water-borne diseases, use of toilet (water sealed toilets) becomes necessary. Keeping the above face in view, sanitation facility has been improved after earthquake by involvement of the following agencies:

i) Launching of sanitation program by District Public Health Office so that diarrhea and water burned diseases can be controlled
ii) Local body can provide safe drinking water for short period of time through co-ordination of department of Health.
iii) Involvement of NGOs and INGOs for launching effective program for local people regarding safe drinking water project

4.4.8 Future Work Procedure

This research study is the base of the future planning for drinking water and sanitation. The study of present situation in the field of drinking water and sanitation will be the base and work as a tool to draft the planning for drinking water and sanitation; the following aspects are to be considered.

4.4.8.1 Use of the List of Difficulties

The research study suggests implementing the programmes on drinking water and sanitation on the basis of difficulties. It means, priority is to be given to such places where the people are deprived of the facility due impact of earthquake.

- **Use of rain-water**

Rain-water should be collected and supplied to such places where water from pipe-system is not possible and are deprived of other water sources as well.

- **Sanitation**

The sanitation-situation in this Village is also dissatisfactory. So, in order to enrich human awareness, the following programmes are to be implemented.

- Carrying out health and sanitation education in schools.
- Implementation of people awareness programmes on health and sanitation.
- Building toilets in each and every village or wards.
- Organization of yearly sanitation-week with rally and seminar and establish the provision to award the village for being best in sanitation.
- Carrying out radio programme on sanitation.

4.5 Role of Culture in Community Resilience

Families and communities and their culture have a great influence on a people's ability to be resilient. The impact of disaster varies across groups and societies, some groups and societies are impacted more while others suffer negligible loss. The impact of disaster on different groups and societies depend upon different intersecting factors: environment, social institutions and forces and the cultural value system.

4.5.1 Role of Settlement Pattern

Like any other ancient village in the Nuwakot district, Chaughada village is a compact settlement. Aside from the historic necessity for defense and the need for proximity to cultivated farmlands, the compact form of vertically oriented living in Chaughada village -or any Danuwar Rai village for that matter is strongly motivated by concerns to preserve rich farmlands and minimize their use for residential purposes. With the abundance of clay in those times, houses have been uniformly built of burnt and un-burnt clay bricks. Houses are closely spaced -built back to back with only a narrow lane between the village buildings. As the housing settlement is compact the interaction of the people with other people around is high which help them to overcome the trauma. Compact housing settlement increases the interaction amount community members and children which enhance resilient in community.

4.6 Case Studies

Case Study-1

Name: Shanti Danuwar Rai
Address: Chaughada village of Nuwakot district
Education: Lower Secondary Level
Age: 30 years

She is already married and had a son and a daughter. Her husband is the carpenter and he goes to central market i.e. Bidur near by his residence for work. Physically her husband is victim of earthquake 2072 and suffers from eye diseases so unable to do hard works. They did not possess any agriculture land except a small piece of household land including kitchen garden and hardly the volume of production meet the consumption for a month. They were loading a miserable life facing economical crisis after earthquake 2072.

About 5-6 months ago she thought of selling vegetables. Then she started selling vegetable, visiting each household. From selling, she can able to collect some money. She invested that money on Storage of vegetable. After few months, due to hard work and self-confidence she achieved her goal. Today she has one tea shop in local bazaar of Chaughada village-1. Now a day her husband does not work and looks after his

children and home. Women also work like man and can handle the house and children if they wish. It is recommended that government should provide soft loan through government owned bank to earthquake victim who have low economic status and willingness to do something in their life.

Case Study-2

Name: Yamuna Danuwar Rai

Address: Chaughada village, Nuwakot district

Education: Certificate Level

Age: 21 years

She got married two years ago. Now she has one son and staying in joint family with Father in law, Mother-in-law and Brother-in-law. She passed I. A. from Saraswoti Multiple Campus, Kathmandu. But after her marriage now she is only limited in household activity within four walls. Her house became damage by 2072 Baisakh-12 earthquake. Now she is living in temporary tent house provided by donor agencies. She has been constructing small house with help of 50,000 cash provided by Nepal government through Earthquake Victim Relief Fund. After earthquake she had to walk half an hour for brining drinking water up to three months until the construction of damage water resources. Recently local body with coordination of INGOs and NGOs made public tap. Now she has to walk just five minutes for brining drinking water.

When I was at her home to ask her personal information for the survey, her husband was making houses damaged by earthquake-2072. When her husband allowed giving information then she gave all information about her situation after earthquake-2072.

CHAPTER V

SUMMARY AND CONCLUSION

5.1. Summary

The findings obtained from the research are analyzed and tried to summarize the main findings. The summary from the findings are explained as per the objective of the research below.

Like other rural villages this Aapchaur village also has mainly agriculture based economic dependency. But only 52% of the entire economic dependency age group members are in agriculture as primary income sources which show the diversification of the economic activity is ongoing on this Rural Municipality. After the earthquake the working on wage for construction work is also another important income sources. At household level 92% of HH engage on any agriculture farming. Other main income sources are business, service, wage, and remittances. The 52% HH have at least 2 income sources. On talking to the land use, most of the Khet are utilized (still 6 HH had left some khet fallowed) where as in an average 3.71 Ropani land is left uncultivated by 19 HH on Bari land.

Annual expenditure is mainly occupied by food, festival, education and health. The surplus earning is saved on groups (36%) and cooperatives (32%) whereas for credit HH are dependent mainly on groups (4%) and cooperatives (8%).

On talking to Gender, Out of total work force (25), 11 (44%) are female and rest are male. There is significant difference between male and female on engagement on agricultural task. 48% of female engage on it whether only 52% of male engage on it. More male member are outside country for earning (12% male against 4% female).Female are involved on business and services besides agriculture whereas male are mainly engaged on wage, business, services and remittances.

In summary we can summarized that the economic activity of people of Aapchaur village is mainly dependent on agriculture. Wage work is also another important activity for earning. Only 16% HH have foreign employee. Female are mainly engaged on agriculture whereas male are engaged on both agriculture and non-agriculture work equally.

This Rural Municipality passes through the massive earthquake with 2 casualties, almost all houses destroyed. From the study we can observed that several changes have been taken place on economic activity/status of the HH. Near about 4% more member are entered on work force after earthquake in comparison to before earthquake. Whereas we couldn't find drastic change on involvement of individuals on different income sources. After the earthquake more dependency of HH increased on agriculture as it was only 96% before and 92% after the earthquake. Similar increment can be observed on wage (from 24% to 32%), services (from 24% to 24%). Foreign employee also increases from 12% to 16% HH after the earthquake.

Before the earthquake almost half HH dependent on one income sources with 92% having atmost 2 income sources but after the earthquake it changes significantly (chi-square statistic 6.9236, $p<0.05$) that near about 70% HH have engagement on at least two income sources. We can observe the significant changes on overall income of the HH on these two period (T- Value 2.568,$p < 0.05$). The average income on each sector increases except business and foreign employee. On talking to land use there is slight reduction in average land ownership and cultivation on khet and bari land but the average fallowed area of earthquake reduces with earthquake on bari from4.73 to 3.71ropani which is positive change.

There was an attempt to identify if there is any changes on income priority on household, where only 4% accepted that their family source changes but rest deny. On talking to the expenditure we can observe that the expanse on food and health increases after the earthquake where other expanse head remain somehow constant. The access of the bank seems low as only 8% save and credit on the bank. In an overall, the saving and credit on institutions reduces after the earthquake. The portion of sources for credit and saving is

not changed after the earthquake but the number of household seeking the services has been reduced. We can summarize that the economic activity has been reduced so that practice of saving and credit reduced.

On observing it from the gender perspective, average income of female increased significantly 5.215 ($p<0.000$), but the male's income has no such significant difference on pre and post-earthquake 1.457 ($P>0.05$). After the earthquake more females are involved on business and services in comparison to males. On talking to age group, people from age 26 to 65 increases slightly but the income of the age 16-25 decreases. On analyzing the number of worker on these group more worker entered on age group 16-25. It may be the average income decrement on this age group. Hence every group has increment on an average.

5.2. Conclusion

Like other Rural Municipalities economy of the Aapchaur village also depend on agriculture and remittances. The divesting earthquake caused several effect on economic behavior of the people. From the above discussion of the findings, we can conclude as follows.

The male and female both are entity of household being engaged on economic behavior. Though female are more engaged on agricultural activity, their involvement on service and business is increasing these days. Unlike many other rural communities household of this ward are not leaving the land fallow and also less household have its member on abroad. As construction of houses and other infrastructure is going on work on wage at village is also another important income sources. As more than 70% HH have more than or equal to 2 income sources, they are more resilient towards disaster.

From the above discussion on summary, we get the overview of the findings from the study. Disaster is directly linked with income, expenditure and prosperity of the household. In developing country like Nepal pre planning to cope with the disaster and reduce risk is always challenging and are not in priority hence have to face great losses when it occurs. Disaster always creates an opportunity, so pre planning of community for

disaster could make less loss, can move ahead catching up the opportunities after the disaster. Since after the disaster several humanitarian organizations come to support on the Aapchaur village, Household have taken advantages and move ahead. Especially income generating activity is changed.

From the above findings and discussions we can conclude that that the livelihood after the earthquake have been difficult and challenging but this also has direct effect on economic activity of Aapchaur village with positive impacts as more household member engaged on income generating activity, females are getting better jobs and widening the scopes. The average income of household increases. One of the impact after earthquake is that agricultural products are nowadays purchased and sale on villages too. Many farmers learn technical issues on farming. Some organization has given skill transfer trainings on non-agricultural work too which also leads for better opportunities.

After the earthquake more member have entered on job market with diversification of income sources. So we can assume that the diversification of sources will make the HH more resilient. Small scale business are increasing though income growth from business is negative. It can be hope the earning will increase on coming days. The rate at which income is increasing after the earthquake is little more to expenditure which shows the increasing status of HH. Expenditure on health is increased as they have no proper houses and have to cope with adverse climate and sanitation.

There was provoke that organization had make the household passive and are always looking for relief material. But study finding does not support the statement more over more member involved on income generation and struggling to improve living standard. Buying and purchasing behavior is also changes these days hence the agricultural product like vegetable are more produced. The less involvement on saving and credit by the household after earthquake provide the glimpse of losing economic status by the HH. HH on remittances increases slightly after earthquake. Similarly movement to nearby city to Kathmandu for seasonal work is also increasing these days.

The case of Aapchaur village somehow can be generalized on other similar Rural Municipalities as our Rural Municipality has homogeneous characteristics. From the findings and observation, we can conclude that after the earthquake or similar disaster the economic activity of household changes, it does not remain stationary. It has created the opportunities but would have better if have utilized it on organized way. Though the income level is increasing, the living standard is not increased and have still number of challenges.

In summary, we can conclude that the impact of earthquake exist on economic activities of HH of Pisker with more opportunities but still need to plan on organized way to catch in better way and improve livelihood. In comparison to pre and post-earthquake the scenario is satisfactory. From the point of sustainability of current income sources, the wage will be reduced once the construction work completes. We can say that agriculture, business and remittances will be the major source of income on coming days.

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