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Effects of Landslide on the Livelihood of People at Ghumthang,

Sindhupalchok

Mandip Shrestha

mandeepstha1234@gmail.com

Abstract

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Landslides are considered as one of the most recurring and common disaster in Nepal. They cause huge loss to infrastructure, property and human casualty. The intensity of landslides in Nepal's mid hills are rising as one of the most common and devastating disasters. The 2020 Ghumthang landslide in Nepal's Sindhupalchok District destroyed the houses, lands and infrastructures and impacted livelihoods of the people living in the area. Every monsoon landslides in hilly region of the country lead to impact on the livelihood of the people and this aspect has not been analyzed in depth. The disaster-affected people face the destruction crop, livestock, and land. They also face damages of house, drinking water and other infrastructure,. In addition they face non-economic effects like health and mental stress. This article based on a household survey combines quantitative and qualitative data from 50 respondents. Questionnaire, interviews and focus group discussions were held during field survey to solicit their perspectives. Secondary sources were consulted and lived experience used to triangulate the survey findings for accuracy. This study reveals multidimensional nature of the impact of landslide on the life of people who live in the affected area.

Corresponding Editor

Ramesh Raj Kunwar

kunwar.dr@gmail.com

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Introduction

Nepal is one of the disaster-prone countries facing frequent landslides fragile geographical structure, active tectonic process, unplanned settlement and high slope are some of the underlying causes of landslides (Poudyal Chhetri, 2001). Poudyal Chhetri (2001) further adds that, lack of public awareness, low literacy, absence of technology, weak economic condition, shortage of technical manpower, undeveloped early – warning systems are other factors that make Nepali people vulnerable to disaster. Geographically, Nepal lies in the tectonically active zone between Gangetic plain of India and the arid plateau of Tibet, China (Pokhrel, Bhandari, & Viraraghavan, 2009) with diverse geographical regions (mountains, hills and Tarai regions). More than 80% of population of Nepal is vulnerable to floods, landslides, windstorms, hailstorms, fires, earthquakes and glacial lake outburst floods (Ministry of Home Affairs [MoHA], 2017). Geologists and disaster management experts have warned that due to weakened landmass by the 2015 earthquakes, Sindhupalchowk district is likely to face increased landslides (Emergency Response Coordination Centre [ECHO], 2020 Sep 14).

In the months of July and August, landslide in Sindhupalchowk district caused death of total 74 people, 40 people have gone missing and 3,297 people displaced. Total 37 people died, 2 people have gone missing and 5 people injured in the village Lidi, Jugal rural municipality. Likewise, landslide led to death of 2 people and 27 people have gone missing in Jambu, Sindhupalchowk district (Armed Police Force, Nepal [APF], 2020).

A month later on 13th September, a heavy rainfall triggered massive rock, sand and soil mixed landslide that led to high flow in the Ghattekhola striking the settlements of Bhirkharka, Nagpuchhe and Newar Tole at Ghumthang of Barhabise Municipality of the same district. In the disaster 16 people died, 15 people have gone missing and 3 injured in ward number 7, of the municipality (APF, 2020).

The objective of the study is to assess the impact of the landslide on the livelihood of the people living in the disaster-prone area. The study focuses on the presenting of the micro perspective on the impact of disaster on the livelihood of people. It is an event based case study of Ghumthang landslide. The study encapsulates the present condition of the villagers living in the risk zone with respect to the landslide risk. It also presents livelihood status of the Ghumthang villagers following the landslide.

This paper is organized in six sections. The first section provides introduction. Section 2 and 3 reviews the impact and cause of landslide. Study area and methodology are presented in section 4. Results and discussion are presented in section 5. Section 6 presents conclusions.

Disaster and livelihood of victims

The concept of livelihood describes how people struggle to make a living by putting emphasis on people's view of their own needs (Scoones, 2009). Livelihoods refer to the resource and asset that people possess which is required for them to meet their basic needs. Such needs refer not only to food but also shelter, clothing and social relations (Gaillard, Maceda, Stasiak, Le Beree, & Espaldon, 2009). Besides loss of life in the disaster area people lose houses, lands, assets and other infrastructures which bring a wide range of impacts on their livelihoods.

We can analyze the impacts on the livelihood of the people on the basis of their income sources (crops, livestock, soil/land, and trees), assets (housing, drinking water, properties) and physical condition (health, mental condition). Bates and Peacock (1992) explain that almost all the societies have a similar pattern of household activities and use almost similar physical items to perform day to day house hold activities. When disaster damages that pattern it takes time for people to get back to their normal living condition.

Due to small scale and scattered household landslides events are underreported, impact on human livelihood and development underestimation while leading to limited scientific attention (Msilimba, 2010; Petley, 2012). This study assesses impact of landslide on livelihoods of the people is analyzed by type and monetary value. Apart from the income sources and damages in assets, the study also assesses non-economic impacts like effects on health and mental stress caused by the losses of their family. The next landslide can again threaten livelihoods of the people.

Landslide not only causes environmental impact but also lead to societal disruption. A landslide that wipeout the agricultural lands creates economic as well as social consequences. It is observed that the effects are long term effect on primary economic activities (Abedin, Rabby, Hasan, & Akhtar, 2020) and thus have serious effect on livelihood of farmers (Mertens, K., et al., 2016) who lose significant part of their income from agriculture. The affected people are likely to get involved in wage employment or self-employed for their livelihood. However, these types of income do not seem to compensate the loss occurred by landslide in their agriculture or other type of income (Mertens, et al., 2016; Parera, Jayawardana, Jayasinghe, Bandana, & Alahakoon, 2018).

After hit by a disaster, affected people sell their properties or cattle in low price to fulfill their immediate financial need. This will have negative financial effect in future and pushes them into poverty. Likewise, health problem arises in the affected area due to poor sanitization, malnutrition, infectious disease and anxiety. Forest an important to the livelihood of rural people is also wiped out by landslide (Geertsem, Highland, & Vangeouis, 2009). After disaster, children can be deprived of education and forced to perform unpaid tasks while domestic work load of

women increase. They need to travel long distance for water and forage and if they need to collect wood fuel for cooking purpose their burden increases (Kaur, Habibullah, & Nagaratnam, 2018).

According to UNDP (2019) the five core indicators shown in table 1 can be used to measure the human impact of disaster: Living condition, health and education, livelihoods, food security, gender equality and social inclusion.

The first indicator (living condition, health and education) measures the impact of disaster on sanitation, water, electricity, cooking fuel, housing, education and health. Second (livelihood) shows the measurement of impact of disaster on employment, productivity, resources (financial, physical and natural) and income. Food security is measured by the impact on food availability, food access, food utilization; study of coping behavior that can lead to food insecurity. In the same way, gender equality tells how women cope with the gender biases and what the outcome of disaster on gender equality is. This also measures the impact on gender specific role (like reproductive, productive and women's community role) and its effect on access and control of services, resources and decision making. Social inclusion considers the particular group of affected people who are regarded as disadvantaged group (in term of cast, ethnic, livelihood or physical disability) among disaster affected population.

Table 1: The Human Impact Analysis: Core indicators, sub indicators and final analysis (The World Bank)

Core Indicators and Sub Indicators				Final Result
Living condition	Standard of living	Health	Education	Multidimensional poverty
Livelihood	Livelihoods	Income	Productive assets and Resources	Income poverty
Food security	Pillar	Households coping strategy		Food security outcomes
Gender equality	Differential impact	Excess to resources and decision		Gender equality
Social inclusion	Equal access	Equal participation	Opportunities	Inclusiveness – leaving no one behind

Source: UNDP (2019)

Causes of landslide occurrence in Nepal

Landslide in Himalayan mountain region is very high due to torrential rainfall and earthquakes (Ahmed 2017; Sharma, Chandel, & Kahlon, 2018). Sarkar, Ghosh, Kanungo and Ahmed (2013) stated that landslide has become one of the major disasters results in considerable loss of lives and properties every year. Proper assessment of landslide hazards can minimize the losses.

About 17% of the natural hazards in the world are recorded as landslides. It has been predicted that with the increase in urbanization, deforestation, shift in land use, over exploitation of natural resources and uncontrolled excavations can result in higher susceptibility of surface soil to instability resulting in increased occurrence of landslide will increase in the future (Ayalew & Yamagishi, 2005; Akgun & Bulut 2007; Manivannan Sandrasekaran & Kasthuri Thilagam, 2020; Andersson-Skold, & Nyberg, 2016).

Other studies have shown that both human activities and climate change are leading to more intense and frequent disasters. The impact of climate change on precipitation and temperature affects the stability of natural slopes which is one of the factors that induce the landslide occurrences (Crozier 2010; Gariano & Guzzetti, 2016; Huggel, Clague, & Korup, 2012; Schmidt & Dehn, 2000).

In a low income country like Nepal, families may take longer time to overcome economic loss and human impact is high (Keating, et al., 2014). The poor are more vulnerable to disaster than non-poor (Chambers, 1989). Osuret et al. (2016) has revealed that people often return back to high-risk area due to poverty, population pressure, low knowledge of disaster risk preparedness and their cultural beliefs. Relocation is thus unsustainable. Likewise, Mertens, et al. (2016) finds that people living with higher assets have faced less impact than those with fewer assets.

Generally, disaster affect socially marginalized sections of the society and leading to the heavy loss of life and property (Hewitt, 2013) which is also termed as disciplinary losses. It has also been found that, economic loss in monetary value is high in high income countries but human fatalities and relative damage are observed high in low- and middle-income countries (Yasuhide, Okuyom, & Sahin, 2009).

Study Area

Ghumthang village is situated in Sindhupalchok district, Bagmati Province, central Nepal under Barhabise municipality of ward number 7 between 27°88'33" N latitude and 85°86'67" E longitude. It is 98.8 km. away from the capital city, Kathmandu. The Araniko Highway passes through the village (Xu, Tian, Zhou, Ran, & Yu, 2017). And multiple landslides after 2015 earthquake

has destroyed the highway connecting China. The destruction of the highway is a physical evidence of the landslide in Sindhupalchok district facing severe impacts on the livelihood of the people (Van der Geest 2018).



Figure 1: The picture of landslide in Ghumthang village and villagers sheltered in the tent.

The area surrounded by hills and mountains is landslide prone. After the earthquake 2015, the condition of soil has become fragile and loose which has increased vulnerability to landslide in the monsoon.

Methodology

This study uses field survey, Key informant interview, field observation, interviews and response of local people of the study area. 10 Key informants including ward president of ward no. 7, Barhabise municipality, battalion commander of No. 15 Battalion of Armed Police Force, local social worker, health worker, local politician was selected as respondents to meet the research objective. The study also used informants' experience and knowledge too.

The interview was conducted with 25 individual and the number selected for such interview is as per the rule of saturation as per recommendation of Guest, Bunce, & Johnson (2006), Creswell (2007) and Pratt (2009). In this regards, Guest et al (2006) and Creswell and Plano Clark (2007) suggested the number of interviewees should be between 5-25 or till the saturation of the data. Likewise, household's survey was conducted with 50 villagers (victims) to collect quantitative data. Affected number of households in the study area was 92. Beyond the household survey, researcher conducted key informant interviews and focus group discussions. Questionnaires are one of the primary sources of obtaining data. Questionnaire with both open end and closed ended questions is regarded preferable to obtain the detail data as (Zohrabi, 2013). So, in this study closed ended questions were asked as a survey instrument and open-ended questions are asked in the interview section

(Kalaian, 2008). Questionnaires are highly structured to collect the empirical data in the social research (O’Leary, 2017). The questionnaire was administered at respondents’ home, public place and agricultural field.

Four random starting points were selected from the entry area of the village to the end of the village. The respondents were selected as per availability from the entire village. Questionnaires are asked in Nepali language. The household questionnaire is the main data source for this study. The questionnaire inquired about basic socio demographic data and posed questions about peoples’ livelihood activities, income, assets, and food security. It also inquired the coping measures they adopted. Enumerators were hired for data collection from structured interview with 50 respondents. They were explained about questionnaires, data gathering process, trained on data gathering and elicitation methods along with ethical issues. Secondary sources and eye witness accounts were also used and consulted to triangulate the survey findings for accuracy. A total of 12 participants were involved in two FGDs who were from the landslide affected area.

The data is analyzed using SPSS (Statistical Package for Social Science) and Excel.

Results

In our survey with 50 respondents, it has been found that 92% of the villagers have lost their agricultural land, 12% have lost livestock, 32% lost crops and 52% lost their house and other infrastructures as shown in chart 1. It was also found that 92% of the local residents were dependent on agriculture for their livelihood as the main source of income which was reduced to 74% after landslide. This was due to loss of agricultural land at the time of landslide. Apart from agricultural loss, victims of landslide reported other loss such as livestock loss and loss of crops/seed. The percentages of the loss are shown in Figure 2.

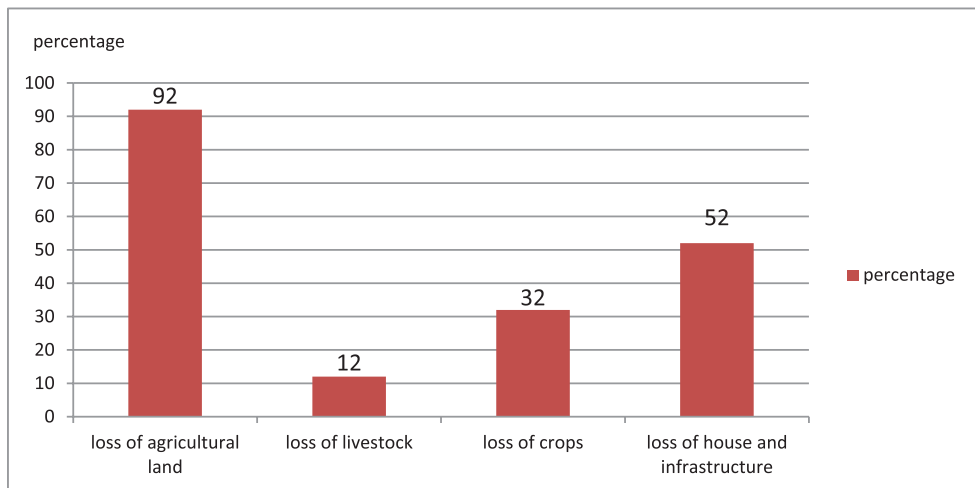


Figure 2: Type of loss from landslide

Due to landslide 180 people were compelled to leave their house due to insecurity issues as the houses were damaged. 83 household stayed on tent and remaining choose to stay in their relative’s house or on the rented house. It was further found that 84% people had 6-15ropani of agricultural land and 88% people had only agriculture as their primary source of income. From figure 1, it is clear that people residing in the disaster-prone area are facing acute problem in their livelihood due to loss of their agricultural land. This study has also found that the majority of the people were depended on agriculture and more than half of them have monthly income below NPR 10,000 (\$78.44) per month (See table 2).

The amount in dollar was as per foreign exchange dated 7th July, 2022

Table 1: Monthly income of the family before landslide N=50

Monthly income of the family Before Landslide	No of respondent	Percentage
Below 10K	29	58%
10K-25K	11	22%
Above 25K	10	20%
Total respondent	50	100%

This study found that more than half of the victims were availing credit facility from the financial institution and many of them are facing difficulties in payment of loan that is overdue.

Figure 3 shows that 96% of the total population was without any income for one month after landslide, 16% of the victims were without any income for more than 6 months. Thus, it can be concluded that most of the victims had no income after landslide and only 4% of the affected people had job after landslide or having income sources as a regular income.

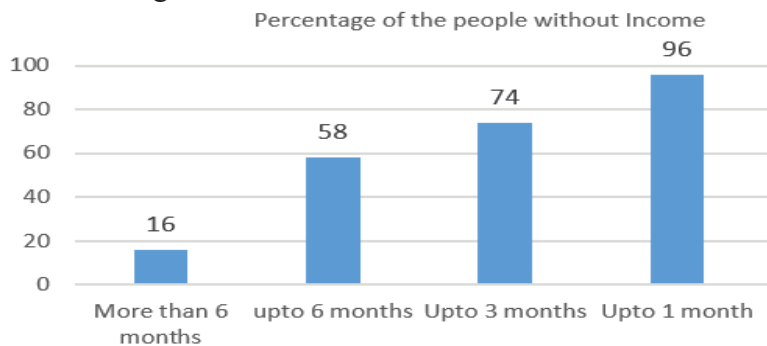


Figure 3: People refrained from regular income after landslide

Likewise, around 53% of the survey participants were availing loan from the financial institution but due to disaster they faced financial crisis and are not able to pay the interest regularly. 70% of the respondent agreed that they are facing difficulties in payment of interest of the loans as well as principal.

Regarding the loss faced by the respondent, almost all of them (46 out of 50 respondents) lost their agricultural land due to landslide in Ghumthang village and had direct impacts on the livelihood of the respondents as agriculture was their major income source. Some respondent agreed that they withdrew kids from school and few reported that they made their minor children work for income. It was also mentioned that some people sold their assets such as gold, silver and livestock as short term coping strategy though it was nominal in number.

In our survey, (Table 2) 92% of the total respondents (46 respondents out of 50) were engaged in agriculture and 8% (4 Respondents) had other jobs. After landslide, however, only 80% of the respondents were dependent on agriculture because most of the people lost their agricultural land and the productive capacity of the land. Our survey revealed that some people switched to other business and jobs from agriculture work.

Table 2: Livelihood of respondent before and after landslide

Before landslide	Livelihood measures	No. of respondents	% of respondents
	Agriculture	46	92
	Job	4	8
	Total	50	100.0
After landslide	Livelihood measures	No. of respondents	% of respondents
	Agriculture	40	80
	Business	3	6
	Other jobs	7	14
	Total	50	100.0

Discussion

The researcher visited landslide area of Ghumthang several times, for short period and developed comfortable relation with the interviewees. Then the tools were used and respondents encouraged to share their experience in detail.

During visit, it was observed that initially out of total 87 affected households 83 households were sheltered in the tent and that they were using basic household and personal supplies provided by NGO's and INGO's. These victims were found to be pessimistic toward government support as they felt that support did not reach the needy persons. Some studies have also found that political intervention may be the reason of diverting the immediate relief to other group rather than to the victim as an emergency assistance (Masud-All-Kamal, 2013).

Most of the respondent (90%) were highly dissatisfied with the relief program of the governments irrespective of the level but positive with the support of NGO and INGO. This was not so with educated respondent who were dissatisfied with

them. During in-depth interview, it was revealed that the cause of dissatisfactions was the religious motive of few INGO's. In the same way, respondent had positive feeling for the support provided by neighbor, friends and relatives.

During second visit, abandoned tents in the shelter area were noticed. It was found that there was a shortage of safe drinking, and proper sanitation facilities in the camp area. Most of the victims left the shelter area and went to live temporarily with their relatives, friends and neighbors. We also observed that most of the land of the victim was not usable compared to use prior to the landslide. Respondents shared that no amount of money or compensation could bring back their loved ones and return them to the level of well-being they had before the landslide. People residing in the landslide prone area experienced severe mental stress and trauma about losses and had fear of new landslides.

It is believed that action should be oriented toward reduction of social, economic and human consequences as humanitarian responses are made during the time of disaster. Because disaster can neither be predicted nor prevented totally, Rayamajhee & Bohara (2018) suggest to focus attention on enhancing disaster preparedness and mitigation strategies at local level.

Landslides have devastating effect on farmers as their land cannot be used for growing crops for many years, seeds are destroyed and loss of livestock and food stock occurs (FAO 2020). In some cases, such land cannot be used again for the cultivation even though almost all of the resident of the research area may be dependent on agriculture for their livelihood. As we found in the survey, 92% of the victims were farmers of which 88% had only agriculture as their source of income. They are now forced to depend upon donations and help of NGOs, INGOs just as they were immediately after the landslide. Study by Merten, et al. (2015) on the impact of landslide on household income in Uganda finds significant loss in income and more than half of the affected household facing hunger after landslide. The study shows that 64% of household faced hunger and average loss of 20% was incurred for the income from agriculture.

Msilimbe (2010) affirms that when support from government is lacking for reconstruction and regeneration of production had improved economy people become unemployed and loss their livelihood and start migrating. Similar tendency has been noted in case of Ghumtang. Landslide, victims were seeking shelter in their ancestral place for the sake of livelihood.

It was observed that victims were helping each other in managing food, work, building house and in other necessary chores. They returned to their home from tent with the help of local community and shows that networks and such support have positive effect on those in the aftermath of disaster (Aldrich, 2015). Social capital is one of the strengths associated with resilience (Yonson & Noy, 2019).

Conclusion

Most of the people in the effect area of Ghumthang village have lost their land due to the landslide of 2020. The impacts on the livelihoods of the people dependent on agriculture were high. The landslide wiped out not only their land, but also destroyed their house, physical assets, life of spouse and relatives. Many of them have lost source of income. It was found that even though non poor households lost more in monetary value in the landslide while livelihood of poor were severely affected as their resiliency was very low. People not only faced income related problems, but also psychological problem, like mental stress and health impacts: the non-economic effects. Governments should adopt short term (immediate action) action and long-term strategic plan to address landslide hazard and safety of disaster victims. Hilly area of the country is vulnerable in terms of landslide and each monsoon people; especially those who live in landslide prone zone face the hazard of a probable landslide. The development of the villages is not well planned in Nepal and people settled in risky area.

The settlements in the village are scattered, in small number and located in remote areas. Providing basic requirements like roads, supplying drinking water, electricity, sanitation facility, health facility, and drainage system is costly and unpractical to each scattered village. Most of them live in disaster prone area and far from the reach of the rescue and relief institutions like Nepal Police, Armed Police Force, Nepal Army, Red Cross and INGOs, NGOs and other social organizations. It is recommended that the settlement should be reorganized by analyzing risk free area with respect to the disaster. Implementation of Integrated village development policy considering risk factors related to disaster is a must in Nepal to minimize the loss of life and property. Acharya and Yang (2015) recommend that the identification of settlement in disaster prone areas should be done with the help of landslides hazard maps in land use planning. In the future, landslides hazard maps should be prepared and used in land use planning as a tool to minimize the loss and damage at local level.

During disaster like landslide, distribution of relief items like foods, cloths and daily necessity goods and providing immediate shelter is necessary. In Nepalese context central, provincial and local governments have the prime responsibility to deal with such immediate problem. Saving foods, using alternative foods and reducing expenditure are some ways that help revive from the impact of landslide. Victims of the landslides should be helped to get support to overcome financial crisis through loan and beginning new business. In case their ancestral land is unstable and the probability of further landslide is high, the farmers/people should be supported to migrate to safer places.

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