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Earthquake Recovery Process in Nepal (A Comparative Analysis with Haiti)

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EARTHQUAKE RECOVERY PROCESS IN NEPAL

(A COMPARTIVE ANALYSIS WITH HAITI)

A MASTERS RESEARCH PAPER

RAMESH KUMAR DAHAL

May, 2016

Submitted to the Faculty of Clark University, Worcester, Massachusetts, USA

In Partial Fulfillment of the Requirements for the Degree

of

Master of Environmental Science and Policy (ES&P)

Department of International Development, Community, and Environment (IDCE)

Accepted on the Recommendation of

Gregory Trencher, Ph.D., Chief Instructor

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APPROVAL

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ABSTRACT

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This paper is a comparative analysis of earthquake recovery processes in Nepal and Haiti. The disaster preparedness plan of both countries is influenced by socioeconomic, political and geographical factors. Effective planning and smoother implementation of earthquake response/recovery and rehabilitation efforts could have saved many lives and properties. The study is undertaken to evaluate the hampering and counteracting factors in both countries in view of generating lessons for the government of Nepal, currently tasked with rebuilding the nation following the earthquake of April 25, 2015 and aftershock of May 12, 2015. Reviewing secondary data, this study has identified that both countries have common and country-specific hampering factors. Common hampering factors include lack of preparedness, transportation obstacles and lack of government efficiency. Unique hampering factors concern each country's unique topography, weather, culture, corruption, security and casualty effects on relief workers. The obstacles faced in both countries could be overcome by enhancing managerial efficiency, improving methods of relief delivery, and relief coordination. Also, the government of Nepal is currently implementing reconstruction policies and building codes for ensuring safer buildings and settlements. Although it is too early to assess the impacts, these reconstruction policies promise to ensure that Nepal can

increase its resilience towards earthquake disasters. To further increase resiliency, this study recommends that Nepal needs to have at least one helipad at each village, keep updated preparedness plans and run capacity development programs to institutionalize earthquake resistant building construction on the village level so that the loss of lives and property damage could be reduced.

Keywords: Earthquake; Nepal and Haiti; Response/relief and rehabilitation; Hampering factors; Mitigation factors, Reconstruction policies, Disaster, Efforts

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DEDICATION

I would like to dedicate the research paper to my daughter, Sadira Dahal and son, Hemanta Dahal and my wife, Sharmila Basnet Dahal.

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It is my pleasure to express my sincere gratitude to my Academic Advisor (research instructor), Gregory Trencher, assistant professor of Clark University for his invaluable motivation, guidance and support in preparation of this research paper.

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ABBREVIATIONS USED

GDP	=	Gross Domestic Product
GFFDRR	=	Global Facility for Disaster Reduction and Recovery
IASC	=	Inter Agency Standing Committee
ICRC	=	International Committee of Red Cross
IFRC	=	International Federation of Red Cross
ILO	=	International Labor Organization
INGO	=	International Non- Government Organization
IRIS	=	Incorporated Research Institutions for Seismology
JICA	=	Japan International Cooperation Agency
NGO	=	Non-Government Organization
NRCS	=	Nepal Red Cross Society
NSET-Nepal	=	National Society for Earthquake Technology-Nepal
OCHA	=	Office of the Coordination of Humanitarian Affairs
UNDP	=	United States Development Program
UNOHCA	=	United Nations Office of the Coordination of Humanitarian Affair
USD	=	United States Dollar

TABLE OF CONTENTS

	Page No
APPROVAL	i
ABSTRACT	ii
ACADEMIC AND PROFESSIONAL HISTORY	iv
DEDICATION	v
ACKNOWLEDGEMENTS	vi
ABBREVIATIONS USED	vii
CHAPTER-1: INTRODUCTION	1-3
CHAPTER-2: BACKGROUND	4-13
2.1 Overview: Nepal and Haiti	4
2.2 Earthquakes: Nepal and Haiti	5
2.3 Loss and Impacts: Haiti and Nepal	6
2.4 Earthquake Recovery: Analytical Framework	8
2.4.1 Response/Relief	11
2.4.2 Rehabilitation	11
2.4.3 Reconstruction	12
CHAPTER-3: METHODOLOGY	14-15
CHAPTER-4: RESULTS	16-29
4.1 Response/Relief and Rehabilitation: Hampering Factors in Nepal and Haiti	16
4.1.1 Common Hampering Factors: Nepal and Haiti	17
i. Lack of Preparedness and Dependency on Aid	17
ii. Logistical and Transportation Problems	17
iii. Lack of Political Stability and Government Efficiency	19
4.1.2 Unique Hampering Factors: Nepal	19
i. Mountainous Topography	20
ii. Rainy Season	20
iii. Lack of Political Leadership at the Local Level	20
iv. Social Discrimination and Marginality	21
4.1.3 Unique Hampering Factors: Haiti	21
i. Shortage of Human Resources	21
ii. Shortage of Ambulances and Equipment	22
iii. Lack of Coordination	22
iv. Feeling of Fear and Lack of Security	22
4.2 Factors to Overcome Hampering Factors in the Future	23
4.2.1 Enhance Effectiveness on Response Management	24
i. Connect Foreign aid Agencies and Local Stakeholders	24
ii. Mobilize Resources through Existing Service Delivery Systems	24

iii. Focus on Marginalized, and Discriminated Populations	25
4.2.2 Develop and Use Effective Communication Networks	25
4.2.3 Choose Cash or Kind Support	26
4.2.4 Construct Temporary Shelter Prior to the Monsoon or Winter	26
4.3 Reconstruction and Resilience Building Policies in Nepal	27
4.3.1 Post-Earthquake Recovery and Reconstruction Policy 2015	27
4.3.2 Guideline for Settlement Development, Urban Planning and Building Construction 2015	27
4.3.3 Design Catalog for Earthquake Resistance Building Volume-I	28
4.3.4 Guideline for Distributing the Subsidy to Reconstruct the Damaged Residents due to Earthquake 2015	29
CHAPTER-5: DISCUSSIONS	30-35
5.1 Hampering Factors in Nepal and Haiti	30
5.2 Factors to Overcome the Hampering Factors in Nepal and Haiti	31
5.3 Reconstruction and Resilience Building Policies in Nepal	33
CHAPTER-6: CONCLUSIONS	36-38
CHAPTER-7: RECOMMENDATIONS	39-40
7.1 Construct a Helipad at each Village Development	39
7.2 Review and Update the Government Plans and Policies	39
7.3 Train Local Mason (Skill Laborers)	40

LITERATURE CITED

CHAPTER-1: INTRODUCTION

The world loses large numbers of people and property each year due to natural disasters. There were 6,698 natural disasters in the world in the period of 2000-2015: broken up by region, 1,490 disasters are from the North and South America, 2588 disasters from the Asia, 1,475 disasters are from Africa and remaining are from other continents (CRED, 2015). The disasters have killed 1.27 million people globally in the period of 2000-2015 out of which the American continent has experienced a loss of 257,305 lives and Asia experienced a loss of 769,867 lives (ibid). Notably, 713,443 people were killed globally due to 446 devastating earthquakes from 2000-2015 (ibid). Similarly, in this duration, 3.16 billion people suffered globally due to natural disasters. Out of this total, 97.64 million people were affected by devastating earthquakes (ibid). The share of worldwide property loss from earthquakes is estimated to be USD 491.4 billion (ibid).

Nepal is naturally prone to multiple types of disasters (GoN, 2011). Nepal's fragile geology suffers from an average of 900 natural disasters annually, causing loss of life and damage to property. Significantly, the earthquake of 2015 took the lives of 8,693 Nepalese residents and caused billions of dollars in property damage. The damage to infrastructure was estimated to be USD 7.0 billion, which is one third of the total GDP of Nepal (GoN, 2015a). Similarly, Haiti experiences different types of disasters annually with a devastating loss of people and property, impacting the social, economic, political and cultural settings. The Haitian earthquake in 2010 killed 300,000 people and 16,000 people are still missing. In order to recover and rebuild Haiti's collapsed infrastructures, USD 13.0 billion is needed (Sarkey, 2013).

Although the impacts of earthquake could have been minimized in both countries with effective planning and smoother implementation of a preparedness plan, the disaster preparedness plans of both countries are poorly managed. The formulation, revision, update and implementation of disaster preparedness plans, strategies and national building codes are influenced by socio-economic condition and political fragility of the countries. The lack of attention from different levels of the countries further magnifies the severity of loss of uncountable lives and property, which could be saved. Furthermore, the vicious cycle of poverty, inadequate infrastructures, and difficult topography, and lack of education, awareness, and backwardness of people are the realities of the countries which have further escalated the vulnerability for human and property loss in small to large scale. Both the countries can be questioned on their accountability, pro-activeness, and the capacity of the governmental, nongovernmental and civic organizations to properly implement disaster preparedness and mitigation efforts.

This paper examines the hampering factors that created obstacles in the implementation of earthquake response, relief and rehabilitation efforts in both countries. Also, it evaluates the reconstruction policies adopted by Nepal in the reconstruction phase. The outcome of the study will help both countries to identify their weaknesses in relief collection, transportation, storage, coordination, and the timely distribution to those affected most by the disaster so that the loss of life and the hardship of affected is minimized. The lessons learned from either country will come together in formulation of disaster preparedness plans, guidelines and reconstruction policies for future effectiveness. In order to solve the problem, hampering factors of the earthquake

response, relief and rehabilitation efforts of both countries and their mitigating factors need to be identified.

The purpose of the paper is twofold:

- To identify factors reducing the effectiveness of response, relief and rehabilitation efforts in Nepal and Haiti and strategies required to overcome these;
- To provide recommendations for reconstruction in Nepal.

To meet these objectives, this study will answer the following three research questions:

RQ1: What factors have hampered response, relief (short-term) and rehabilitation (midterm) efforts in Nepal and Haiti?

RQ2: What must be done to overcome the hampering factors to improve the effectiveness response, relief and rehabilitation in the future?

RQ3: What types of policies are being adopted during the reconstruction (long term effort) in Nepal?

This paper includes seven chapters. Chapter-2 includes background information on the research topic, Chapter-3 includes the methodology, Chapter-4 includes results, and Chapter-5 includes discussion. Similarly, Chapter-6 and Chapter-7 include conclusions and recommendations, respectively.

CHAPTER-2: BACKGROUND

2.1 Overview: Nepal and Haiti

Nepal is the 20th most disaster prone country in the world (Center for Excellence, 2015). The mountainous country Nepal has coverage of 147,181 square km. The country's Gross Domestic Product (Purchasing Power Parity) is USD 42.1 billion, and the annual economic growth rate is 3.6%. The annual percapita income of the country is USD 1,508(Center for Excellence, 2015).

Haiti is a republic country of the western hemisphere, which occupies 27,560 square km. The Dominican Republic is the only a land-based borderer of Haiti. The south and west border of Haiti is the Caribbean Sea and the Atlantic Ocean lies to the north. Haiti's topography includes mountains which divide Haiti into three regions: the Northern Peninsula, Central Region, and Southern Region (Hadden and Minson, 2010).

Table-2.1

Summary of Facts about Nepal and Haiti

Description	Nepal	Haiti
Area in km ²	14,7181	27,560
Population	28,811,808	10,415,874
Population density (people/km ²)	196 persons	356 persons
GDP	USD 42.1 billion	USD 8.7 billion
GDP percapita	USD 1,508	USD 889
Currency (March 17, 2016)	USD1=NRs.106.7	USD1=Gourde 61.23

Source: <http://Countrymenets.finfo/en/Nepal>; <http://Countrymeters.info/en/Haiti>

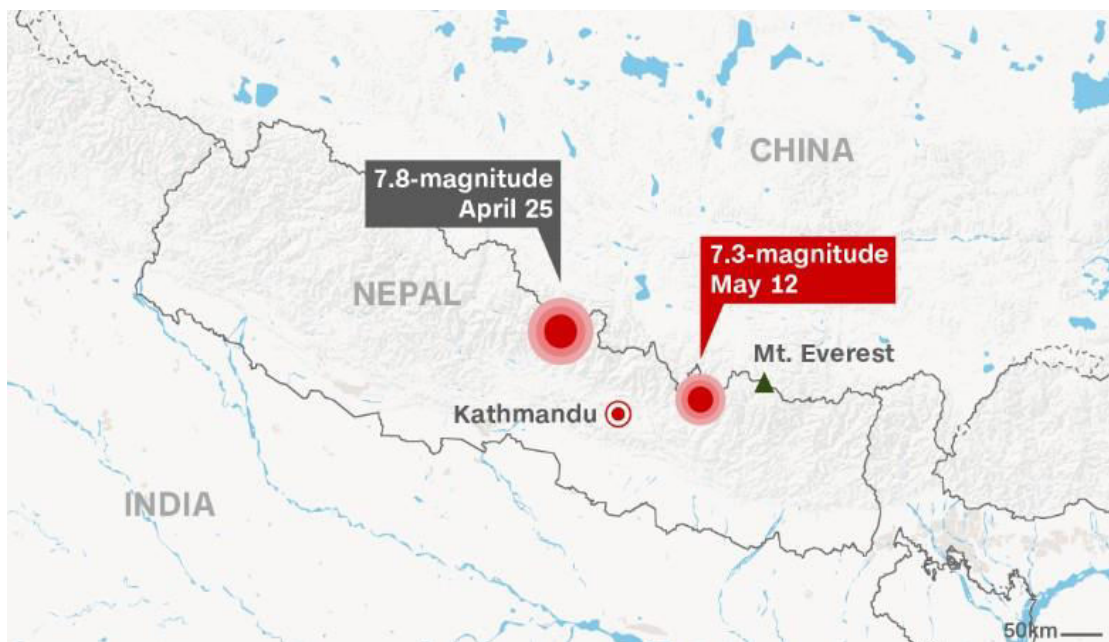
Table-2.1 presents the facts of Nepal and Haiti. The population density (people/square km) of Haiti is 356 persons which is 1.81 times higher than Nepal. Similarly, the annual GDP percapita of Nepal is USD 1,508, which is 1.69 times higher than Haiti.

2.2 Earthquakes: Nepal and Haiti

On April 25, 2015, an earthquake of 7.8 magnitude hit Nepal with an epicenter in the Barpak Village of Gorkha district located 77 km northwest of Kathmandu. The initial earthquake was followed by thousands of aftershocks and another powerful quake of 7.3 magnitude with an epicenter in Sunkhani of Dolakha district on May 12, 2015 (UNOCHA, 2015). Figure-2.1 shows the locations of devastating earthquake and aftershocks in Nepal. The earthquake and the aftershocks occurred as the result of the thrust faulting between the subduction of Indian plate and overriding of the Eurasian plate to the North (IRIS and The University of Portland, 2015).

Figure-2.1

Location of the Earthquake 2015 in Nepal 2015



Source:<http://www.cnn.com/2015/05/13/asia/nepal-earthquake/>

In Haiti, an earthquake of 7.0 magnitudes occurred in 2010 near the ‘Enriquillo-Plantain Garden Fault’ which is a strike-slip fault (Prentice et. al., 2010). Haiti has experienced large scale earthquakes in the past in 1751, 1770 and 1860 which caused huge amounts

of destruction (O’Loughlin and Lander, 2003). Figure 2.2 shows the affected areas from the 2010 earthquake in Haiti.

Figure-2.2

Location and Affected area of the Earthquake 2010 in Haiti



Source: <http://stmargaretmaryparish.ca/haiti/index.html>

2.3 Loss and Impacts: Haiti and Nepal

Haiti and Nepal experienced loss of life and property damage from the devastating earthquakes in 2010 and 2015, respectively. In Haiti, human loss was recorded at 300,000 deaths, and the earthquake left more than one million people homeless (Tong, 2011) and 16,000 persons are still missing (GoH, 2010). In addition to this, the devastating earthquake has damaged property equivalent to USD 7.0billion in Haiti. In order to recover, USD 13.0 billion has been pledged out of which USD 7.5 billion have been distributed for relief and recovery purposes in Haiti (Sarkey, 2013). Those affected

in Haiti are suffering from not having enough toilets (one toilet for 114 users), inadequate means of waste disposal, and lack of drinking water. Even ten months after the earthquake, residents suffered from waterborne diseases, including cholera. The earthquake damage left residents vulnerable to flooding especially from hurricanes (Moloney, 2014).

Table-2.2

Comparison of the Losses of Lives and Property Nepal and Haiti

Effects	Nepal	Haiti
Loss of life	8693	316,000 ¹
Injuries	22,221	300,000
Homeless	95,000	13,000,000
Loss of property	USD 3.5billion	USD 7 billion
Displaced people	95,000	13,000,000

Source: Women News Network, 2014; World Economic Forum, 2015; Amnesty International, 2015; Government of Haiti, 2010; Cavalloet. et. al, 2010.

Turning to Nepal, the 7.8 magnitude earthquake and its subsequent aftershocks affected 14 districts, which represent 20% of the total land in the country. As a result, Nepal experienced a loss of 8,693 lives with 22,221 injured persons. It has been estimated that Nepal experienced property loss equivalent to USD 3.5 billion (Amnesty International, 2015; World Economic Forum, 2015).

¹The loss of 16,000 people are assumed to be dead

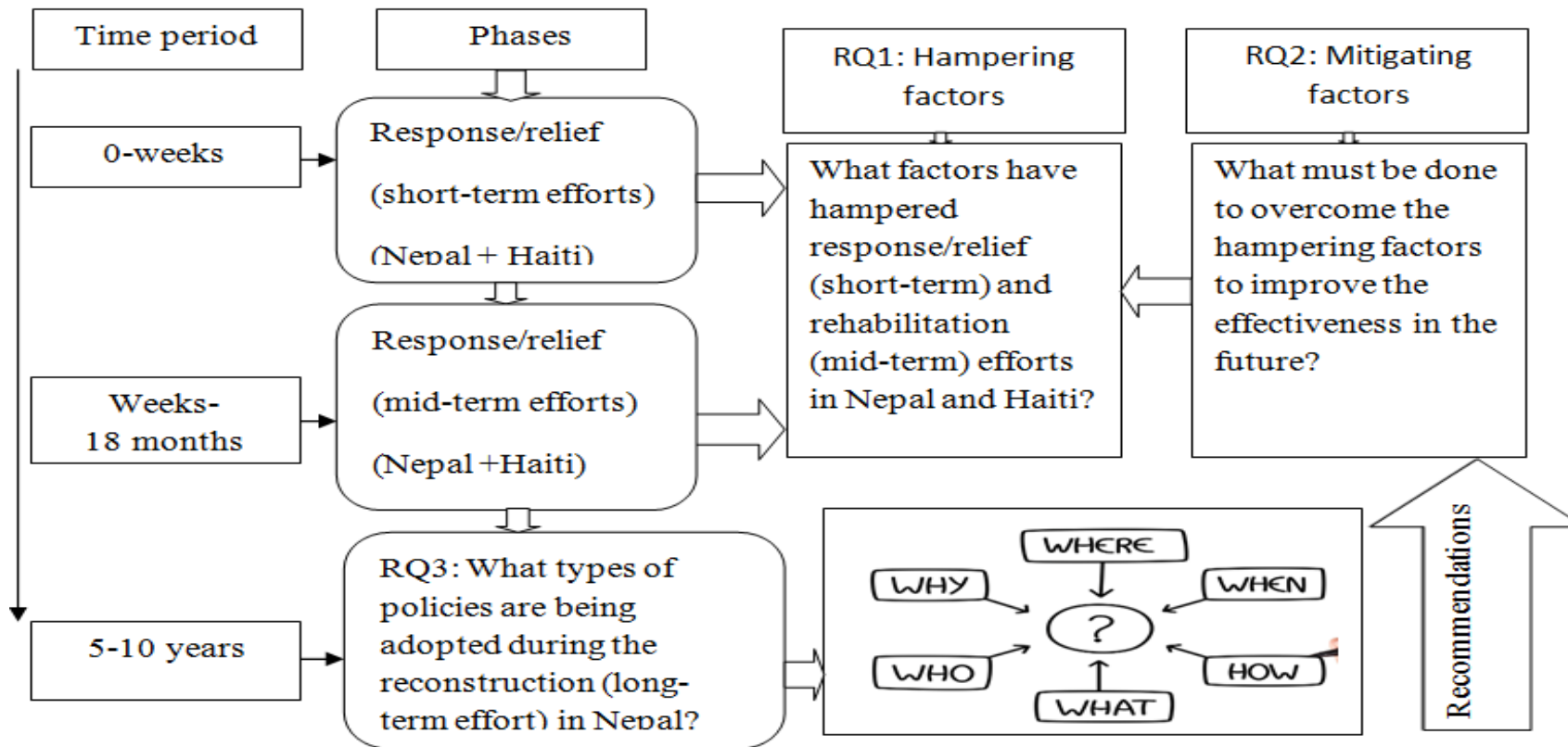
The estimated cost for the response, relief and rehabilitation effort in Haiti is also higher than the cost required for the recovery in Nepal (Table-2.2).

2.4 Earthquake Recovery: Analytical Framework

This paper is of the basis of the analytical framework as shows in Figure-2.3. This figures presents how time, phases related. Also, the linkage between hampering factors and their counteracting factors interlinked.

Figure- 2.3

Analytical Framework of Earthquake



As shown in Figure-2.4, this paper focuses on three major phases of post-disaster management cycle, each of which are explained further below:

2.4.1 Response/Relief

2.4.2 Rehabilitation

2.4.3 Reconstruction

The first and second research questions address ‘response/relief’ and rehabilitation in both countries. The third research question focuses on ‘reconstruction’ in Nepal.

Figure-2.4

Disaster Management Cycle



Source: Vasilescuet al. 2008

2.4.1 Response/Relief

Response/relief is a humanitarian effort which takes place in the short term as presented in Table-2.3. This is an effort taken immediately after the disaster to limit casualties, reduce hardship and suffering, mitigate further damage and loss, and provide the foundation for subsequent recovery (Carter, 2008). The response/relief package includes life-saving medicines, water, shelter, clothes, and food (refer Table-2.3). It is crucial that the response/relief package is transported, handled, stored, secured and dispatched to the victims in time.

Response/relief takes shorter or longer time depending on the efficiency of rescuers, the magnitude of the disaster, the preparedness of the country, and the vulnerability of and accessibility to the affected locations. For example, the relief phase in Haiti took one and half years, but in Chile, which suffered an earthquake in February 2011, the response/relief was executed in just a few months. The response/relief phase ends when systems are in place, people feel physically and emotionally safe, and are interested in rebuilding their livelihoods (Crutchfield, 2013).

2.4.2 Rehabilitation

Rehabilitation represents the restoration or construction of temporary infrastructures and the rehabilitation of the livelihoods of affected people (Carter, 2008). This means that livelihoods of affected people are more stable: they have available food, medicine, water, shelter, clothing, cooking utensils, and other necessary items to begin living a more normal life (Table-2.3). As a result, at least, they have no additional life threatening situations. People return to normal life, such as children attending school, even if the classes are run under a tent, in a cottage, or on open ground. People visit

health clinics run under a tent, shed, or cottage (Crutchfield, 2013). Different activities engage people, such as the UNDP-established Cash for Work Program in Haiti to remove the debris, which focuses on employment generation (UNDP, 2010).

2.4.3 Reconstruction

This stage addresses the issue of reconstruction and resilience building in disaster affected countries (refer Table-2.3). Policies, guidelines and government strategies are the key drivers of the success of the reconstruction phase. Many relevant policies are developed on the grounds of national building codes. These codes provide regulations and guidelines for the construction of buildings (GoN, 1994). National plans can be developed to reduce risk and mitigate the effects of the disaster. The expected outcomes and impacts of the reconstruction effort are reflected in national development plans. As a result, new and modernized infrastructures such as earthquake resistance buildings are constructed (Carter, 2008).

The impacts of the reconstruction are seen as people return to normal life and receive services from the infrastructure. Buildings are built or renovated following the national building codes and new safety standards (Crutchfield, 2013). Reconstruction is the phase when people completely return to new but established livelihoods (ibid). Governments and international organizations implement community development activities to improve livelihoods and drive the local economy through income generating activities. The government and donors invest in enhancing the institutional, financial and technical capabilities of affected people. For example, the UNDP supported Haiti for income generation and livelihood alternatives (UNDP, 2010). This phase establishes the new way of life for the people.

Table-2.3

Relief, Recovery and Reconstruction

Description	Post Disaster Recovery Phases		
	Response/relief	Rehabilitation	Reconstruction
Focus of Assistant	Humanitarian assistance	Recovery assistance	Reconstruction assistance
Urgency	Declaration of state of emergency	N/A	N/A
Activities	<ul style="list-style-type: none"> - Search and rescue - Evacuate - Medicine - Clothes - Water - Food (mainly readymade) - Shelter - Sanitary - Surveying and assessing - Safety/Security 	<ul style="list-style-type: none"> - Availability of service centers - Stable life - Absence of life threatening situation. - Availability of daily needs - Operation of school, health clinics under tents, cottages or in open ground. - Availability of temporary house - Restoration of repairable house. - Establishment of physical/psychological rehabilitation 	<ul style="list-style-type: none"> - Long term measures of reconstruction. - Replacement of building and infrastructure. - Enforcement of building code. - Regulation of safety for high raise building - Regulation of Land use - Reflection of disaster related activities and national development plan.
Required Time to Accomplishment phase	<ul style="list-style-type: none"> - Days to 18 weeks (short-term) 	<ul style="list-style-type: none"> - Upto18 months (mid-term) 	<ul style="list-style-type: none"> - Up to 10 years (sometime 10 years+ depending on disaster)
Impacts	<ul style="list-style-type: none"> - Life Saved 	<ul style="list-style-type: none"> - Life Recovered 	<ul style="list-style-type: none"> - Prevailing of normal situation

Source: Compilation from Carter, 2008; UNDP, 2006; ICRC, 2009; World Vision, 2015, Crutchfield, 2013, GoH, 2010.

CHAPTER-3: METHODOLOGY

This study covers the response/relief and rehabilitation efforts of Nepal and Haiti including policy development on reconstruction in Nepal up to March 20, 2016.

From Nepal, secondary data was collected from reports, action plans, and reflection papers of governmental entities, non-governmental organizations, private sector businesses, and the online news. Specifically, I collected data from the National Planning Commission, the Ministry of Home and Affairs, the Ministry of Urban Development and Planning, the International Federation of Red Cross (IFRC), the International Committee of Red Cross (ICRC), the Women News Network, Amnesty International, the World Economic Forum, and individual writers. I also analyzed the reconstruction policies of Nepal.

Secondary data regarding the earthquake relief and recovery process of Haiti was collected from the United Nation Development Program, ALANP, Transparency International, the action plan of the government of Haiti, and individual writers. I reviewed the reports, action plans, and policy documents of humanitarian organizations, government entities, and concerned authorities. Similarly, television footage from the BBC and Al Jazeera and online news of major publications of Haiti were reviewed. Also, I incorporated informal discussions with friends, intellectuals, and professors. Data also stemmed from the first-hand experiences of the author, who visited the site or faced the consequences of the devastating earthquakes themselves.

I incorporated my personal learning as I myself am a government categorized 'A' class earthquake victim of Nepal and was a volunteer worker for a month, from May 15 to

June 15, 2016 in the rescue operation in my home district of Dolakha. I directly observed the difficulties of transporting relief supplies to remote settlements throughout the mountainous topography of Nepal and coordinating with stakeholders and felt the need of elected political leadership.

I compared the results to related literature and generalized the findings on common and unique hampering factors along with their mitigating factors. The proposed recommendations are based on these findings.

CHAPTER-4: RESULTS

4.1 Response/Relief and Rehabilitation: Hampering Factors in Nepal and Haiti

Table 4-1 below presents the common and unique hampering factors for Nepal and Haiti during the response/relief and rehabilitation phases.

Table-4.1

Factors Affecting Relief and Early Recovery Process

	Nepal	Haiti
4.1.1 Common hampering factors		
i	Lack of preparedness and dependency on aids	
ii	Logistical and transportation problems	
iii	Lack of political stability and government efficiency	
4.1.2 Unique hampering factors		
i	Mountainous topography	Shortage of human resources
ii	Rainy season	Shortage of ambulances and equipment
iii	Lack of political leaders at local level	Lack of coordination
iv	Social discrimination and marginality	Feeling of fear and lack of security

Sources: OCHA, 2015; Amnesty International, 2015

4.1.1 Common Hampering Factors: Nepal and Haiti

i. Lack of Preparedness and Dependency on Aid

In both countries, government efforts for disaster preparedness at the household level are not effective. Although the government has provisioned funding for local-level relief efforts, most of the disaster preparedness plans, policies, building codes and standards have not been updated or implemented in Haiti (Dekens, 2007).

Nepal depends on foreign aid for the response/relief and rehabilitation efforts, so it is difficult to meet the emergency needs for responds/relief support and rehabilitation efforts (Alam, 2006). Increased dependency on foreign aid for disaster response puts affected populations in a more vulnerable position (Jigyasu, 2002).The increased amount of government funds for disasters also increases the dependency.

History shows that disaster preparedness efforts in Haiti are taken on an ad hoc basis. The disaster preparedness plan was neglected in an allocation of budget, capacity building and awareness creation (Pan American Health Organization–PAHO, 1994). On the other hand, the preparedness plan was heavily dependent on the financial input from the UNDP (UNDP, 2012) as Haiti had no economic power to implement the preparedness plan. For example, Haitians were unable to store food, water, and other essentials for three days as the disaster preparedness guideline recommends, due to lack of awareness and economic reasons (ibid).

ii. Logistical and Transportation Problems

Nepal faced logistical bottlenecks due to the limited capacity of the single international airport and entry roads from China and India. The response/relief and rehabilitation supports were hampered due to poor road quality in the affected districts. The damaged

gravel-road networks in the rural areas delayed delivery of support. The limited road connection from India affected timely arrival of the goods. Due to not being able to deliver the materials to affected areas, the relief materials were damaged, stolen and misused (Ramalingam and Sanderson, 2015). In addition, the short runway and restrictions on aircraft weight at the Tribhuvan International Airport made landings for commercial aircraft difficult. In addition, upon arrival at the airport, the relief supplies could not be unloaded due to a lack of weight lifting equipment. For instance, the World Food Program intended to drop about 50,000 metric tons of food but no more than 150 metric tons of rice, including the aircraft's load, could be dropped at a time. As a result, the transportation of food to Nepal took months (Page, 2015).

In Haiti, roads, an airport tower, and several governmental buildings, hospitals, and schools collapsed. Due to damaged road, injured people could not be transported to medical camps for treatment. Administrative buildings, and the parliament and the presidential building were damaged, which delayed early decisions (Margesson and Morales, 2010). In Haiti, city roads were blocked with collapsed buildings, debris, dead bodies and space occupied by people. The blocked roads made it difficult to reach victims with relief support (Margesson and Moral, 2010). Many vehicles were buried under debris or trapped under the collapsed infrastructure. As a result, the injured could not reach health camps in time due to restricted movement of vehicles (Goyet, et. al, 2011). The drive to the medical camps was also risky and there were several cases of motorbike accidents, which caused injury and even death (McLaughlin and Rogers, 2013). The international airport at Port-au-Price closed when an airport tower collapsed but it reopened for the U.S. Army and for bilateral relief assistance (Margesson and Moral, 2010). The only airport is narrow with insufficient physical capacity and

warehouses, remained too busy to drop the materials a timely manner. The airport is narrow, so relief materials laid in a corner of the airport (BBC, 2010b).

iii. Lack of Political Stability and Government Efficiency

In Nepal, the aid organizations, including the United Nations, were disappointed by the inefficiency of the government (Herman, 2015). The paperwork for the entry of relief goods at Tribhuvan International Airport and subsequent road transit was heavily bureaucratic, which caused delays in the release of the materials (Ramalingam and Sanderson, 2015; Luitel, 2015). The bottlenecks at customs, repeated harassment of inspection of aid convoys, seizure of goods by the local authorities and mandatory provision for getting approval before distribution of the tents and tarpaulins were significant barriers. This resulted in materials being stuck at the airport or in road transit that was then stolen, misused or damaged (Herman, 2015).

In Haiti, the political instability and corruption has reduced the short to mid-term efforts of the disaster response. Haitians have repeatedly criticized their government for not being effective in the early response period after the disaster. Due to the bureaucratic process of the Haitian government, important tasks such as relief networking, coordinating and mobilizing tasks were negatively influenced as a result of their delayed response (Margesson and Moral, 2010).

4.1.2 Unique Hampering Factors: Nepal

The previous section dealt with hampering factors during the earthquake recovery process that were common to both countries. This section turns to factors unique to Nepal.

i. Mountainous Topography

Difficult topography and terrain rendered most of the affected area difficult to reach (OCHA, 2015). The aid organizations reported that remote parts of the affected regions – mostly hilly or mountainous terrain - could not be accessed without helicopter services. The challenging topographies of the affected districts also contributed to landslides during aftershocks (Ramalingam and Sanderson, 2015).

ii. Rainy Season

The rainy and agricultural season from June to mid-September started shortly after the earthquake in 2015 (OCHA, 2015). The monsoon worsened physical access to remote communities, made it difficult for affected populations to move to safety, and resulted in damp and/or damaged relief goods (UNOCHA, 2015). Additionally, many of the affected areas faced severe rains, flooding and landslides during the monsoon. The rain further damaged the muddy roads, resulting in the remote settlements being totally cut-off (American Red Cross, 2015). As a result, the supply of food, medicine, and construction materials were severely delayed until mid-September of 2015 (OCHA, 2015).

iii. Lack of Political Leadership at the Local Level

The lack of political leadership in the local government made it difficult to identify and target affected communities (Amnesty International, 2015). Also, the lack of coordination from the elected bodies at the community level resulted in resource waste, manipulation and lootings. The political leadership did not bridge the gap between affected people and relief workers (ibid). Due to the lack of political leadership, the

relief support could not reach the affected people. Identifying affected people and the disbursement of cash support for immediate need became delayed (Luitel, 2015).

iv. Social Discrimination and Marginality

Sixty-five percent of *Dalit*² was unable to access relief and 80% of *Dalit* felt that there had been willful negligence in relief distribution. The need identification and loss evaluation was significantly lacking in *Dalit*. For example, the rescue team gave less priority to searching for the buried in *Dalit* at the Gongabu area of Kathmandu city. The *Dalit* members were not allowed to share a shelter with so-called upper caste people in the Rasuwa district (Sob, et. al., 2015). However, *Dalit* women, old people, children and hidden population are more vulnerable during disasters due to their social, physical, and economical standing in the community. Current humanitarian standards lack the necessary provisions for considering their marginality (Cobley, 2011).

4.1.3 Unique Hampering Factors: Haiti

i. Shortage of Human Resources

Haiti lost 30% of civil servants in the earthquake (UNDP, 2015). Among 6,812 health workers the earthquake killed 5,879 (86%) (Goyet, et. al., 2011; Kidder, 2010). Loss of a large number of government employees delayed the administration of support (Kidder, 2010). The lack of international rescuers and volunteers made it difficult to remove trapped people and dead bodies (Walker, 2011). Troops and rescue teams were not active even two days after the earthquake, so the amateur efforts of locals were largely ineffective (BBC, 2010b).

²*Dalit* is a term used to identify those people who are at low rank in the caste hierarchy. In most cases, the term-*Dalit* is used to identify the vulnerable and poor groups of people who are oppressed, suppressed, and exploited (ILO, 2005).

ii. Shortage of Ambulances and Equipment

There is only one ambulance in Port-au Prince. The ambulance is privately run and operated in different corners of Port-au Prince to take the injured to medical treatment. Only a single busy driver worked voluntarily, and managed fuel for the ambulance using donated money. The shortage of ambulances contributed to the high numbers of casualties (Walker, 2011). Similarly, a shortage of heavy lifting equipment and electricity made rescues even more difficult. The collapsed buildings and the rubble could not be removed in time due to the shortage of heavy lifting equipment. People worked many hours to remove tons of rubble manually with hammers or rods, which were not strong enough to pull the trapped people and dead bodies out (BBC, 2010b; Walker, 2011). Finally, rescues could not be operated at night due the lack of electricity (BBC, 2010b).

iii.Lack of Coordination

The lack of coordination between government agencies themselves and with NGOs contributed to inefficient rescue efforts (BBC. 2010a; Kidder, 2010). As a result, 1,800 international rescue teams saved only132 people in Haiti (Walker, 2011). One of the senior UN officers acknowledges that the lack of coordination mechanisms had negatively affected the recovery efforts. The lack of coordination resulted in the huge wastes of time and abuses of resources (ibid).

iv. Feeling of Fear and Lack of Security

Haitians were angry and dissatisfied with international rescuers and the Government of Haiti for the absence of relief efforts and slow progress. Cases of looting goods from abandoned supermarkets were reported (BBC, 2010b). A group of about 5,000 escaped

prisoners were suspected to be involved in looting, illegal road charges, road blockades, rapes, and other crimes (Margesson and Moral, 2010). Meanwhile, at least one person was killed in a looting crowd while he was trying to grab a relief package. In spite of this, most people patiently waited for relief (BBC, 2010a). Feelings of fear and the lack of security in Haiti made international relief workers and NGOs hesitant to deploy (Walker, 2011) which resulted in delays of efforts (BBC, 2010b).

4.2 Factors to Overcome Hampering Factors in the Future

This section presents ideas for the improvement of earthquake response/relief and rehabilitation effort in Nepal and Haiti. Table-4.2 shows the hampering factors and countermeasures for them.

Table-4.2

Hampering Factors and their Mitigations

Hampering factors	Desired countermeasures
Common hampering factors: Lack of preparedness and dependency on aid Logistical and transportation problems Lack of political stability and government efficiency	Enhance effectiveness on response management by emphasizing: Connection between foreign aid agencies and locals actors Mobilization of resources through existing service delivery systems Development of effective communication networks
Unique hampering factors: Haiti Shortage of human resources Shortage of ambulances and equipment Feeling of fear and lack of security	
Unique hampering factors: Nepal Mountainous topography Rainy season Lack of elected political leaders at the local level Social discrimination and marginality	Construction of temporary shelter prior to monsoon and winter Choose cash or kind support Focus on marginalized, hidden and vulnerable populations

4.2.1 Enhance Effectiveness on Response Management

Based on the hampering factors identified above, the following countermeasures, mostly concentrated in areas of managerial efforts, are needed to improve the effectiveness of future response/relief and rehabilitation efforts in both countries.

i. Connect Foreign Aid Agencies and Local Stakeholders

Connections between foreign agencies and governmental actors in Nepal need to be established to serve as a bridge between relief providers and affected populations (Ramalingam and Sanderson, 2015). In Nepal, 28 community based organizations and NGOs received relief/recovery packages to deliver to the affected people from *GlobalGiving*, a humanitarian support organization. They monitored the effectiveness and found that relief was timely delivered to the affected people. The combined efforts of donors and local stakeholders assure efficiency in resource distribution (Lake, 2016). Also, collaborative actions of rescue workers with national actors will ease the identification of affected people and will facilitate the prioritization of efforts (Ramalingam and Sanderson, 2015).

ii. Mobilize Resources through Existing Service Delivery Systems

Cooperation of the international community within local systems helps to keep tasks on track (IASC, 2010). This can be done by procuring local foods, water, and goods such as bamboo, woods, and locally made products which also encourage synergetic relationship among actors (Ramalingam and Sanderson, 2015). Humanitarian actors should utilize existing local networks to deliver aid for effective response. The existing local networks are the District Development Committee, the Village Development Committee and community based organizations and local markets.

iii. Focus on Marginalized and Discriminated Populations

Special attention to marginalized and/or hidden populations³ is required during relief and recovery support (Sanderson and Knox Clarke, 2012). In order to support the affected *Dalit* community in Nepal, a vigilant task force should be formed to identify affected *Dalit* villages and families to connect them with relief providers, political parties' representatives, and government officials at the national and local levels. A tent, steel roof cover, and tarpaulin should be provided to *Dalit* families, as well as food for at least three months. Similarly, medicine, nutrition and health services must be supplied to the elderly, women, children and especially pregnant women from *Dalit* families. Also, a 'National Task Force' should be formed to identify short term to long term needs of *Dalit* (Sob, et.al, 2015).

4.2.2 Develop and Use Effective Communication Networks

Effective communication networks make sharing information easier and faster. In order to establish an effective communication network, the authorities need to map disasters using digital mapping technology through OpenStreetMap, crowdsourcing information, and monitoring social media (Vinck, 2013). They need to establish an agency to share data and use satellite imagery for timely communication (Ramalingam and Sanderson, 2015). With this information, efficiency of air lifting and transport can be enhanced so that the injured persons can be taken to the nearest health center immediately. Data sharing among the agencies will facilitate an understanding of the severity and swift decision making. In Nepal, FM radio stations operated around the country to keep communication linkage alive (Ramalingam and Sanderson, 2015). On the other hand,

³ Hidden population comprises illegal migrants, sexually hidden people, people who are fleeing persecution or law, homeless people and street children (Sanderson and Knox Clarke, 2012).

Haiti had effective communication through text SMS, community-based communication systems, and collaborations with local media (Wall and Chery, 2011; Walker, 2011).

4.2.3 Choose Cash or Kind Support

The cash support helped affected people to buy food and non-food items as per their need. This type of support includes providing a lump sum amount to affected people so that they can buy the items they need (Kauffmann, 2012). The cash-based program, however, demands an understanding of the market situation. Cash support may not be appropriate in the response/relief stage as people are unable to buy and transport the goods, as they are physically, mentally and emotionally suffering (Ramalingam and Sanderson, 2015).

4.2.4 Construct Temporary Shelters Prior to the Monsoon or Winter

In order to protect people affected by disasters from the elements, temporary shelters with water resistant tarps needs to be constructed before the monsoon or winter (Stops and Ashmore, 2007). Delivery of the most essential supplies must be done before heavy rains make accessibility difficult (UNOCHA, 2015). Construction of temporary but durable shelters, such as high-quality waterproof tents, could be erected if the supplies are available. In order to construct the temporary shelters, local materials such as bamboo, wood, or grass can be used (Ramalingam and Sanderson, 2015).

4.3 Reconstruction and Resilience Building Policies in Nepal

This section presents the results for earthquake reconstruction policies of Nepal in the long term.

4.3.1 Post-Earthquake Recovery and Reconstruction Policy 2015

The Government of Nepal has established the National Reconstruction Authority under the chairmanship of the Prime Minister. The objectives of the authority are to assure better and safer residences and livelihoods. It focuses on earthquake reconstruction and to draw aid from the committed donors to finish the reconstruction in six years (GoN, 2015a). The authority focuses on resettlement through reconstruction and new construction, and resilience building by integrating social, economic and physical developments (ibid). It evaluates losses, prioritizes tasks, develops policies, allocates budgets, collects funds and approves plans and programs for earthquake reconstruction for the long term (Kathmandu Post, 2015a). However, the continued existence of the National Reconstruction Authority is uncertain due to opposition from another political party-the Nepali Congress is not satisfied with the appointment of its officer (Sharma, 2015). The Nepal Communist Party (United Marxist-Leninist) is also dissatisfied with the appointment of the officer (Rai and Shrestha, N.D.).

4.3.2 Guideline for Settlement Development, Urban Planning and Building

Construction 2015

The Government of Nepal has promulgated a policy for ‘Guidelines for Settlement Development, Urban Planning and Building Construction 2015’. The policy regulates open space for buildings, right of way, and confirms the suitability of the land for settlements development (Sangraula, 2015). The objective of the policy is to regulate the

uncontrolled and risky urban housing on unsystematically plotted land to promote earthquake resistant buildings (MoUD, 2015). It is expected to fill the gap of the National Building Code which is long due for an update (Thapa, 2015a). The expected impact of the policy is that it will promote safer private and public earthquake resistant buildings in Nepal (Sangraula, 2015). Unfortunately, the implementation of the policy seems difficult due to the lack of technical human resources at the local level (Thapa, 2015b).

The government of Nepal has categorized the buildings as category A, B, C, or D according to their size, purpose and location. The policy facilitates the construction of building category 'A', 'B', 'C' and 'D' buildings. The design of categorized 'A' and 'B' buildings is provisioned to be done by a civil engineer with at least five years long experience but the design of 'C' and 'D' category buildings can be prepared by a civil Sub-Engineer. VDCs approve the design of the building as per the guideline but the construction should be monitored and verified by the district level technical authority (MoUD, 2015).

4.3.3 Design Catalog for Earthquake Resistance Building Volume-I

Most of the private buildings prior to the earthquake were constructed without following the National Building Codes. Out of 191 municipalities, only 26 were following the National Building Codes in Nepal (Earthquake Engineering Research Institute-EERI, 2015). In order to fill the gap, the Government of Nepal has promulgated Design Catalog for Earthquake Resistant Building Volume-1, which contains sixteen prototypes and four flexible earthquake resistant building designs. The objective of the catalog is to provide clear guidance for the construction of earthquake resistant buildings by applying the

National Building Code (GoN, 2015b). The policy aims to enhance environmentally friendly, socially acceptable, economically viable and technically feasible reconstructions, considering climate change concerns and sustainable resource management (World Economic Forum, 2015). The catalog includes an owner-driven reconstruction approach, holistic habitat development, and basic service infrastructure to materialize the aim of ‘building back better’ for long-term resilience by reducing vulnerability of the local communities (The Kathmandu Post, 2015a).

4.3.4 Guideline for Distributing the Subsidy to Reconstruct the Damaged

Residence due to Earthquake 2015

The objective of Guidelines for Distributing Subsidies to Reconstruct the Damaged Residence due to the Earthquake 2015 is to identify affected families, facilitate the subsidies and concessional loans for the reconstruction of earthquake resistant houses (The Kathmandu Post, 2015b). The Ministry of Urban Development delegates the authority to local bodies so that Village Development Committees and municipalities disburse the amount to the affected families (ibid). An amount of Rs. 200,000 (USD 2,000) will be disbursed in three equal installments to construction a new house (MoUD, 2015). If needed, the family may get a loan up to USD 3,000 with 2% interest rate against bank collateral. However, no funds will be provided to a family if they are receiving support from outsiders. The family will receive the financial support only for one house (The Kathmandu Post, 2015b). The policy is expected to help families financially in rebuilding and constructing an earthquake resistant house. However, the guideline does not address those who have already constructed their houses at their own cost. Similarly, poor families will not be able to get the bank loan due to their lack of collateral capacity (ibid).

CHAPTER-5: DISCUSSION

5.1 Hampering Factors in Nepal and Haiti

Data reflects that Nepal and Haiti are relatively similar in their social, political, and economical status. The similarities of the countries also appear in their ineffectiveness during earthquake response/recovery and rehabilitation efforts.

The common hampering factors in both countries for effective implementation of response/relief and rehabilitation are earthquake preparedness plan, availability of transportation, political fragility, corruption, and lack of government efficiency which are related to the social, economic and political situation. The social, political, and economical capacity of developed countries such as the USA, Japan, Australia and others are strong so they are well prepared, equipped and efficient. On the other hand, poor countries such as Nepal and Haiti are financially weak so they depend on the foreign aid. This is why domestic rescue teams in China could save 90,000 people after the earthquake in 2011 whereas 1,800 international rescue teams managed to save only 132 persons in Haiti (Walker, 2011). In general, the effectiveness on response/relief and rehabilitation efforts depends on the social, economic and technical capabilities of the country. Factors such as unrecorded mobilization of funds through NGOs, ineffective government and political instability are also present in other developing countries (Margesson and Morales, 2010). Therefore, perhaps common hampering factors can be generalized to other developing countries too.

Nepal and Haiti also have unique hampering factors that have affected response/relief and rehabilitation efforts. Mountainous, remote topography in Nepal reduced

accessibility (UNOCHA, 2015) whereas the loss in Haiti is concentrated in the capital city-Port-au-Prince and nearby locations (Walker, 2011) where topography was not an issue but security was an issue (BBC, 2010a). In Nepal, fourteen mountainous districts including the capital city of Kathmandu were affected where difficult topography inhibited timely response (Ramalingam and Sanderon, 2015). On the other hand, Haiti's response/relief and rehabilitation efforts were hampered due to a lack of human resources, ambulances and heavy lifting equipment.

Nepal and Haiti both have socially marginalized and vulnerable people in their demographics. However, the issue of social discrimination and marginality appeared as more of a hampering factor in Nepal. Although the 2015 Nepalese constitution abolished caste wise discrimination, some *Dalit* organizations raised the issue of discrimination. However, this is difficult to factually prove. The lack of independent proof from Nepal leaves a space for further research. In general, common factors can be generalized to appear in other developing countries. However, unique hampering factors appeared as a result of the geography, time, and severity of the losses do exist.

5.2 Factors to Overcome the Hampering Factors in Nepal and Haiti

Some of the hampering factors of both countries can be solved with effective managerial efforts with minimum cost but some require resources investment and infrastructure. For example, coordination among aid agencies can improve communication. It requires a huge amount of national investment to construct an international airport and road connectivity. That said, the government should devote money and time to maintain the airport for the free flow of international support especially during times of crisis (Minnesota Airport Technical Assistance

Program,N.D). The difficulties associated with the international airport and impact on the response/relief and rehabilitation of both countries show that Nepal and Haiti need to manage the airport for timely entry of the international rescuers.

Similarly, acquiring international relief aid is not an issue but being able to effectively manage and deliver the aid to affected people is. The international community may seek the entry points to deliver relief to affected people and at the same time, national and local agencies may wait for external support (Carter, 2008). The effective coordination, communication and exchanging ideas will impact on early response/relief and rehabilitation efforts (Ramalingam and Sanderson, 2015). So the coordination between governmental agencies, CBOs, local NGOs and international community will bring efficiency and help to solve human resource related constraints as well as early delivery of response/relief rehabilitation efforts to the affected people (UNOCHA,2015).

Although mobilization of local human and nonhuman resources through local service delivery system may not be sufficient for long term, it is still a good strategy to reduce the dependency on foreign rescue teams in the short to mid-term (Ramalingam and Sanderson, 2015). The reduction of dependency on foreign support during crisis depends on the intensity of effects. Not only this, the mobilization of local resources such as skill and material boosts up the local economy. For example, the World Food Program mobilized 16, 695 local laborers to transport the food from nearest market in Nepal. The mobilization of local porters also helped to boost up the local economy (WFP, 2015). The mobilization of mules was found to be a good strategy in

transporting food in Pakistan, Nepal and Sudan. These efforts assured early transportation of life-saving food and medicine.

Caste-wise discrimination is not present in Haiti but played a role in the relief efforts in Nepal. Even though caste based discrimination in Nepal is illegal, it still continues to occur. In every society, people from specific social groups remain passive or inactive, keeping themselves hidden (Jakobsen, 2011). Also, special attention to *Dalit's* disabled, aged, pregnant, children and prisoners is required to protect them. The elderly have limited mobility, muscle strain and are vision impaired so special attention is required (Fraser, 2013). The issues raised by the *Dalit* organization are not proved by independent researchers so in reality the issues raised in some locations of the country may be questionable. However, the special focus to such marginalized section of the population will be really significant.

5.3 Reconstruction and Resilience Building Policies in Nepal

The earthquakes in Haiti and Nepal killed 300,000 and 8,693 people respectively. While similar scale of earthquakes in Chile and California killed 1,000 and 100 people respectively (Marks, 2015). These facts demonstrate the importance of infrastructure and building codes for both private and public buildings.

The reconstruction process of Nepal is gaining momentum after the government established a powerful National Reconstruction Authority. Reconstruction Authority is a powerful government entity established to administer the reconstruction process of Nepal. It will mobilize financial, nonfinancial and technical human resources along with international aid. Although the authority is not free from critique, it is a leading governmental agency in Nepal to undertake the reconstruction and resilience building.

According to Global Facility for Disaster Reduction and Recovery (GFDRR, N.D.), government leadership is key for effective implementation of reconstruction policies where the international community supports to strengthen the government's capacity (Thapa, 2015b). For example, Indonesia, China, and Chile are countries who have demonstrated good reconstruction examples even one faced with great loss. This was possible only due to the powerful government leading the reconstruction process.

Policies on settlement development and urban planning are based on the success of India, China, and Chile should be modeled in Haiti and Nepal. The Chilean reconstruction plan consists of regional and urban development, inter-communal, communal and plans for specific sectors of cities and neighborhoods (Platt, 2011). The Chilean government emphasized preservation of local identity, territory, sustainable urban plan, but Nepal's target is to construct earthquake resistant houses, controlling unplanned land plots and addressing environmental concerns. Significant, powerful leadership with political, financial and technical capacity will achieve the objectives of the policy in Nepal and Haiti as Chile, India and China have. In this situation, the leadership of the Government of Nepal in reconstruction will 'bring Nepal back better.'

The building construction technology and materials are same and are based on reinforced cement concrete in each part of the world. The materials and technology is similar so the reconstruction decision needs to be based on the experience from other countries. Since the policies are based on the experience of other countries, Nepal will know potential hurdles in implementing reconstruction policies. The reconstruction policies are to be decentralized at the local level emphasizing the quality standard of the reconstructions. They are pro-poor, focused on building quality standards and the rural

and the urban. According to GFDRR, (N.D.), above mentioned policy factors are crucial in reconstruction for their success.

The government of Nepal has formulated reconstruction policies and guidelines. They are now implementing on the basis of good governance and transparency with a focus on poor people. The policies are principled by good governance, transparency, accountability, and participation of stakeholders (Thapa, 2015b) which are addressing the suggestions of 'International Conference on Nepal's Reconstruction' held in July 25, 2015 (Sharma, 2015). On the other hand, reconstruction policies of Haiti are dominated by the international community. The role of government in mobilization of resources is in the shadows. None of the government, people or NGOs participated in preparation of Haitian reconstruction policies. This shows that Haiti's reconstruction policies lack participation by stakeholders. In Nepal, the policies were developed in the leadership of government as the reconstruction policies of India and China. Unfortunately, according to UNCRD (2008), developing countries rarely implement the policies due to lack of political consensus, financial capabilities and human resources.

Some political challenges in the future may come up regarding land acquisition for resettlement because land is a scarce natural resource in Nepal. Implementation of already approved design and prefabricated building materials will be problematic as they remain unfit in new building designs. The technical capacity of the country may not be enough to transpose the building policies into practice. However, the policy will serve as a guideline for national and international stakeholders and will bring them under the governmental umbrella in reconstruction.

CHAPTER-6: CONCLUSIONS

The social, political and economic situation of Nepal and Haiti are similar. The similar characteristics of both countries are reflected in common hampering factors that troubled earthquake response/relief and rehabilitation efforts. Common hampering factors of both countries include: lack of enough preparedness, logistical and transportation problems, and government inefficiency. The execution of the preparedness plan depends on foreign aid. The development of logistical and transportation sectors have been influenced due to economic capacity whereas the government efficiency of both countries is the outcome of fragile politics.

Nepal and Haiti are unique in topography, human rights, politics, and impact of the earthquake. The uniqueness of the countries has resulted in unique hampering factors which creating hurdles in the smooth functioning of earthquake response and rehabilitation efforts. The unique factors have added extra severity in either country in saving lives and reducing destruction.

The disaster preparedness plan of both countries is negatively influenced due to socio-economic backwardness, dependency on foreign aid and political instability. The result of the poor preparedness plan failed to adopt the strategy to save the lives and property. After the earthquake, the transportation sector, services from the government and non-government sectors were paralyzed due to heavy destruction of infrastructures and workforce loss. Because of economic incapability, Nepal and Haiti are unable to construct additional airports or roads to connect settlements in a short time. The revitalization of the destructed transportation facilities due to the earthquake in a short

time is also not possible. Both the common and unique hampering factors have resulted in additional loss of lives and damage of property which could be minimized with effective measures.

The obstacles faced after the earthquakes in Nepal and Haiti could have been overcome if they managed the relief/response and rehabilitation efforts properly. In other words, disaster response policies, guidelines, and strategies need to be developed, updated, and enforced to solve the hampering factors. For effectiveness, countries need to strengthen relief management and delivery methods. They need to take the lead role to bridge the affected people and relief providers by mobilizing local capacity, resources, networks, and skills. Participation of local authorities, community based organizations, and stakeholders will resolve the issues related to corruption, manipulation, conflict and waste of resources. Also, relief/response and rehabilitation efforts become need-based if they choose cash or in-kind support to affected people. The results drawn from Nepal and Haiti can also be replicated in other developing countries whose socio-economic and politics are identical.

The reconstruction policies, guidelines, standards and directives of Nepal are based on good governance, decentralization. They are state-driven and pro-poor. The integration of the suggestions and aspirations of national and international stakeholders, desires of people, political visions, local capacity and resources are incorporated in the reconstruction policies. The policies are based on National Building Codes, aiming to regulate the technical parameters of the lands for urban development, including public and private building construction in Nepal. Policies have emphasized socio-economic development, environmental protection, and ecological conservation during resilience

building. A powerful, newly established National Reconstruction Authority is implementing the reconstruction policies in Nepal.

The strategy for mitigating the hampering factors in both countries along with reconstruction and resilience building in Nepal depend on how the political parties and stakeholders implement them; how they build political consensus in implementing the policies for reconstruction and resilience building. Importantly, the role of National Reconstruction Authority in mobilization of the resources from national and international level will determine the success or failure of the policies and the role of politics will be significant here. As a citizen of Nepal, my personal perception is that Nepal develops policies following policy development norms and procedures, but the implementation is always jeopardized.

Finally, Nepal and Haiti will effectively save the lives and reduce property damage by addressing the identified hampering factors. The reconstruction policies of Nepal will fortify Nepal by completing reparations within six years.

CHAPTER-7: RECOMMENDATIONS

Based upon the findings discussed earlier, the following recommendations are made to increase the effectiveness of earthquake recovery efforts in Nepal in the future.

7.1 Construct a Helipad in each Villages Development

Due to the mountainous topography of the country, landing helicopters at villages seemed difficult. As an earthquake relief volunteer, I observed this difficulty first-hand. The helicopter dropped the relief materials where the pilot felt was easiest. Dropping materials from a helicopter a few hundred feet in the air caused the materials to be damaged or broken. The materials were captured by the persons on the ground who might not have been those affected by the earthquake. In this context, if the village development committee constructs at least one helipad at each village, dropping off relief materials and picking up injured people will be easier in the future.

7.2 Review and Update the Government Plans and Policies

It is recommended to update the Disaster Risk Reduction Preparedness Strategies, Policies, Guidelines and Directives regularly. One of the criticisms of Nepal and Haiti's disaster risk reduction preparedness is a lack of preparedness, revision and update of plans. The Disaster Management Act, National Building Code, Building Catalogue are recommended to be updated regularly. It is recommended to update the Basic Standards on Settlement Development, Urban Planning and Building Construction 2015, and Design Catalog for Earthquake Resistance Building Volume -1. Updates of the mentioned policies and plans will assure houses and urban settings in Nepal are earthquake resistant.

7.3 Train Local Mason (Skilled Laborers)

The Government of Nepal has updated the National Building Code, building catalog, and design policies to assure cost effective and earthquake resistant houses. The new building designs have different technical parameters such as building foundations, walls, roofs, wall bonding, reinforcement, concrete structures and others. It is technically difficult to implement new models without upgrading the skills of the mason and laborers. So, it is recommended to develop and offer a basic level course in technical school so that capacity at the local level develops to transpose the design into actual implementation. Not only this, the traditional building workers are unaware about the construction methodology of new buildings as per new design standards. It is therefore recommended to organize ‘labor leadership training’ in villages at least for two people who may train others in future. This will result in the internalization of earthquake resistant buildings construction techniques in Nepal.

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