

PERCEPTION REGARDING SECURITY FORCES INVOLVEMENT IN POST GORKHA EARTHQUAKE SCENARIO 2015, NEPAL

¹Manoj Bakhunchhe Shrestha, ²Dr. Krishna Kumar Tamang, ³Tulshi Laxmi Suwal, ⁴Anjay Mishra

¹Engineer at Armed Police Force, Nepal (Technical Deputy Superintendent).

²Ex Additional Inspector General of Armed Police Force, Nepal.

³President: Small Mammals Conservation and Research Foundation, Nepal.

⁴ Assistant Professor at Nepal Engineering College - Centre for Postgraduate Studies, Nepal.

ABSTRACT: *The Barpak, Gorkha, Nepal 7.8 magnitude earthquake on 25th April 2015 was a catastrophic, with an epicenter of Barpak village, approximately 80 km to the northwest of Kathmandu, the capital of Nepal. A series of aftershocks began immediately after the mainshock, at intervals of 15–20 minutes, which had the subsequent effects on myriad of seemingly related disasters: triggered an avalanche on Mount Everest and Langtang valley, landslides on different part of the country which further result in loss of human lives and physical infrastructures. Among the 14 severely affected districts in Nepal, the earthquake's effects were amplified in Bhaktapur district, mainly around the Bhaktapur Municipality area due to compact Newar settlements of improperly maintained brick mud mortar buildings. 45.44% of the total numbers of houses, i.e 17,698 were damaged in which 36.62% and 11.82% were the completely and partially damaged respectively in Bhaktapur Municipality. It was also recorded that the total number of deaths in municipality were 252 and 357 were severely injured. Similarly, among 860 historical monuments, the total damaged monuments were 116 which also includes the centuries-old buildings of UNESCO World Heritage Sites including Bhaktapur Durbar Square. Of them, 67 were completely damaged while 49 suffered from partial damages. This research was done to assess the people's perception and effectiveness of the security forces involvement in rescue and relief operation carried out post earthquake in Bhaktapur Municipality. For this study, the primary information's were collected through Focus Group Discussions comprising respondents of the affected area and the security personnel from the Nepal Police and Armed Police Force. Key Informant Interview was also conducted with Municipality staffs and Security personnel. Several published books and conference papers were referred for the secondary data. Security forces were highly appreciated for their immediate prompt actions and laudable works during a devastating period which gave the rays of hope for survival to locals. Their continuous devotion to the tasks rescued a notable number of lives in need. Despite the fact that lack of advanced equipments and skilled rescue workers were affecting the assigned jobs, however the coordination among the security forces with local authorities; especially the affected people had made the operation steady.*

Key Words: *Ancient, Earthquake, Debris Management, Disaster Equipment, Response, Rescue, Security Forces*

1. INTRODUCTION

1.1 Background

Bhaktapur municipality is the ancient historical and cultural city. Interestingly, we can see that even now some few aged people walk with naked foot. The core area of the municipality is highly vulnerable to the earthquake and other disasters. The core area of the municipality has very congested unplanned, adobe, traditional type buildings, narrow roads and most buildings are old, unreinforced masonry and non-engineered type. The revenue of municipality largely depends on upon the tourism from which, it extensively uses to maintain traditional buildings, archaeological monuments and to motivate by giving a certain percentage of money on the wood to the house owner to maintain a traditional outlook of the buildings in the core area. Bhaktapur municipality is the only one municipality in local bodies in Nepal which uses its revenue in the education sector. Bhaktapur Municipality has been operating the Khwopa Engineering College, Khwopa College of Engineering, Khwopa College, Khwopa Higher Secondary School, and Khwopa Polytechnic Institute at affordable and cheap fee structures.

Nepal is one of the most vulnerable countries to the impact of the disaster and ranked 11th in the earthquake-prone country in the world [1]. Nepal lies in between the Indian and Tibetan plate, along which a relative shear strain of about 2 cm per year is assumed and also the Indian plate is subducting at a rate of 3 cm per year. Despite the long history of earthquakes and seismic hazard, the lack of resources in the rural areas has prevented many Nepalese from using modern construction methods, technology and materials that are designed to withstand earthquakes. More than 98% of the buildings in Nepal are built with low-quality materials and by the people who were not trained for proper construction practices [2]. The major earthquake on April 25th and its terrible aftershock of May 12th, 2015 killed 8,773 people. 2,638 government houses, 505,577 private houses, 392 public health facilities, 32,145 classrooms were fully damaged [3]. Security forces are the key first respondent during any disaster in Nepal. Armed Police Force (APF) has the mandate to serve the nation in natural disaster recovery and management. APF has its own Disaster Management Training Center (DMTC) in Kurintar, Chitwan, which was established in 2011 AD. The main objectives of the DMTC are to produce professional APF personnel in disaster and rescue activities and strengthen APF's efforts to enhance the field of disaster management. The training center produces well-trained police personnel for disaster management. The trained personnel are able to rescue victims, building demolition, ability to treat victims, relief material distribution, safely settlement and resettlements in a society of the victims [4]. For the disaster period to distribute fresh potable water to the victim's at seven location of Kathmandu valley in the premises of APF offices deep tube well were already constructed before April 25th, 2015 with the financial and technical assistance of US government with storage of safety stock. APF is always in standby condition for disaster rescue in various places of Nepal. Armed Police Force have APF Disaster Rescue Valley Battalion at Sinamangal, Kathmandu of having total strength 761 and Nepal Army (NA) has its two Disaster Battalion one at Sundarijal, Kathmandu and another is on Rasauli, Chitwan having 575 strengths each. Also, Nepal Police (NP) has its Disaster Management Division at Samakhusi, Kathmandu of having total strength 447 at their own disaster

Battalion for the disaster preparedness. Security forces act upon the Disaster Relief Act of 1982, which has provisions to form a central rescue committee, at times of natural disaster, chaired by the Minister of Home Affairs. Further provisions are laid down in the Act to form sub-committees for search, rescue and relief.

1.2 Statement of the Problem

There are high numbers of non-engineered houses in the study area. As long as the building code implementation is concerned, there is not sufficient awareness among policy makers, building professionals, general public including potential house owners, and even educated masses [5].

Security forces were extensively deployed immediately after the main shock shook the nation for rescuing, keeping safely to victims and distribution of relief material in spite of the lack of advanced equipment and insufficient disaster related equipments and materials. Security personnel were highly appreciated by the people for their hard work and dedication. A total of 66.12% Nepal Police personnel were mobilized in an earthquake rescue and relief program, 94 foreigners from 16 different nations lost their life and 167 were rescued and returned safely to their nations [6].



Fig. 1. Mud dust seen instantly after 25th April Earthquake in Municipality from Jawaladal Battallion, Suryabinayak (Source: NA)



Fig. 2. Excavator on work at 25th April, 2015 in Chyamasing, Bhaktapur



Fig. 3. Damage seen at Jellan, ward number 2



Fig. 4. RC Frame structure damage by 12th May, 2015 Earthquake (aftershocks) at Sallaghari



Fig. 5. RC Frame structure building collapsed at Sitapaila



Fig. 6. Ancient Fasi Dega Temple collapsed at Bhaktapur

The main objective is to assess the situation and effect of 25th April 2015 AD catastrophic earthquake affected community in Bhaktapur Municipality. Specific objectives are as follows:

- 1) To assess the people's perceptions on the deployment of security forces in protecting life and property, including security management immediately after the earthquake.
- 2) To assess the security forces perceptions on their role played in earthquake disaster.

1.4 Scope and Limitations of the Study

The scope of the study was to explore the damages of buildings occurred in the study area due to the earthquake and to assess the effectiveness of the security system in the post disaster scenario.

Limitations of the study were as follows:

- Study was done at earthquake affected six wards out of seventeen wards at Bhaktapur Municipality selecting affected ward numbers 1, 2, 9, 10, 16 and 17.

2. LITERATURE REVIEW

2.1 Disasters Scenario in Nepal

Nepal is a Himalayan country having prone to earthquake and it lies in the active seismic zone V. Nepal lies in between $80^{\circ} 4'$ to $88^{\circ} 12'$ East longitude and $26^{\circ} 22'$ to $30^{\circ} 27'$ North latitude. It has an area of 147,181 sq. km. extending roughly to 885 km. from East to West and varies from 145 to 241 km. North to South. The country is landlocked bordering with India on the east, west and south, and China on the north. Nepal is situated in the middle portion of the Hindu Kush-Himalayan Region. The altitude ranges from a minimum of 70 meters to a maximum of 8,848 meters, whereas the climate varies with its topography and altitude. A combination of rugged topography, high reef, active tectonic process and intense monsoon rain has made this fragile environment vulnerable to varieties of hazards and disasters [7]. Unreinforced brick and stone masonry buildings are found in most of the areas in Nepal. A typical older Newari house is composed of thick brick and mud/lime walls, wooden beams with planks to support mud floors, clay tile roofing, wooden stairs and columns which serve as the load bearing system. These types of houses are very common in Bhaktapur, Lalitpur and also in the Kathmandu. Newari houses suffered severe damage, particularly in Bhaktapur, Sankhu and Khokana. Wood deterioration, poor bonding between the mud and brick, and construction of additional floors with heavy roofing might have contributed to the failures of these structures on the 25th April 2015 earthquake [8].

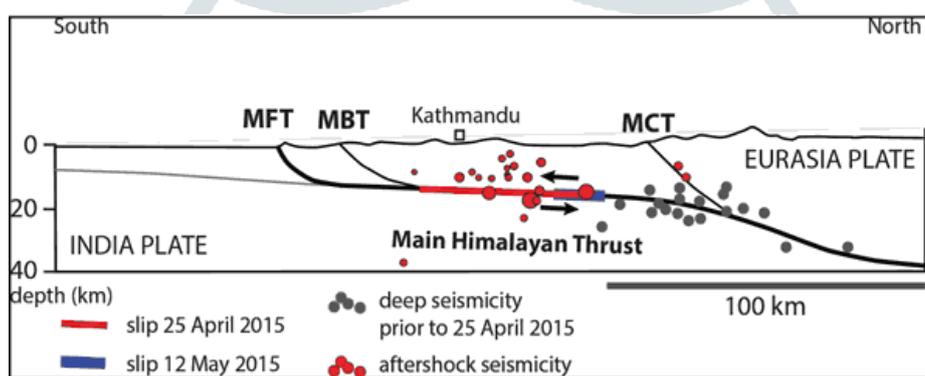


Figure 7. Main and Aftershock Ruptures Locations due to Barpak, Gorkha, 7.8 magnitude earthquake on 25th April 2015[2]

Many studies have been carried out in the past to evaluate the earthquake risk of Kathmandu Valley. The most significant among such studies are: the Study on Earthquake Disaster Mitigation for Kathmandu Valley conducted in 2002 by the Ministry of Home Affairs (MoHA) with support from the Japan International Cooperation Agency (JICA); and the earthquake risk assessment and scenario development in 1997 of Kathmandu Valley Earthquake Risk Management Project (KVERMP) implemented by the National Society for Earthquake Technology, Nepal (NSET). A simple loss estimation carried out during the KVERMP suggested that in case of a recurrence of similar shaking to that of 1934 in Kathmandu valley would result in the following consequences: building damage: 60%, death: 40,000, injury: 95,000, homeless population: 600,000 – 900,000, half of bridges, 10% of roads, 95% of water supply pipes and 50% of other components like pumping stations and treatment plants [9].

2.2 Disaster Preparedness and Awareness

Japan is the father of the disaster preparedness and also the most equipped country for the preparedness to deal with the earthquakes. The technologies and management of building construction have been upgraded and the country has been able to construct lots of earthquake resistant buildings. As a matter of fact, though Japan has been considered as the most hazardous country in the context of earthquakes, but the fatalities and casualties level are far less considered in the global scenario [10]. In Japan, September 1st is celebrated as “Disaster Management Day” and the period from August 30th to September 5th is declared as “Disaster Management Week”. Various events such as the Disaster Management Fair, Disaster Management Seminar and Disaster Management Poster Contest are held to increase disaster management consciousness and disseminating disaster management knowledge. At the Great Hanshin-Awaji Earthquake Disaster in 1995, the number of people captured in the buildings is around 35,000. After the earthquake happened, in the situation that the telephone didn’t work and there was a heavy traffic on the road, 27,000 people were rescued by neighbors and 80% of them were alive. However, 8,000 people were rescued by the Army, Police or Fire Fighters and less than 50% of them were alive. Community-based voluntary organization for disaster management, which promotes volunteer activities and local disaster management activities based on neighborhood associations on “Disaster Management and Volunteer Day” on January 17th and during Disaster Management Volunteer Week (January 15th – 21st) are also held. Also, the local government promoted seismic retrofit of private houses and concrete block fences [11]. Two large earthquakes in China: the 2008 Sichuan Wenchuan earthquake and the 2013 Sichuan Lushan Earthquake were compared to develop effective ways to reduce casualty and economic loss in future earthquakes. After the Wenchuan earthquake, it was understood how to reduce future losses. China focused on seven factors: basic information, preparedness, government response, local residents’ responses, medical rescue teams’ work, earthquake-induced secondary effects, and injurious character. It recommended that three major actions should be emphasized to facilitate the most effective course of disaster planning and action. First, sufficient preparedness and strict preventive measures form the foundation to minimize damage and reduce casualties. Second, once the disaster had occurred, a single well-run headquarters increases efficiency in rescue efforts. Finally, local rescue strength of both professional staff and citizens is the most critical factor to lower disaster casualties [12]. Disaster Awareness (DA) initiatives consist of individual activities such as conducting earthquake awareness meetings, or earthquake preparedness posters presentation and demonstration at a local community. Another more comprehensive DA approach involves,

planning a series of coordinated activities, for example, a comprehensive DA campaign can be implemented as a disaster awareness day/week, publications, broadcasting on the radio and television, conducting poster contests and performing disaster drills at community and schools. Finally the most effective at the community level is a strategy formulation that integrates DA into broader community health and development goals [13]. The damage caused to life and property can be wisely mitigated to a great extent by proper disaster management, which includes pre-disaster planning, preparedness and providing suitable rescue and relief materials to affected people. In addition to the government agencies, voluntary national as well as international organizations and educated and well-trained community plays an important role in disaster management. The miseries can be considerably reduced if our society is adequately prepared to fight the initial impact of the disaster and a swift rescue and relief is provided [14]. Nepal government has designated January 15 as the Earthquake Safety Day, in recognition of the occurrence of the earthquake tragedy to strike the valley on January 15, 1934. An Earthquake Safety Day National Committee has been constituted by the Minister of Science and Technology as the Chair, and 22 representatives of various organizations, including NSET, as committee members. The Committee is responsible for organizing the Earthquake Safety Day events annually. The first Earthquake Safety Day was organized during 12-18 January with the Prime Minister releasing the Kathmandu Valley Earthquake Risk Management Action Plan (KVERMP) and the Earthquake Scenario of Kathmandu Valley, and the Minister for Science and Technology is vowing to work towards implementing the KVERMP. An Earthquake Safety exhibition was organized by NSET/KVERMP in cooperation with private, public and non-government sectors of Nepalese society. In addition, NSET-Nepal organized interactive activities, including discussions on radio and television, a technical seminar for professionals of the building industry, earthquake-theme essay writing and painting contests for school children, and a street performance depicting what to do in case of an earthquake. A high point of the event was a simulation of how different building types, both with and without seismic reinforcement, would react to a high-intensity earthquake like that of 1934, demonstrated using a simple shaking table and one-tenth scale models of typical Nepalese buildings [15]. Concerning the natural disaster management by her virtue and deeds the Armed Police Force cannot be inevitably excluded. The mandated tasks of Armed Police Act 2001 govern the force to assist in natural disasters and prevent the outbreak of epidemics. The APF Disaster Management Training Centre produces skilled personnel for rescue operations. The Centre at times gets involved in awareness campaigns of disaster and rescue savoir faire. Besides, APF has Samarpan Rastra ko Lagi (Dedication to the Nation) Nepali program telecast in the TV channels of Nepal whereas vocational and life saving practical educative radio programs are on air every Sunday on 100 megahertz band. These programs have been beneficial to the disaster prone site inhabitants [16].

2.3 Security Forces' Involvement in Disaster

A total of 66,069 army personnel were mobilized in a sustained manner. Amongst these 52,870 troops were deployed covering all the municipalities and VDC.s in the fourteen most affected Districts. They carried out damage assessment of VDC.s, helped to distribute the relief items through the disaster management committees. They helped to construct shelters and provided security to the local population [17]. In the earthquake affected districts, 623 APF disaster management trained personnel, 52 Peer course (CSSR/MFR) trained personnel altogether 22 thousand APF personnel were deployed for rescuing, relief management, dismantling risky houses and for debris management. APF, Guheshori Battalion dismantled 375 risky adobe houses and 10 risky masonry and RC houses in Bhaktapur district [4]. Police in Nepal have deployed extra forces in a bid to stop a spate of burglaries and thefts from homes ruined by April 25th, 2015 earthquake. Many reports on robbery were also filed and some robbers were arrested too. People who had been camping on an army parade ground in the city with thousands of others were worried about their property locked inside their home. Police thought it was obvious that some people would want to exploit the emergency and alert people about the risk of robbery to be careful [18]. Crime and violence were drastically increased due to escapes of prisoners during 2010 Haiti Earthquake. Youth gangs and other armed groups regained their strength in most vulnerable neighborhoods and spreading to other areas of the city. In IDP camps displaced people, especially women and children remain vulnerable to sexual and other crimes [19].

3. METHODOLOGY

3.1 Study Area:

Bhaktapur Municipality is located about 13 km from the eastern part of the capital city of Kathmandu. Bhaktapur is the smallest district of Nepal, which occupies an area of 119 square kilometers. Bhaktapur Municipality lies between 27.67222°N 85.427778°E. The east-west length of the district is 16 kilometers. The altitude ranges from 1,331 meters to 2,191 meters above the sea level. The highest peak of the district is Nagarkot. The average literacy rate of Bhaktapur is 81.68% where the male literacy rate is 90.48% and that of female 72.65 [20].

Bhaktapur is the home of traditional art and architecture, historical monuments and craft works, magnificent windows, pottery and weaving industries, excellent temples, beautiful ponds, rich local customs, culture, religion, festivals, musical mystic and so on. Bhaktapur is still an untouched as well as preserved ancient city that is itself the world to explore for tourists. It has 17,698 households and 84,748 populations where most of the persons occupation is agriculture. Tourism is the main income sources of the municipality. Changunarayan Temple and Bhaktapur Durbar Square are enlisted in the World Heritage.

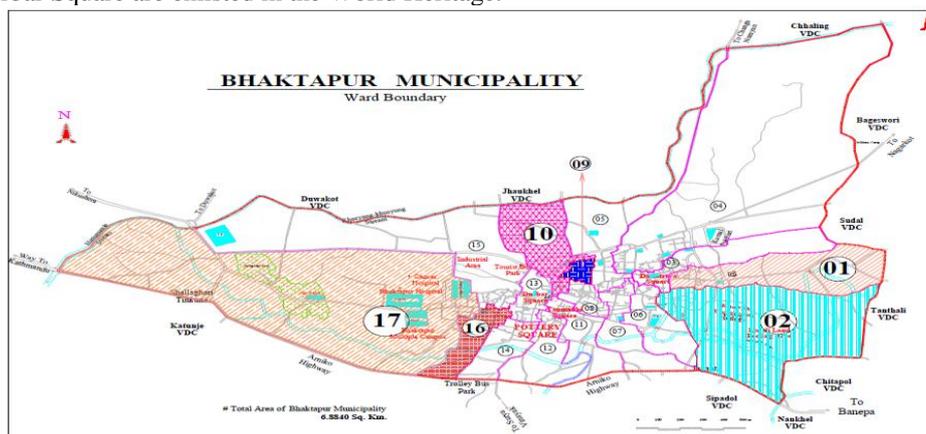


Figure. 8. Study Area

Fifty-five-window Palace, Datatraya Temple, Nyatapole, Bhairab Temple and Nagarkot are the prominent tourist destinations of Bhaktapur. Juju Dhau known as “King of Curd” is a superb brand of the Bhaktapur and is popular in international arena too. Due to its unique taste, Juju Dhau is a must-try food for both internal and external tourist to savor. It is local homemade curd using high quality milk. This is an unavoidable ingredient in every function and ritual of Newar community. Even pregnant women are given this high-calorie food. As such, Bhaktapur is one remnant of the whole eastern culture. It is a unique heritage city.

3.2 Methods of Data Collection

Primary sources of data were collected in this study. For this, the study area was visited instantly after 1 hour of the 25th April 2015 earthquake and later on numerous times for the primary data collection.

3.2.1 Primary Data:

Primary data were collected by friendly Focused Group Discussion method with both security personnel of Nepal Police, Armed police Force and local residents and municipal staffs of ward number 1, 10, 17. Key personnel interviews with Bhaktapur Municipality staffs and Nepal Army were also done for the assessing effectiveness of the deployment strategy of security forces in protecting life and property, including security management immediately after the earthquake. While conducting the FGD in this study respondent's inner feeling, emotional attitudes and perspectives were deeply explored. Respondents were free to talk on the topic and the new or additional information and opinions generated were recorded. Respondents were identically chosen and all were motivated to discuss on the topic equally. While conducting FGD age, occupation and gender sensitivity were highly considered.

3.2.2 Secondary Data:

Secondary data were collected from several published books and conference papers.

4. RESULTS AND DISCUSSION

4.1 Perception on the Deployment of Security Forces

4.1.1 Rescue Period

APF, Industrial Security Base, Byasi, Bhaktapur:

On the first 25th April 2015, Industrial Security Base, Byasi's (ward number 10) personnel were dispersed for recce in sano Byasi, thulo Byasi and Sallaghari area. Some personnel were deployed to clear the road blockage of a rubble pile and traffic management in Byasi road area. Section (13 personnel) reached in Byasi area for a rescue job within 10 minutes with shovels. They told that only relatives and friends helped in the rescue operation. Personnel told that they had to overcome the obstacle of the congested mud mortar brick house settlement constructed as per the Newari civilization and its architecture and the blockage of roads which compel them to carry out their assigned tasks on foot.

NP, Metropolitan Police Range, Bhaktapur:

In the earliest hour post earthquake, the police personnel were instantly deployed to the nearest disastrous area at Sano Byasi within 3 to 5 minutes below the Nepal Police Metropolitan Police Range. Respondent told that 5 to 7 personnel were deployed to core areas within 10 minutes. After the message arrived from the radio communication set (walkie-talkie) of the destructions, the security personnel geared up with some tools such as picks, shovels, ropes and stretchers for the rescue process. Locals also helped by giving whatever rescue materials they had and locals were self-motivated in rescue because of involvements of security personnel.

NA, Jawaladal Battalion, Suryabinayak:

Jawaladal Battalion personnel saw muddy dust in the air after the earthquake in the municipality area immediately and they deployed 1 platoon (46 personnel) within 15 minutes from battalion at Suryabinayak with picks, shovels, ropes and stretchers. Then other groups were also entered into the municipality core area from Bhelukhel, Chyamasing, Byasi and Ram Mandir area.

APF, Guheshori Battalion, Bhaktapur:

In Golden Hour (72 hrs): on the first 25th April, Armed Police Force, Guheshori Battalion personnel were gathered within 5 min at the assembly area. Respondent told that they were moved within 30 minutes from battalion premises to Bode and Nikosera the nearer affected area. While going to the rescue they took pick, shovel, ropes and stretchers. Around 15:00 hrs on 25th April they reached the most affected area Byasi, Chyamasing, Durbar square, Bhelukhel, Inacho and other places. APF personnel headed towards the affected area by clearing the blocked area with proper safety precautions. If any personnel were at risk during rescue time, the other APF personnel were deployed with proper back force to help them with first aid tools. APF was deployed independently till the rescue period. On the next day, APF personnel were deployed with Collapsed Structure Search and Rescue (CSSR) team who were equipped with cutting, drilling equipment with a generator as a power source.

Ward number 1:

Respondent told that on the day of devastating earthquake and its series of aftershocks they were very petrified and came into senses after a while. Overcoming their own feeling, they tried best to rescue their dear ones. They used their own house tools and agriculture tools to rescue the family members and neighbors. They told that they even didn't care about any bitter emotions and bad relationships, instead tried to save and rescue relatives in the humanitarian feelings. Respondent told that they rescued more victims in the first two days very more than the security forces. Two excavators were used by locals with the help of brick kiln entrepreneurs in the Chyamasing gate area. Security force joined the rescue tasks at around 14:00 hrs on the same day in an outer area while they were deployed with increased number of security personnel on the next day only to the inner core area.

Ward number 10:

Respondents told that they tried best to rescue their family and neighbors with the help of police personnel. They used the tools available to them like agricultural tools and the tools used for construction in rescuing their relatives and neighbors. Excavators from the brick factory were also used during rescue period. Since Security force offices were nearer to the respondents location they came sooner near about 12:30

hrs i.e. after 35 minutes for the rescue. Security personnel came with picks, shovels and ropes. Due to continuous aftershocks the rescue process was disturbed numerously on halting the golden chance to recover the live bodies both to local and security personnel.

Ward number 17:

Respondent told that they rescued their family members and neighbors in most areas and called the help of security personnel to rescue where they were unable to reach. Respondent told that they rescued more victims than that of security personnel using the available tools with them to rescue their family members and neighbors. Security forces were not seen so much on that day. Security personnel involvements were more seen on 3, 4 days later after the earthquake.

The golden period was well utilized by security forces in the rescue operation of victims. More victims were rescued by security force coordinating with the volunteer groups established by local people. Hundreds of lives were saved and more were rescued regardless of the lack of advanced tools.



Fig. 9. Rescue operation at ward no 1, Suryamadhi



Fig. 10. Rescue operation at Collapsed RCC structure (Source: APF)



Fig. 11. 11 year old Girl Rescued after 90 hrs at Dattatraya (Source: NA)



Fig. 12. 'Miracle Baby' rescued after 22 hrs under rubble in Ward no: 4, Muldhoka (Source: NA)

4.1.2 Coordinated Rescue and Relief

This is the period after 72 hr (Golden hour) of 25th April, 2015 Earthquake. In this period security force were mainly focused on relief distribution to earthquake victims while a rescue operation was continued simultaneously, although it was given less priority due to minimal chance of live bodies to be found.

APF, Guheshori Battalion, and APF, Industrial Security Base, Byasi:

After a golden hour, Armed Police Force, Guheshori Battalion and APF, Industrial Security Base, Byasi jointly continued their rescue operation with Collapsed Structure Search and Rescue (CSSR) team in different parts of municipality areas. Respondents told that they were busy on the rescue operation, clearing the blocked debris, making an arrangement of the temporary shelters and makeshift camps for 2-3 days, relief materials distributions i.e. food and non-food materials to the victims. Their focused were also in the dead body recovery so that area would be free of foul smell and prevent the epidemics.

NP, Metropolitan Police Range, Bhaktapur:

Nepal Police personnel were also busy on the rescue operation, clearing the blocked debris, helping to make tents and shelters, relief materials distributions i.e. foods and non-foods materials to the victims. Their focused were also in the management of the dead body.

NA, Jawaladal Battalion, Suryabinayak:

The personnel of Jawaladal Battalion were also busy on the rescue operation, clearing the blocked debris, helping to make tents and shelters, relief materials distributions, i.e. foods and nonfoods materials to the victims and dead body management.

Ward number 1, 10 and 17:

Respondents told that they had also done the rescue themselves forming social youth groups as well as the combination with a security force and municipality staffs. They helped security force to locate the relatives in the debris. Respondents said that Bhaktapur municipality had also cleared the road blockage with its truck, tipper, and excavators.

The rescue was continued after golden hours also and relief distribution was done after 2 days of the disaster. During this period dead body management was also carried out simultaneously by security forces. The rescue team and medical experts, including firefighters, physicians from different part of the world were involved during this devastating period to ease with rescue and relief operation.

4.2 Debris Management**Nepal Army, Nepal Police, Armed Police Force and Bhaktapur Municipality:**

All security forces had jointly conducted debris management after completing coordinated relief and rescue operation. With the collaboration of Bhaktapur municipality, security forces continued their debris management tasks of historical monuments of Bhaktapur Durbar Square and also public and local's residential buildings in different part of the municipal area. Piles of rubbles in the streets as well as in core area were effectively managed with the help of foreign support machineries like small excavator which easily entered to the small width of the narrow passage of a core area. Truck, dumpers, excavators were used by the municipality for clearing the blocked debris and disposed of in safe, open area. Other vehicles and equipment from local brick kiln entrepreneurs were also used for which Bhaktapur municipality had managed and expended nearly 20 million rupees for fare, fuels and allowances to operators. Local residents managed their debris, mostly themselves. Some construction company's dumpers and excavators were also used with the help of locals in Bhaktapur municipality. Locals were less involved in debris management, some were seen playing games instead of participating in the operation except their concerned houses debris.



Fig. 13. Combined Debris Management of Ancient Krishna Temple at Bhaktapur Durbar Square



Fig. 14. Debris Management by Indian Army at Bhaktapur (Source: NA)



Fig. 15. Shelter Preparation at Bhaktapur Municipality (Source: APF)



Fig. 16. Relief Material Distribution (Source: APF)

4.3 Public Response and Opinion towards Security Force**Ward number 1, 10 and 17:**

Respondents said that security forces had done an excellent job on post earthquake operation. Security force's image was more applauded during rescue, relief and debris management. The respondent thought was totally changed about security forces from sleeping bodies that abuse the people paid taxes to a rays of hope as a guardian to the victims for the rescue and relief operation post-disaster. They were also concerned with the lack of advanced equipments with security personnel as one of the respondents said that if the security force were equipped with modern search and rescue equipment probably the job can be carried out effectively in a short time. For best result security force should have more advanced training and continuous drill operation for the preparedness. If possible they sought the drill with the local people also so that the damages can be minimized.

4.4 Crime Scenario**APF, Guheshori Battalion:**

The core area was like a vacuum, people were less in numbers in the core area because they were going to a safe area like Chyamasing, Kamalbinayak, Dekochha, Khwopa engineering college, Bageshwori College leaving all of their belongings behind. Locals were more

concerned about their lives and terrified due to continuous aftershocks that shook their mental state. Inadvertently, this situation came as a golden opportunity for thieves to go for a hunt in an empty settlement and the opportunist had a chance to steal ornaments, money and other assets. As a theft case from Chyamasing filed with Nepal police, one gets caught and handed to police. Some bizarre cases were also heard like a spread rumor of a ghost appeared in makeshift camps and temporary rehabilitation center so that an opportunist could steal money and materials.

NP, Metropolitan Police Range, Bhaktapur:

There were increments in the number of some minor cases like an increase in number of thieves in the core area and in the shelter area. Near about 5% minor crimes were increased like creating rumor to the affected people, minor theft cases, and burglary. Women and child trafficking were not seen in the municipality area, though some gender violence's were seen in the shelters. Self-defense training like Judo and Karate were held at the Maheshori football ground shelter. Four crime cases were registered in court during this period. The first case was registered by Metropolitan Police Range, Bhaktapur for terrifying the victims of shelters. The second case was registered by Metropolitan Police Circle, Thimi for an attempt to rape. The third case was registered by Metropolitan Police Range, Bhaktapur for misbehaving to victims of the shelter and the fourth was by Metropolitan Police Circle, Jagati for disturbing the victims in the shelter by showing snake.

All the security personnel, especially Armed Police Force and Nepal Police had continued their patrolling in the night during the disaster period as well. Security personnel's main focuses were on a highly vulnerable area such as shelters, camps and inner core area. After the 24 hours, there were the problems for people for food and shelter, especially for rented people. Those rented people might not have food materials and no work till the disaster period, which increases the crime scenario naturally. So security forces focused their eyes on them as well as to distribute the relief materials.

5. CONCLUSION AND RECOMMENDATIONS

The main objective of this research was to assess the perception of people on the contribution of security forces for rescue operation, relief distribution, shelter management, debris management, also peace and security of the locality. Qualitative research methodologies have been used for the study.

5.1 Conclusion:

Security forces were taken as their own, one and only guardian by the municipality residents. Security forces were applauded by people for their continuous devotion to the work in post disaster operation despite their own similar problems. Security forces were now taken as the quick and prompt responder in a disaster. In spite of all their hard-work and dedication, they were lagging behind to carry out their operation effectively due to lack of advanced technology machineries for the rescue and debris management also insufficient number of trained security personnel to carry out the rescue operation along with relief distribution.

5.2 Recommendations:

Security forces had played pivotal role in the post disaster response program both in immediate as well as a long term program to support the disaster-victims. They were the first respondent among the stakeholders. Thus, their operations should be effective enough to reduce the damage. To make it more effective, the following recommendations are advised:

- Security forces should be equipped with more personal protective equipment (PPE), advanced tools and equipment.
- The regular advanced drill should also be done with other stakeholders even with people.
- Sufficient facilities should allocate so that security personnel moral will boost in disaster response.
- Quick standby disaster response team should be prepared at each level of security forces offices.
- Increment in storage capacity for stockpiling of relief materials.
- Coordination among local authorities and stakeholders should already be planned.

ACKNOWLEDGEMENTS

We are thankful to Professor Dr. Prem Nath Maskey (Institute of Engineering, Pulchowk Campus, Nepal), Professor Dr. Hari Krishna Shrestha, Professor Dr. Khem Raj Sharma, Associate Professor Robert Dongol (Nepal Engineering College - Centre for Postgraduate Studies, Lalitpur, Nepal), Associate Professor Amrit Man Tuladhar (Head of Civil Engineering Department, National College of Engineering, Lalitpur, Nepal) and Assistant Professor Dr. Man Kumar Dhamala (Tribhuvan University, Central Department of Environmental Science, Nepal). Also, we would like to thank Security Personnel, People of Bhaktapur Municipality and our colleagues for their kindness and contributions during the study.

REFERENCES

- [1] UNDP., 2011. *Comprehensive Disaster Risk Management Plan*. Kathmandu, Nepal: United Nations Development Programme.
- [2] USGS., 2015. The M7.8 Nepal Earthquake, 2015 – A Small Push to Mt. Everest. United States Geological Survey(USGS):<http://earthquake.usgs.gov/research/ fy16-nepal2015/> [Accessed on April 15, 2016].
- [3] MOHA, 2015. *Gorkha Earthquake One Month Report, May, 2015*. Kathmandu, Nepal: Ministry of Home Affairs (MOHA). Available at: <http://neoc.gov.np/en/gorkha-earthquake-one-month-report-103. html> [Accessed on November 20, 2015].
- [4] APF, 2015. *Mahabhukmpa 2015*. Duwakot, Bhaktapur: Armed Police Force (APF), Guheshori Battalion.
- [5] Dixit, A. M., 2000. *Challenges of Building Code – Implementation in Nepal*, Kathmandu: Nepal Society for Earthquake Technology – NSET, Nepal.
- [6] NP, 2015. *Police Mirror 2015*. Naxal, Kathmandu: Nepal Police (NP) Headquarters.
- [7] MOHA, 2016. *Risk Profile of Nepal 2015*. Kathmandu, Nepal: Ministry of Home Affairs (MOHA). Available at: <http://drrportal.gov.np/risk-profile-of-nepal> [Accessed on July 15, 2016].
- [8] Shakya, U., Blaisdell, M. and Fleischman, R. 2016. Challenges and Possible Solutions for Building Back Better in Nepal. In: Khwopa Engineering College and Khwopa College of Engineering, *International Conference on Earthquake Engineering and Post Disaster Reconstruction Planning*. Bhaktapur, Nepal, 24 – 26 April, 2016..
- [9] NSET, 1999. *Kathmandu Valley's Earthquake Scenario*. Kathmandu, Nepal: National Society for Earthquake Technology (NSET).

- [10] Yamasaki, E., 2011. What we can learn from Japan's Earthquake Early Warning System, Japan, Scholarly Commons.
- [11] Saito, T., 2007. Disaster Management of Local Government in Japan. Available at: <http://www.uncrd.or.jp/hyogo/hesi/pdf/peru/saito.pdf>. [Accessed on June 12, 2016].
- [12] Yang, J., Chen, J., Liu, H. and Zheng, J. 2014. Comparison of two large earthquakes in China: the 2008 Sichuan Wenchuan Earthquake and the 2013 Sichuan Lushan Earthquake. *Nat Hazards* (2014), 73:1127–1136.
- [13] INCCDP, 2000. Increasing Community Disaster Awareness. Inter Works for the International Federation of Red Cross and Red Crescent Societies Disaster Preparedness (INCCDP), Geneva.
- [14] Pal, S., 1986. Earthquake Disaster Management. *8th Symposium on Earthquake Engineering*, Roorkee. 1986, 1, pp. 39-46.
- [15] Dixit, A. M., Samant, L., Nakarmi, M., Pradhanang, S. and Tuckker, B. 2000. The Kathmandu Valley Earthquake Risk Management Project: An Evaluation, *12th World Conference on Earthquake Engineering (WCEE)*. Auckland, New Zealand, 30 January- 4 February, 2000.
- [16] Tamang, K. K., 2015. Armed Police Force in Disaster Mitigation- Special Publication Bulletin, APF, DMTC, Kurintar.
- [17] NA, 2015. *Operation 'Sankatmochan' 2015*. Bhadrakali, Kathmandu: The Nepalese Army (NP), Army Headquarters.
- [18] Rauniyar, I., 2015. Nepal police step up patrols to prevent thefts in an earthquake zone, *The Guardian*. Publication date: Tuesday 28 April 2015 17.52 BST, 2015. Available at: <http://www.theguardian.com/world/2015/apr/28/nepal-police-step-up-patrols-prevent-thefts-earthquake-zone> [Accessed on June 21, 2016].
- [19] Berg, L., 2010. *Crime, Politics and Violence in Post- Earthquake Haiti. 2010*. United States Institute of Peace. Available at: <http://www.usip.org/publications/crime-politics-and-violence-in-post-earthquake-haiti> [Accessed on April, 23, 2016].
- [20] <http://ddcbhaktapur.gov.np/en/brief-introduction/> [Accessed on June 20, 2017].
- [21] Shrestha, M. B., 2016. *Effects of Gorkha Earthquake on Residential Buildings in Bhaktapur Municipality, Nepal*. *Nepal Engineering College - Centre for Postgraduate Studies, Pokhara University, Nepal*.

AUTHORS BIOGRAPHIES



Manoj Bakhunchhe Shrestha: He is the **Gold Medalist** of Master's Degree in Construction Management from Nepal Engineering College, Pokhara University, Nepal in 2016. He has completed Diploma in Electrical Engineering (1996) and Bachelor in Civil Engineering from Pulchowk Campus (2000), Tribhuvan University, Nepal. He has experience as a lecturer in Khowpa Engineering College, Bhaktapur, Nepal. Currently he is at Armed Police Force, Nepal as Technical Deputy Superintendent.



Dr. Krishna Kumar Tamang: He was the Additional Inspector General of Armed Police Force, Nepal. He received his Doctorate in Public Administration from Singhania University, Rajasthan, India. He has more than 30 years of working experience in security force. Currently he is working as a safety and security advisor.



Tulshi Laxmi Suwal: She is Ecologist and currently President of Small Mammals Conservation and Research Foundation (SMCRF), Nepal. She has completed Master of Science in Zoology (Ecology and Environment) from Tribhuvan University, Nepal. She is the energetic researcher, working closely with community and conducting awareness program. Similarly, she has more than 10 years of teaching experiences.



Anjay Mishra: Currently he is an Assistant Professor at Nepal Engineering College - Centre for Postgraduate Studies, Nepal. He has Master's Degree in Business Administration, from University of Allahabad, India. He has published several papers in International Journals.