

CHAPTER II

THE FACTORS OF DISASTER VULNERABILITY, TYPE OF DISASTER AND DYNAMIC OF DISASTER IN NEPAL

As this undergraduate thesis attempts to analyze the disaster issues of Nepal. It becomes necessary information to determine the characteristic of a disaster that frequently occurs in the country. This chapter firstly explains the factors of disaster vulnerability in Nepal. The discussion in this chapter is continued by discussing the type of disaster, and the dynamic of disaster specifically in 2012 and 2013 before the main disaster happened in 2015.

A. Factors of disaster vulnerability in Nepal

Nepal is a country that prone to numbers of natural hazards and human-generated disasters. There is more than 80 percent of the total population of Nepal is at high risk of the occurrence of hazards' impacts and disasters such as earthquakes, floods, landslides, windstorms, hailstorms, fires, drought, Glacial Lake Outburst Floods (GLOFs) and so forth. A wide variety of geographical, geological, ecological and hydro-meteorological factors contribute to the high levels of hazards vulnerability in Nepal. While demographic factors such as high population growth, slow economic development, and unawareness of mitigation of disaster also make the country extremely prone to disaster. (Nepal M. o.-M., 2011)

According to Nepal Disaster Report 2015, the country stands at the top 20th list of the most multi-hazard vulnerable countries in the world. (UNDP/BCPR, 2004). The country is prone to natural disaster due to multiple factors, both natural and human-induced disaster. Natural factors that contribute to the vulnerability of disaster are variable geographical

conditions, ecological and hydrometeorological phenomena, and fragile geological structure. Meanwhile, human factors that generated disaster occurrences in Nepal are unplanned settlements, deforestation, and environmental degradation. (Nepal M. o., 2015)

The first factor of disaster vulnerability in Nepal is geographical conditions. Geographically, Nepal is a country located on the slopes of Himalayan Mountain, specifically in the southern part. It is a land-locked country bordering with China on the North and India on the East, West, and South. It lies in between 80° 4' to 88° 12' East longitude and 26° 22' to 30° 27' North latitude. The total area is 147,181 sq. Km. approximately encompassing to 885 km. from East to West and varies from 145- 241 km. North-South. The country lies in the middle part of the Hindu Kush Himalayan (HKH) Region. Hills and high mountains cover approximately 86% of the total land area, and the remaining 14% are broad alluvial plains called as *Tarai*. The *Tarai* itself has different altitude from above sea level to the peak of the Everest, the world's highest mountain in Himalayan ranges. (Nepal D. P., Hazard in Nepal, 2013)

Moreover, physiographically, the country is divided into five regions namely: the *Tarai*, the *Middle Hills*, the Churiya hills, the High Hills and the Himalayas. Meanwhile, the country ecologically is divided into three regions looking from east to west, namely; the *Tarai*, the Hills, and the Mountains. The *Tarai* is low, flat and fertile land. It covers around 23 percent of the total area of Nepal out of which 40 percent is under cultivation. The *Tarai* itself is also known as the "grain basket" of Nepal. It consists of some dense forest areas, national parks with wildlife reserves and conservation areas. (Nepal M. o., 2015)

The *Tarai* is home to 48.4% of the population with the total number of 27 million. Around 14.2% of the total

population lives in urban areas. Every year, there has been an increasing number of migration from villages to urban. A report from Human Development shows that Nepal is among the poorest countries in the world, with one-third of the Nepalese living under the poverty line. The country's weak economic status, high illiteracy rates, malnutrition, unemployment, infant mortality, and public health problems have increased the country's overall vulnerability. (Crescent, 2011)

Furthermore, the hydro-meteorological factors also contribute to the country's susceptibility to disaster. Different types of climate can be found in Nepal such as monsoon subtropical, temperate monsoon and alpine/tundra. The subtropical monsoon climate is located in the Tarai, mild monsoon in the Hills and alpine in the Mountainous region of Nepal. Monsoons usually start from June to mid-September which brings about 80 percent of the rainfall during that period. Meanwhile, rest of the seasons usually becomes dry. The most pleasant season in the country is spring and autumn. In the winter season, temperature drop to freezing with a high level of snowfall in the mountains and hills. (Dangal, 2011). A combination of rugged geography, fluctuate demography, and various climate has made this fragile environment vulnerable to hazards and disasters.

B. Type of Disaster in Nepal

Disasters are so penetrative in every geographic and societal framework of Nepal that the people are constantly under the threat of multiple disasters. The country doesn't face catastrophes like volcanic eruptions; otherwise, almost all types of disasters are prevalent to occur in Nepal. According to various reports and research, every year, floods, landslides, fires, avalanches, and epidemics have caused hundreds of people lost their lives and destroyed physical infrastructure

and property worth billions of Rupees. (Disaster Preparedness Network Nepal, 2015)

Disaster in Nepal falls into several categories. Some of the disasters occur in a certain period depending on the factors of climate and the rest are occur naturally. However, there are some types of disasters in this chapter that frequently occur in the country, as follows:

1. Landslide

Landslides are one of the most frequent disasters to strike the country, particularly in the hilly region. According to a research study, Laban (1979) estimated that at least 75% of all landslides in Nepal were natural. (Nepal D. P., Hazard in Nepal, 2013). Natural factors that contribute to the occurs of the landslide are steep slopes, fragile geology, and high intensity of rainfall. Meanwhile, some the human activities such as deforestation and unplanned human settlements are the major causes of a landslide. Besides, the risk of the disaster is further exacerbated by improper activities like unorganized land use, encroachment into fragile land slopes and unplanned development activities such as the building of roads and irrigation canals without appropriate measures in the prone area of the mountain. The hilly region is located in the Siwalik, Mahabharat range, Mid-land, and also fore and higher Himalayas are more vulnerable to landslide because of steep topography and fragile ecosystem. Moreover, the area of the country is mostly covered by hills and mountains, hence the possibility of a landslide occur is also high. Therefore, every year, a landslide caused much loss of living, material, and property. Landslides also destroy crops and agricultural land since many Nepalese builds their home in rural areas and apply mountain farming systems. (Affairs, n.y)

2. Flood

Among the disaster that occur regularly in Nepal, floods are by far the most serious ones. The disaster has been most frequent, highly damaging and widespread natural hazards. There are some 6,000 rivers and rivulets are in Nepal flowing from north to south. Among these, snow-fed rivers, such as the Koshi, Narayani, Karnali, and Mahakali, are perennial rivers. They come from the Himalayas and snowcapped mountains and pass through the hills to the Terai plains. During the monsoon period (June-September) where rainfall is in high intensity, these rivers swell out and cause destruction to the villages, crops lands, and livestock remained within the river basins. (Affairs, n.y). In fact, the country stands at the 30th position in the world regarding flood hazard. (UNDP/BCPR, 2004). Every year, floods caused lots of casualties and other damage such as destruction of livestock, harvest land and blockages of highways. (Nepal M. o., 2015)

3. Fire

This is a recurring disaster that frequently occurs during the dry season from February to May. There are large numbers of fire incident reported, mostly in the Terai where about three-quarter houses are made from a fragile material such as straw. The condition of high temperature and strong winds also exacerbate the fire. Every year, forest fires occur throughout the country and result in deforestation of around 1.7 percent of the total forest area. These fires cause economic losses and environmental degradation. Subsequently, the ecosystems out of balance. This disaster is also threatening valuable and extinct flora and fauna, degrading the soil and generating flood and landslide. (Dangal, 2011)

4. Windstorm, Thunderbolt, and Hailstorm

The country also faced hydrological disasters such as windstorm, hailstorm, and Thunderbolt. Windstorm occurs mainly during the dry season between March to May. Thunderbolt occurs during monsoon and hailstorm start from the beginning and end of the monsoon. Hailstorm causes heavy losses of crops. In addition, windstorm and thunderbolt cause the loss of human life as well as physical property. In recent years, casualties from the thunderbolt are in increasing trend. It may be due to the climate change or increasing population. (Nepal M. o., 2015)

5. Drought

Most of the region in Nepal is in the grip of drought-like condition from the end of March till the monsoon arrives next in June and the Terai and western hills are more frequently affected than other regions. This hazard causes damage to crop failures and famine, both during the monsoon season and rest of the year, when winter crops are planted. More than 5,000 families residing in the pockets of hills and Terai are badly affected by drought each year (MoHA, 2009). (Dangal, 2011)

6. Epidemic

An epidemic is a severe outbreak of an infectious disease rapidly spreading among the population. Epidemics may spread from person to person and through exposure of many people to a single source, e.g., water supply. In addition, epidemics usually accompanies the worst floods. Lack of proper health care and sanitation are the major cause of epidemics. So far, epidemics have been found the leading cause of human casualties from disasters. (Nepal M. o., 2015). Epidemics of infectious diseases have two peaks: first, before the rainy season

during the months of May and June and next in the month of August, where it is the height of the monsoon. The unhealthy condition of drinking water and a low level of sanitation are the primary factors causing of water-borne diseases. Water-caused diseases continue to take lives in Nepal. In fact, over 80 percent of all illness is attributed to inadequate access to clean water supplies, poor sanitation, and poor hygiene practices. (Nepal M. o.-M., 2011)

7. Glacier lakes outburst floods (GLOFs).

It is located in the high altitude areas particularly in the foothill of the mountain. These lakes contained vast volumes of water melting of glacier-formed as the impact of global warming. It may lead to outbreak the lakes, called a glacial lake outburst flood (GLOF) with substantial capacity to cause significant damage in downstream. Totally, more than 2,315 glacial lakes have been classified and 14 of the hazard were recorded between 1935 and 1991. (Affairs, n.y)

8. Earthquake

Earthquake is the most destructive types of disasters in Nepal. According to Global Assesment Report, the Himalaya is believed to be the most active and fragile mountain range in the world, because it is still rising and its rocks are under constant stress. The resulting strain build-up is released from time to time as earthquakes. (Nepal U. N., 2009). Geologically, the country lies on a seismic zone which experiences frequent earthquakes. As a result, earthquakes with various magnitudes occur almost every year and have caused massive losses of lives on several occasions. (Nepal D. P., Hazard in Nepal, 2013) . This disaster mainly occurs due to young and fragile geology. Besides, the other reason for Nepal's vulnerability to earthquakes is the shoddy construction of

public infrastructure such as buildings and houses, particularly in densely populated areas like Katmandu.

Globally, Nepal is ranked at 4th and 11th regarding its relative vulnerability to climate change and earthquakes, respectively. In addition, Kathmandu, the capital city of Nepal is one out of 21 cities around the world that located in similar seismic hazard zones, and the city is at the highest risk regarding the impact on people. (Nepal M. o., 2017). The Nepalese are living in a country of highest seismic hazard, have faced the consequences of many earthquakes including the recent devastating Gorkha Earthquake of 25 April 2015. This quake is the very recent striking example of earthquake vulnerability of the country. Based on the Disaster Situation Report, earthquakes with of 5 to 8 magnitudes on the Richter scale have occurred throughout the country, and 279 quakes with epicenters and magnitudes above 3.9 have been recorded in Nepal. The country's high seismic city is related to the presence of active faults between tectonic plates along the Himalayas.(Nepal, Disaster Profile - Nepal, n.y)

Nepal, therefore, faces a variety of natural hazards of geologic and climatic origin as a threat of country. Each part of the country is exposed to one or more types of natural hazard. The extent and frequency of natural hazards are much greater than the global average. Most hazard events are easily translated into disasters, because of the high vulnerability the country has. (Nepal U. N., 2009)

C. The Dynamic of Disaster in Nepal

Over the years and seasons, the occurrence and effect of different types of disaster are varied. Several disasters exhibit a specific pattern whereas the others don't. For instance, floods and landslides occur every year in monsoon season while

earthquake does not show any pattern of season or year to happen. A review of kaleidoscopic on the impact of various disaster since 1971 shows that epidemic has caused the highest number of fatalities. However, regarding impacted families, the flood has affected the most significant amount. Other major disaster types, such as landslide, flood, fire, and thunderstorm has caused the highest number of loss of life. (Nepal D. P., Hazard in Nepal, 2013)

The historical record shows that Nepal has been experiencing various type of disaster. The country witnessed three significant earthquakes in the 20th century namely Bihar-Nepal quake (1934), Bajhang earthquake (1980) and Udayapur earthquake (1988) were the most devastating earthquakes in Nepal in the past 80 years. The 1993 floods and landslide in south-central Nepal was one of the most catastrophic disasters ever recorded. It is caused by continuous rainfall between 19 and 21 July 1993. The maximum rainfall was recorded at that time. The total effect of the two events was 1,460 people dead or missing, 73,606 families severely affected, 39,043 houses destroyed (wholly or partially). (Nepal U. N., 2009)

The different types of disaster have frequently been occurring in the whole part of the country until the recent time. However, the dynamic of disaster will be highlighted between 2013 and 2014. As in the past, during these two periods, Nepal witnessed an overall increase in the disasters – particularly floods and landslides. They are the most destructive disasters to hit the country. The floods and landslides that occurred in 2013 in Far Western Region mainly in Darchula district and the floods and landslides in 2014 in Mid-Western Region particularly in Banke, Bardia, Dang, and Surkhet were the most frightening disaster that caused enormous losses to human lives and physical properties. (Nepal M. o., 2015)

1. Major Disasters in the year 2013

According to the report from the Minister of Home Affairs of Nepal published in 2015, several significant disasters that occurred during this year were thunderbolt, fire, flood, landslide, and another disaster. The thunderbolt claimed the highest number of human deaths. Furthermore, a total of 146 people lost their lives due to thunderbolt in 2013 followed by the floods that claimed 132 lives. The landslide caused around 87 people lost their life. Fire disaster killed around 59 people and various other disasters caused 36 death tolls. The rest of disasters such as cold wave, epidemics, heat wave, windstorm, heavy rainfall, drowning, avalanches, air crash, and boat capsized caused 36 people lost their life. (Nepal M. o., 2015)

The occurrence of disaster cause economic losses of various types in addition to human casualties and injuries. The economic damages include losses of houses, livestock, crops, and damages include public infrastructures and properties, and so forth. In the year 2013, a disaster caused a total of 460 human deaths by various types of natural disasters. In addition, all of these disasters caused a total of 2,697 families were affected by different disasters. Meanwhile, in term of economic loss, these major disasters caused the total estimated cost worth 2,057 million rupees. (Nepal M. o., 2015)

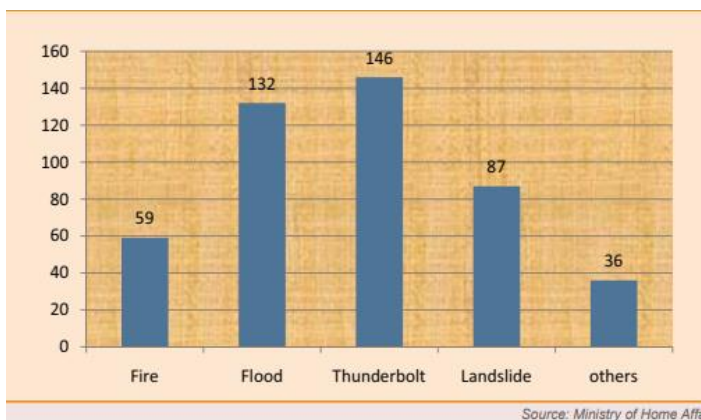


Figure 2.1: Human Casualties by Major Disasters 2013

Source: (Nepal M. o., 2015)

2. Major Disasters in the year 2014

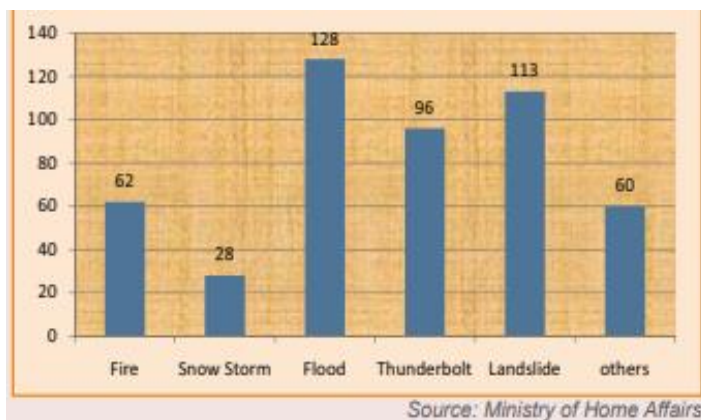


Figure 2.2: Human Casualties by Major Disasters 2014

Source: (Nepal M. o., 2015)

Based on the similar data, several major disasters occurred in 2014 were floods, landslides, thunderbolt, fires, and snowstorm. These frequently hit disasters caused loss of live, damaged properties, and substantial economic loss. As portrayed in figure 2, the disaster such as floods alone caused 128 people killed. In 2014, mostly the victims came from Mid-Western Region of Nepal. This year, Thunderbolt stood at a third position which caused 96 casualties while in the previous year it was the number one killer. Furthermore, Landslide caused 113 death tolls during this year. A fire claimed the death of 62 people, snow storm (Hudhud) killed 28 people and all other remaining disasters such as heat wave, cold wave, and animal attack caused 60 death tolls. Finally, In 2014, a total of 487 people lost their lives due to those significant disasters. This year, the number of human deaths is higher than in the previous year.

Finally, Nepal is facing the wrath of natural and human-generated disasters with higher frequency and intensity. It is one of the highest risk countries in the world due to various types of disasters. Every year, multiple types of disasters such as landslide, flood, fire, epidemics, avalanche and various other natural and human-induced disasters lead to the casualty of thousands of human lives and destruction of physical property worth billions of rupees. Therefore, the disaster issues in Nepal is considered as a great challenge for the country to deal with and there is a need to protect the people and property since Nepal is perceived as the emerging country that still lacks robust mechanism of disaster management.