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Research Paper

# Local Level Disaster Response Effectiveness in Nepal: Recent (31 March) Tornado as a Case Study

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**ABSTRACT**

Nepal is amongst the most disaster-prone countries in the world. Annually more than 400 people are dying in various natural disasters. More than 80% of the population is at risk from natural hazards like a landslide, flood, fire, cold wave, wind storm, avalanche, inundation, and glacial lake outburst.

Surprisingly on 31st March 2019, a Tornado occurred in Parsa and Bara districts. It was for the first time in the history of Nepal that a tornado of such magnitude occurred and caused such devastations. Twenty-eight people lost their lives and more than 600 got severely injured. More than 1400 houses were turned into rubble.

In the immediate aftermath response operations were launched. Security forces including government agencies and humanitarian organizations made their efforts to render rescue and relief to the victims. But the response effort was not sufficient. Keeping this tornado response as a case study this paper examines the gap prevalent in local level disaster response mechanism in Nepal.

During the research, it was found that the capacity of civil servants, bureaucrats, and elected representatives functioning at the local level is not enough to render an effective response.

## 1. Introduction

Nepal is amongst the most disaster-prone countries in the world. The combination of rugged topography, high reef, active tectonic process and intense monsoon rain coupled with unplanned urbanization, rapid population growth, haphazard development works, poor economic condition, and growing environmental degradation has made the country much susceptible to a natural disaster (MoHA, 2018; UNDP, 2004). Today more than 80% of the population is under the threat of disasters like a landslide, flood, fire, cold wave, wind storm, avalanche, inundation and glacial lake outburst (MoHA & DPNET, 2015; MoHA 2017). The government's data reveals that every year around 400 people die due to such calamities in the country (MoHA, 2018) (see table 1).

Indeed, research has proven that the developing nations in the world are the most vulnerable to natural disasters, and the majority of them lack resilience capacity and effective disaster response systems (Coppola, 2006). Along with human losses and property damage, due to disaster, these countries are facing a threat to their social, economic, and political disruption.

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Infectious diseases outbreak, food insecurity, population displacement, development work disruption or delay, and law and order disturbance are the disaster's consequences that are pushing these countries into more complexity (Noji, 2005; Watson, 2007; Asian Disaster Reduction Center, 2005). In this backdrop, these developing nations need an effective disaster management system that complies with the types of disasters that are likely to occur including appropriate risk reduction, mitigation, and response mechanism.

In Nepal, the Disaster Risk Reduction and Management Act, 2017 (DRRMA), National Strategy for Disaster Risk Management, 2009 (NSDRM), National Disaster Response Framework, 2018 (NDRF) and Local Government Operation Act, 2017(LGOA) are amongst the fundamental legislations to guide disaster management venture (Nepal et al., 2018). This legislation has designed three tiers of disaster management mechanism in the country in which the Ministry of Home Affairs is at the lead role (Nepal et al., 2018) (see figure 1).

Since all disasters are local, the major responsibility of their management belongs to local governments (Manus & Caruson, 2006). From risk reduction to mitigation, response, and recovery their active involvement is much expected (Kusumasari et al., 2010; Perry & Mushkatel, 1984). Due to this reason, the local government's entities have to be explicit, particularly in the roles and responsibilities of disaster response (Madan & Routray, 2015).

In Nepal two disaster response mechanisms function concurrently at the local level - the District Disaster Management Committee (DDMC) and the Local Disaster Management Committee (LDMC) (Law, Justice & Parliamentary Affair Ministry, 2017). DDMC is moreover a coordinating body that focuses on response whereas LDMC focuses on mitigating disaster risk, resilient building, and disaster response. DDMC is chaired by Chief District Officer, a bureaucrat, whereas LDMC is chaired by the elected municipal chairman (Disaster Risk Reduction and Management Act, 2017).

Emergency Operations Center (EOC) is another parallel entity that operates from central to the local level (see figure 1). Currently District Emergency Operation Center (DEOC) is active to take overall command control of response operation once a disaster occurs at the district and below (MoHA, 2017).

Precisely, the disaster response is a complex process where lack of coordination, duplication of effort, lack of clear leadership, and accountability tend to be the problems in developing countries like Nepal. To avoid these complexities in 2005 the United Nation's Humanitarian Reform Agenda introduced an element known as the cluster approach. Its aim is to strengthen humanitarian response demanding a high standard of

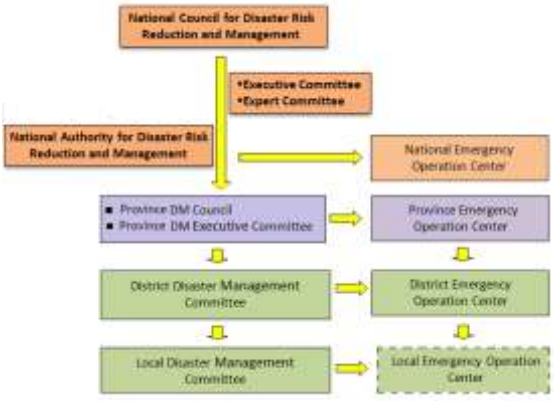


**Fig. 1.** National disaster management structure.

**Table 1.** Human death from disaster since years 2000 to 2018.

| Year | Flood & landslide | Thunder-bolt | Fire | Hail-stone | Wind-storm | Avalanche/ Snowstorm | Epidemics | Earthquake | Total |
|---|---|---|---|---|---|---|---|---|---|
| 2000 | 173 | 26 | 37 | 1 | 2 | - | 141 | 0 | 380 |
| 2001 | 196 | 38 | 26 | 1 | 1 | - | 154 | 1 | 417 |
| 2002 | 441 | 6 | 11 | 0 | 3 | - | 0 | 0 | 461 |
| 2003 | 232 | 62 | 16 | 0 | 20 | - | 0 | 0 | 330 |
| 2004 | 131 | 10 | 10 | 0 | 0 | - | 0 | 0 | 151 |
| 2005 | 141 | 18 | 28 | 0 | 0 | 21 | 41 | 0 | 249 |
| 2006 | 141 | 15 | 3 | 1 | 0 | - | 34 | 0 | 194 |
| 2007 | 216 | 40 | 9 | 18 | 1 | 6 | 0 | 0 | 290 |
| 2008 | 134 | 16 | 11 | 0 | 2 | 0 | 3 | 0 | 166 |
| 2009 | 135 | 7 | 35 | 0 | 0 | 2 | 10 | 0 | 189 |
| 2010 | 240 | 70 | 69 | 0 | 2 | 2 | 462 | 0 | 845 |
| 2011 | 263 | 95 | 46 | 2 | 6 | 0 | 36 | 0 | 448 |
| 2012 | 123 | 119 | 77 | 0 | 18 | 9 | 9 | 6 | 361 |
| 2013 | 219 | 146 | 59 | 0 | 3 | 7 | 4 | 0 | 438 |
| 2014 | 241 | 96 | 62 | 0 | 3 | 38 | 12 | 0 | 452 |
| 2015 | 293 | 115 | 53 | 0 | 2 | 2 | 18 | 9366 | 9849 |
| 2016 | 297 | 105 | 85 | 0 | 4 | 0 | 14 | 0 | 505 |
| 2017 | 236 | 85 | 63 | 0 | 5 | 1 | 10 | 0 | 400 |
| 2018 | 105 | 68 | 89 | 0 | 45 | 19 | 0 | 0 | 326 |
| Total | 3957 | 1137 | 789 | 23 | 117 | 107 | 948 | 9373 | 16451 |

Source: Ministry of Home Affairs// drrportal.gov.np

**Table 2.** Clusters at national and local level.

| S. No | Name of clusters | Government Lead Agency | | Assisting agency |
|---|---|---|---|---|
| | | National Level | Local Level | |
| 1 | Health | Ministry of Health and Population | Office of District Health | WHO |
| 2 | WASH | Ministry of Water Supply and Sewage | Water Supply and Sanitation Division Office | UNICEF |
| 3 | Emergency Shelter | Ministry of Urban Development | Urban Development and Building Construction Division Office | IFRC/UN HABITAT |
| 4 | Food Security | Ministry of Agriculture and Livestock Development | District Agriculture Development Office | WFP/FAO |
| 5 | Nutrition | Ministry of Health and Population | Office of District Health | UNICEF |
| 6 | Camp Coordination and Camp management | Ministry of Rural Development | ---------- | IOM |
| 7 | Protection | Ministry of Women, Children and Senior Citizen | District Office of Women and Children | UNHCR/UNICEF/UNFPA |
| 8 | Early Recovery | Ministry of Federal Affairs and General Administration | ---------- | UNDP |
| 9 | Education | Ministry of Education, Science and Technology | District Education Office | UNICEF/SC |
| 10 | Logistics | Ministry of Home Affairs | CDO's Office | WFP |
| 11 | Emergency Communication | Ministry of Communication and Information Technology | CDO's Office | WFP |
| 12 | Search and Rescue | ---------- | CDO's Office | |

predictability, accountability, and partnership in all the sectors or areas of activity (IASC, 2006).

In Nepal, at the national level, there are eleven thematic clusters led by nine ministries whereas at the local level there are nine or more clusters, as per requirement, led by the district office of the concerned ministries (MoHA, 2013) (see **Table 2**). The local cluster heads are also the members of DDMC. And when a disaster occurs DEOC mobilizes these clusters.

Unfortunately, the local-level disaster response competency of Nepal has always remained questionable. Lee (2016) wrote that Nepal falls into the list of countries that lack effective governance of the disaster response system. The key activities like coordination, damage assessment, information management, search and rescue, and management of relief material have always been problematic in the country (Sanderson and Ramalingam, 2015; MoHA, 2017). And how to render effective response is always a challenge for the government authorities. Koshi flood of 2008, Jure landslide of 2014, and the Gorkha earthquake of 2015 are some examples where such problems took place (Nepal et al., 2018; Khanal and Gurung, 2014; MoHA &DPNET, 2015).

Since Nepal is a signatory member of international conferences on disaster management - 1994 Yokohama, 2005 Hyogo and 2015 Sendai- the country must strengthen the local-level disaster response mechanism along with disaster risk reduction and mitigation (Nepal et al., 2018). Through various policies and guidelines, the country has also committed to enhancing the local-level disaster response competency (Nepal et al., 2018) (see table 3). But 'whether those commitments have been fulfilled or not' is a debatable issue.

On the other hand, although current literature has highlighted the significance of local government to introduce, manage and implement effective disaster response initiatives at its respective level there is yet to study this aspect of developing countries (Kusumasari et al., 2010; Madan and Routray, 2015; Pearce, 2003). Similarly, since Nepal has not been able to utilize available expertise, experience, research, and human resource in disaster response, the context has remained more obscured (MoHA, 2018).

Based on this background, considering the 31st May 2019 tornado as a case study, this exploratory paper has investigated the local-level disaster response effectiveness in the country. It is an in-depth study that has contributed to a better understanding of the strength and weaknesses of the local-level disaster response agencies. This paper is also an aid to the national and international scholars and researchers to comprehend the reality of the ground-level disaster response mechanism of Nepal.

## 2. Tornado of 31st March 2019

Surprisingly, on 31st March 2019, for the first time in the history of Nepal, a tornado between the scale EF2 and EF3 (Fujita-Pearson intensity scale) occurred (Picazo, 2019). Two districts of No. 2 Province, Parsa and Bara, were hardest hit (Rimal, 2019). The twister caused severe devastation in eleven municipalities, where the residents were poor with low income, less educated and living in the houses that were made of mud and brick.

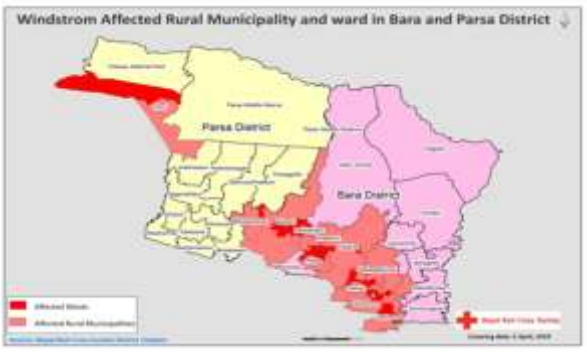


**Fig. 2.** Tornado affected area.


**Fig. 3.** Direction and extent of tornado.

In total 28 people were killed, more than 600 were injured and more than 1400 houses were completely destroyed (Rimal, 2019; Pandey, 2019) (see **Figs. 2** and **3**).

Immediately after the tornado response operations were initiated. Troops of the Nepali Army, Armed Police Force, and Nepal Police got mobilized on the ground for search and rescue operation. Medical teams, civil society, volunteers and INGO/NGOs responded as per their capacity. The relief and rehabilitation operations lasted for a couple of weeks. In that period tons of relief materials were distributed, dozens of medical camps were run and hundreds of temporary shelters were constructed in the affected area. But despite such effort at the end, the response bore criticism. Allegations were made that the response was slow, uncoordinated and inadequate (Bhattrai, 2019; Sapkota, 2019). Even victims also complained that they didn't receive enough response and relief.

## 3. The objective of the study

The fundamental objective of this research is to investigate the effectiveness of the local-level disaster response mechanism of Nepal. And the investigation was conducted keeping the following questions at the nexus.

(1) Did the response carried out during tornado meet the need of the situation?
(2) How effective was the cluster approach during tornado response?
(3) Did the tornado response comply with the National Disaster Response Framework's (NDRF) stipulated time frame?
(4) What were the gaps observed at the time of tornado's response?

## 4. Methodology

This paper is a quantitative research based on the numerical data analysis. The opinion and behavior of the sample population has been studied through questionnaire survey. Sample population was divided into two categories- tornado victim and DDMC member. Separate questionnaire survey was conducted for both the categories. Objective questions that are relatively cognitive to answer were designed for the surveys.

In-depth study of the literatures such as national legal document, binding and non-binding guideline, plan and policy of disaster management was carried prior to the conduct of questionnaire survey. Similarly, during investigation, the comparative study among the activities provisioned by National Disaster Response Framework that are supposed to take place during response and the actual response activities took place on the ground at the time of tornado response was also conducted. The gaps and solutions were recognized at the end of the research.

### *4.1 Sample population analysis*

For the first questionnaire survey sample population was randomly selected from the tornado victims. Altogether 98 study participants were selected. This is around 1.4% of the total victim population (Reliefweb, 2019; Reliefweb, 2017). Their age varied from 16 to 64 years. For the second survey 12 active members from Parsa DDMC and Bara DDMC were selected. That is around 24% of the total DDMC members. The chief districts officers, district commanding officers of the Nepali Army, Nepal Police, Armed Police Force, and National Investigation Department and districts head of Nepal Red Cross Society were the interviewees. In both the surveys the questions were asked in Nepali language.

For the clarity of understanding local language interpreters were selected as enumerator and the questions were asked in an interview style. In an average, it took around 10 to 15 minutes to answer all the questions during surveys.

### *4.2 Research design*

In both surveys, the closed-ended Self-Administered Questions (SAQ) were asked to the study participants (Brancato et al. 2004; Andrew et al. 1998; Ronan et al., 2010; Kuroiwa, 1993; Henning et al., 2004; Arya, 1993).

During the first survey, seventeen questions were asked to the disaster victims. Did they receive any early warning of tornado, who did come first to rescue them, what all relief materials did they receive, when did they receive medical assistance, when did they receive temporary shelter, did they receive any drinking water and toilet facilities were amongst the questions asked. Similarly, what all assistance did they receive from their respective elected representatives and the local government, and which government – federal, provincial or local- they found most assistive during response were also the questions asked to the participants.

Likewise, in second survey eighteen questions were asked to the DDMC members. How do they categorize this disaster, how did they manage information during response, how did they carry out command and control of the response operation, when did they prepare Initial Rapid Assessment (IRA), who all did take lead of the relief distributions and rehabilitation process were amongst the questions asked. Additionally, another three questions about the fundamental issues of disaster management was also the part of this survey. These questions helped to gauge the understanding of the DDMC members on the principle aspect of disaster management venture.

### *4.3 Method of analysis*

The tools of inferential analysis were adopted to investigate the effectiveness of local level disaster response mechanism. Frequency distribution of the responses was studied thoroughly. The results were displayed in the bar graph, pie chart and comparison table, which were used to illustrate the variation between the stipulated principle activities – 'what should be done' and 'who should do' during disaster response - and the actual activities occurred during tornado response – 'who all did' and 'what all did they do'. Similarly, the comparison table was used to compare the stipulated timeline set by NDRF for response activities and the actual time taken for various activities during tornado response.

## 5. Analysis of the survey

### *5.1 Analysis of the survey of disaster victims*

During the first survey, it was revealed that not any early warning was disseminated in the local community before the occurrence of a tornado. Participants were completely unaware of the upcoming tornado. Once the tornado occurred, within an hour, around 38% of the participants received assistance from security forces (see figure 4). Amongst them, 78% of the participants were assisted by Nepal Police (see **Fig. 5**). Dismayingly 35% of the participants didn't receive any assistance for the first 12 hours of the incident (see **Fig. 4**).

Around 50% of the participants were assisted by the medical personnel within 24 hours. Another 25% of the participants received medical assistance in the next 48 hours of the tornado (see **Fig. 6**).

In total, 92% of the participants replied that they received relief food materials. Only 28% of the participants received food relief in the first 24 hours. 8% of the participants neither received any food items nor cash to buy food throughout the response period. 90% of the participants who received food items replied that those items were delivered by NGO/INGOs and private sectors. Only 10% of the participants replied that the food was given to them by the local authorities and the government agencies (see **Fig. 7**).

Similarly, 95% of the participants replied that they receive non-food relief items like a cooking utensil, clothing, cooking stove, cooking gas and sleeping mat, etc from NGO/INGOs and the private sector. Only 5% of the participants admitted that such items were provided to them by the government authorities (see **Fig. 8**).

Around 75% of the respondents replied that they received temporary shelters after 3 to 4 days of the incident (see **Fig. 9**). All the participants replied that their shelters were constructed by the soldiers of the Nepali Army. 15% of the respondents replied that they received shelter after a week of the tornado.

When asked about hygiene and sanitation, only 65% of the respondents replied that they were provided toilet facilities that were built by NGO/INGOs. Around 70% of the respondents replied they were provided with water filters and water purifying tablets. 21% of the respondents replied they have received garbage bins and 8% of the respondents replied they received washing and bathing facilities (see **Fig. 10**).

Regarding the responding agencies, when asked, around 90% of the respondents replied that the Nepali Army soldiers were the most assistive during the tornado response. Less than 2% of the respondents replied that the Nepal Police personnel and the Armed Police Force personnel assisted them most. Only 5% of the respondents chose the local government officials as the most assistive during the response.

Similarly, less than 30% of the participants replied that they received relief materials from their respective municipalities (see **Fig. 11**). Only 13% of the participants

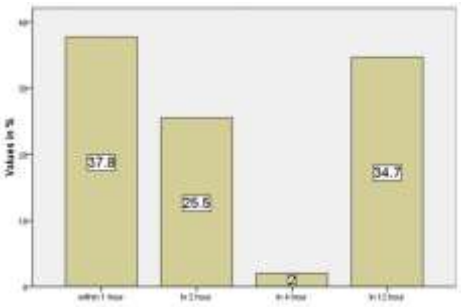


**Fig. 4.** When did the first rescuer arrive after tornado.

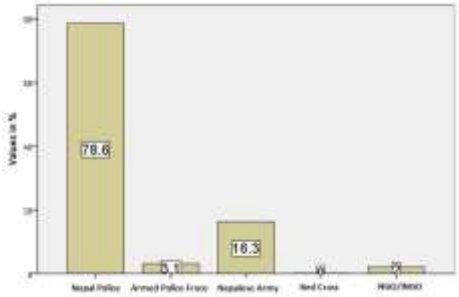


**Fig. 5.** Who did come first to rescue you when tornado occurred?

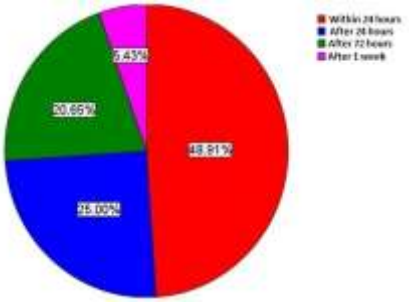


**Fig. 6.** When did you receive medical assistance?

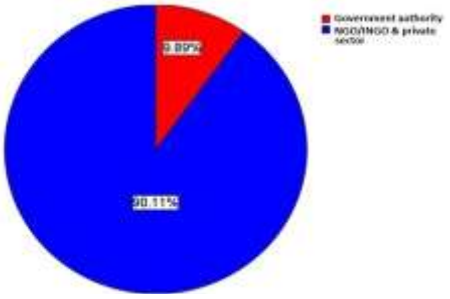


**Fig. 7.** Where did you receive food relief from?

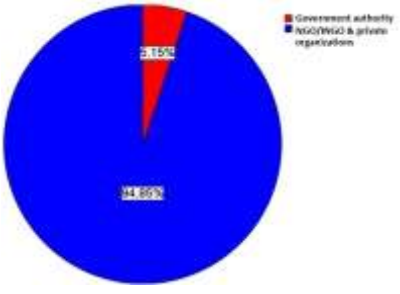


**Fig. 8.** Where did you receive non-food materials from?

replied that their ward authorities were much helpful (see **Fig. 12**). 75% of the participants replied that the district administrative officials assisted them effectively; whereas, only 15% of the participants replied that their local government officials were the most effective assisting body during the tornado (see **Fig. 13**).

### *5.2 Analysis of the survey of DDMC members*

Around 59% of the participants replied that the tornado was the 'district-level disaster'. Only 8% of participants replied that it was the provincial level disaster (see **Fig. 14**). 50% of the participants replied that they were contacted by the DEOC duty officer within an hour of the tornado. But 33% of the participants replied that they were not contacted by the duty officer. 16% of the participants replied that they were contacted by the duty officer after an hour of the incident (see **Fig. 15**).

In the context of command and control of the response operations around 42% of the participants responded that they remained physically present at the incident site for the command and control purpose. 25% of the participants replied that the response operations were commanded personally by the district security heads (Nepali Army, Armed Police Force, and Nepal Police) and another 25% of the participants replied that the response operations were directed from the CDO's office. Only 8% of participants replied that the command control was maintained from the DEOC (see **Fig. 16**).

Only 16% of the respondents replied that the local media was used to disseminate relative information in local communities during response. All the respondents replied that the first DDMC meeting was held only after 12 hours of the tornado.

Similarly, only 33% of the respondents replied that the Initial Rapid Assessment (IRA) was carried out within 24 hours of the incident. Another 33 % of the respondents replied that it took more than 4 days to complete IRA (see **Fig. 17**).

When asked 'how did you manage the relief materials', only 16% of the respondents replied that the materials were managed from the pre-positioned warehouse. 50% of the respondents replied that the relief materials were contributed voluntarily by NGO/INGO and private organizations (see **Fig. 18**). Likewise, 50% of the respondents replied that the food cluster was led by the district administration office (see **Fig. 19**). None of the respondents replied that it was led by the district agriculture office.

When asked about fundamental issues 50% of the participants replied that the level of disaster risk determines the extent of disaster loss. Even 16% of the participants replied that the risk itself is a disaster (see **Fig. 20**). Similarly, 58% of the participants replied that the disaster risk reduces if the vulnerability is reduced (see **Fig. 21**). Only 41% of the participants replied that disaster risk reduction means the process of reducing disaster's effect. But 33% of the participants replied it is the 'post-disaster rescue

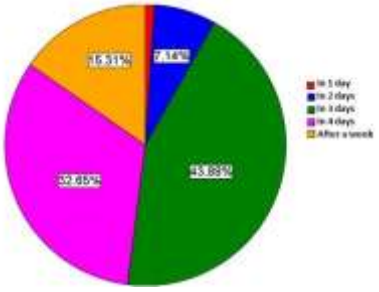


**Fig. 9.** When did you receive temporary shelter?

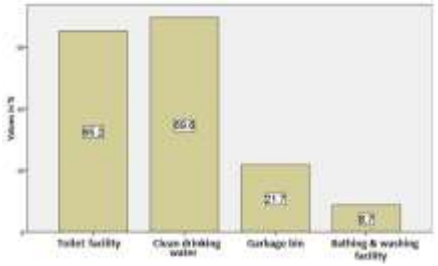

**Fig. 10.** Did you receive any WASH facility?

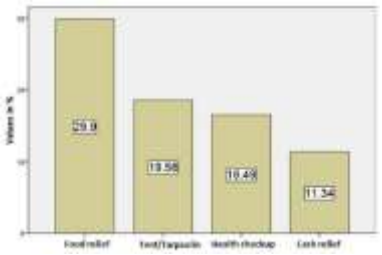


**Fig. 11.** What assistance did you receive from municipality?

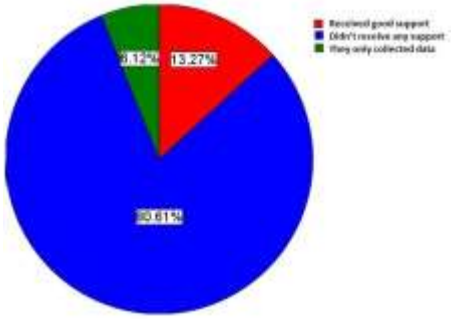


**Fig. 12.** Did you receive support from ward authority?

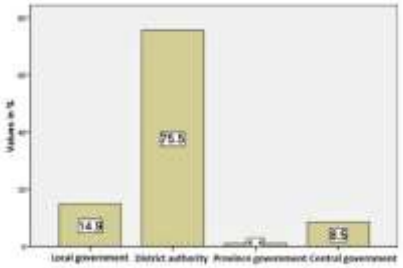


**Fig. 13.** Which government did assist you most?

and relief process' (see **Fig. 22**). Similarly, 25% of the participants replied that there is no difference between the disaster consequences in plain area and the mountain area. Another 41% of the participants replied that disaster management is easier in plain compared to the mountain. Only 16 % of the participants identified that the chances of human casualty during disaster remains high in plain compared to the casualty in the mountain (see **Fig. 23**).

### *5.3 Response activities as per the time frame*

The result of the data showed that during tornado response only search and rescue operations met the NDRF response time frame as the security forces were mobilized immediately once the tornado occurred. Rests of the cluster activities overshot the stipulated time frame.

Unfortunately, throughout the response phase DEOC neither could establish coordination nor could take the lead of the response operation. The DDMC also took 12 hours to carry out their first meeting. The committee also failed to carry out IRA within the required time frame. The means of social media were not used to aware and alert the local population, neither any information center was established for information management. Only less than 30% of the participants received food relief within 24 hours. Only 43% of the participants received non-food relief during the response. Around 50% of the participants received medical treatment within 24 hours. And 85% of the participants were provided with temporary shelters within a week (see **Table 4**).

## 6. Discussion

The Bara-Parsa tornado response has reflected the current practice of local-level disaster response in Nepal. The lethargic cluster approach, empathy of cluster leading agencies, over-reliance on NGO/INGOs for relief, the ineffectiveness of the local government, overburdened DDMC, and latent DEOC were the drawbacks observed during tornado response.

Such deficiencies have raised a question in the overall disaster response preparedness of the country. Absent to an implementation of effective cluster approach empirically illustrated the weakness of the disaster governance of the country. Although nine clusters, as per requirement, should activate at the local level, except search and rescue cluster, other clusters such as WASH, Emergency Shelter, Food Security, and Emergency Communication hardly functioned properly during the response. Concerned authorities such as the Office of District Health, Water Supply and Sanitation Division Office, District Agriculture Development Office, and Office of District Health remained reluctant to activate them. The only effective entities were the security forces, especially the Nepali Army, and the CDO office.

During the response most of the relief materials and

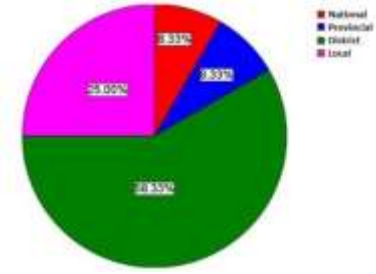


**Fig. 14.** What do you think was the level of disaster?

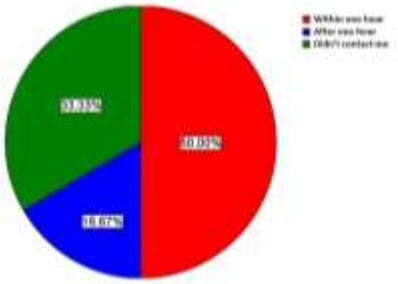


**Fig. 15.** When did the duty officer from DEOC contact you once tornado occurred?

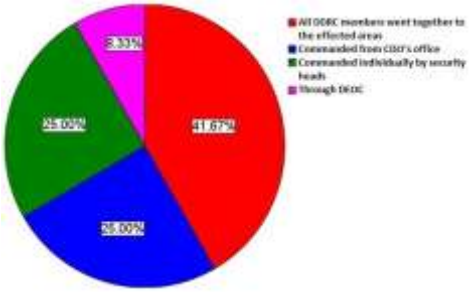


**Fig. 16.** How was the command control of the response operations of tornado maintained?

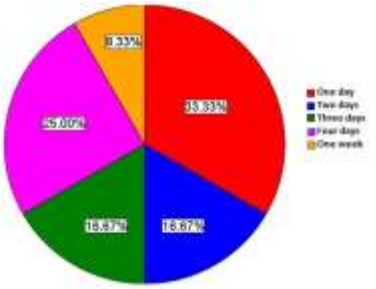


**Fig. 17.** How long did it take to complete IRA?

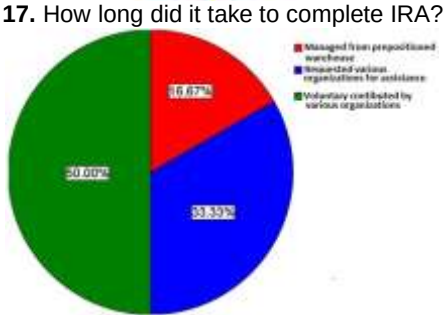


**Fig. 18.** How were the relief materials managed for disaster victims?

facilities - food and water, clothes, utensils, medical, hygiene, and sanitation - were managed by NGO/INGO and private sector. And the relief distribution also remained unsystematic and insufficient because it didn't follow the DDMC's one-door policy.

Although the Disaster Risk Reduction and Management Act 2017 and Local Government Operation Act 2017 have made local government most responsible and accountable for disaster governance, due to their frail capacity, the response during tornado moreover relied on the district mechanism. Municipalities and their elected representatives- mayor, ward chief, and ward member- were neither prepared nor remained accountable for the response. They lacked their duty and responsibility.

At the district level too, the effectiveness of DDMC and DEOC was questionable. Functions like the establishment of an information center, activation of command cell, effective information management including the use of local media for information dissemination and rapid need assessment, were found overlooked. These gaps resulted in the tornado's response didn't comply with the NDRF time frame. One reason for such a consequence is the result of limited disaster-related knowledge of DDMC members that was observed during the survey as well.

Tessema and Soeters (2006) stated that the quality of governance is typically highly personnel activities thus can be judged particularly based on performing the organizations' human resource. The effectiveness of the local-level disaster response mechanism largely depends upon the competency of the local level institutions and their members (Quarantelli, 1988; Wisner et al., 2004; UNISDR, 2009). In this context, the limited capacity of local authorities comprising civil servants, bureaucrats, and elected representatives can be attributed to the feeble local level disaster response mechanism of the country.

However, at a national level, 'the capacity building of the responding agencies' is always an agenda of national policies and plans. But deficit political will, hardly favorable working environment, lack of actionable and practical road map, and ineffective organizational structure have limited such an agenda only in papers.

On the other hand, overreliance on the security forces, especially the Nepali Army, for multiple tasks of disaster response is a general tendency of the country's disaster governance system (Manandhar et al., 2017; Thapa, 2016; Marshall & Adkin, 2016). To some extent, this tendency is rational since a developing country like Nepal can't afford to have a separate civil defense mechanism for disaster response (Qu et al., 2012). But 'whether the personals of these forces are competent enough or not to carry out such functions is a thinkable question that requires thorough investigation.

However, how to mainstream government agencies in disaster response and how to build disaster response capacity of local authorities effectively is the crux of

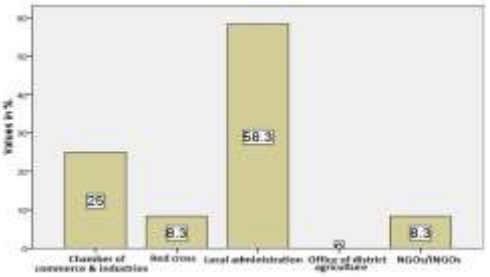


**Fig. 19.** Who did take lead of food cluster?

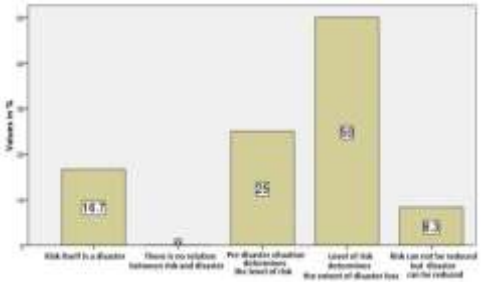


**Fig. 20.** What is the difference between disaster and risk?

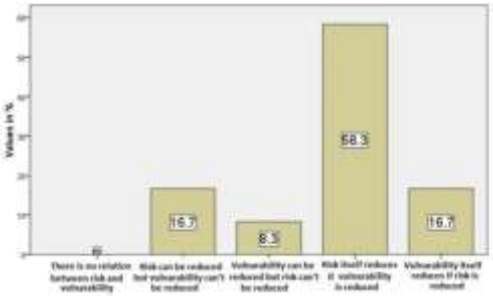


**Fig. 21.** What is the relation between risk and vulnerability?

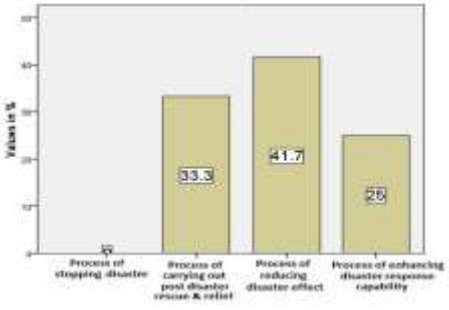


**Fig. 22.** What do you understand by disaster risk reduction?

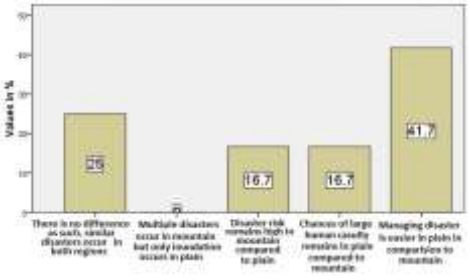


**Fig. 23.** What is the difference between 'disaster in mountain' and 'disaster in plain'?

the problem of the local level disaster response mechanism

**Table 4.** Details of response activities carried out along with time line.

| Timeline | Required activities | Conducted activities |
|---|---|---|
| Pre disaster | 1.Early warning about disaster | No early warning was disseminated |
| 0-2 hours | 1.Activation of DDOC<br>2.Immediate mobilization of security forces and commence SAR operations | Hardly activated<br>Security forces were mobilized immediately. 62% of the victims received assistance within 2 hours. Nepal Police addressed 78% of the victims |
| 0-10 hours | 1.DDMC's meeting<br>2.Alert local population through social media like radio, TV, papers<br>3.Pursue SAR operations | DDMC's meeting was held in 12 hours<br>Social media were hardly used.<br>Security forces and volunteers continued SAR operations |
| 0-24 hours | 1.On ground medical treatment of the victims<br>2.Carry out IRA (Initial Rapid Assessment)<br>3.Establish emergency information center. | 48% victims were treated within 24 hours<br>Only 33% IRA was completed within 24 hours. It took 4 days to accomplish the task.<br>Was not established |
| 24-48 hours | 1.Distribution of relief food items | 28% received food in first 24 hours. |
| 48 hours to 7 days | 1.Distribution of non-food relief items<br>2.Establishment of temporary shelters | Around 42% received all kinds of non-food relief items<br>Around 35% received temporary shelters within a week |

that is ultimately blunting the overall national efforts of response mechanism at the time of crisis.

## 7. Conclusion

Indeed, the Parsa and Bara tornado response has explicitly exposed the limited disaster response capacity of the local level in the country. Such lethargic response is the result of non-other than the lack of competence of the local authorities. That is further aggravated by their heavy reliance on security forces.

Undeniably, the systematic and standard capacity building process for the civil servant, bureaucrats and, elected representatives will help to plug the gap to some extent. Which is also an urgent in today's context. Otherwise the state's responsibility to save peoples' lives and properties during disaster will only remain in words, whereas the disaster losses alongside the suffering of the people will keep on rising.

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We would like to extend our sincere appreciations to the victims of Bara and Parsa tornado, who amicably agreed to part take in data collection process. Similarly, the members of Bara and Parsa DDMCs are also the parts of felicitations since their support have remained invaluable to complete this research work. Last but not least we also thank to the officials of Himalayan Conservation Group for their extensive support in this venture.

## References

Andrews, J., Benthien, M. and Tekula, S.,1998. Southern California Earthquake Center Outreach Report 1998: Public Awareness Education and Knowledge Transfer Programs and Fiscal Year 1998 Activities. http://www.scec.org/research/98research/98andrews.pdf.

Arya, A. S., 1993.Training and Drills for General Public in Emergency Response to a Major Earthquake, Training and Education for Improving Earthquake Disaster Management in Developing Countries. In UNCRD Meeting Reports Series, **57**: 103-114.

Asian Disaster Reduction Center, 2005. Disaster Risk Management for Sustainable Development, Total Disaster Risk management- Good Practices 2005: 7-9. http://www.adrc.asia/publications/TDRM2005/TDRM_Good_Practices/GP2005_e.html.

Bhattarai, S., 2019, April 5. Disastrous Management. Nepal, Nepali Times.

Brancato, G., Macchia, S., Murgia, M., Simeoni, G., Blanke, K., Korner, T. and Zlotnik, J.H.P.H., 2004. Handbook of Recommended Practices for Questionnaire development and Testing in the European Statistical System.

Coppola, D. P., 2006. Introduction to International Disaster Management. Butterworth, Heinemann.

Disaster Risk Reduction and Management Act, 2017. Chapter 7: 19-22. http://drrportal.gov.np/uploads/document/1109.pdf.

Henning, E., Rensburg, W.V. and Smit, B., 2004. Finding Your Way in Qualitative Research. Van Schaik Publishers, Pretoria, South Africa.

IASC, 2006. Guidance Note on Using the Cluster Approach to Strengthen Humanitarian Response.

Khanal, N.R. and Gurung, D.R., 2014. ICIMOD Rapid Field Investigation: Jure Landslide Dam Site Jure, Sindhupalchok District, Nepal. ICIMOD, **30**: 1-7.

Kuroiwa, J.A., 1993. Peru's national educational program for disaster prevention and mitigation (PNEPDPM), training and education for improving earthquake disaster management in developing countries. In UNCRD Meeting Report Series, **57**: 95-102.

Kusumasari, B., Alam, Q. and Siddiqui, K., 2010. Resource Capability for Local Government in Managing Disaster, Disaster Prevention and Management, **19** (4): 438-451.

Law, Justice and Parliamentary Affair Ministry, 2017. Disaster Risk Reduction and Management Act- 2017: 1-26.

Madan, A. and Routray, J.K., 2015. Institutional Framework for Preparedness and Response of Disaster Management Institutions from National to Local-level in India with Focus on Delhi. International Journal of Disaster Risk reduction, **14**: 545-555.MoHA, 2015. Nepal Disaster Report 2015.

Manandhar, M.D., Varughese, G., Howitt, A.M. and Kelly, E., 2017. Disaster Preparedness and Response During Political Transition in Nepal: Assessing Civil and Military Roles in the Aftermath of the 2015 Earthquakes. The Asia Foundation: 5-6. https://asiafoundation.org/wpcontent/uploads/2017/04/Disaster-Preparedness-and-Response-During-politicalTransition-in-Nepal.pdf

Manus, S. A. M. and Caruson, K., 2006. Code Red: Florida City and County Officials Rate Threat Information Sources and the Homeland Security Advisory System. State and Local Government Review, **38**: 87-89.

Marshall, A.R.C. and Adkin, R., 2015. Nepalese army gets image boost from quake relief work. Reuters. https://in.reuters.com/article/quake-nepal-army/nepalese-army-gets-image-boost-from-quake-relief-workidINKBN0NL0TT20150430.

MoHA, 2013. National Disaster Response Framework (NDRF).

MoHA and DPNET, 2015. Nepal Disaster Report 2015: 5.

MoHA, 2017. Nepal Disaster Report 2017: 1-6.

MoHA, 2018. National Position Paper on Disaster Risk Reduction and Management Nepal. AMCDRR 2018, Mongolia: 1-28.

Nepal, P., Khanal, N.R. and Sharma, B.P.P., 2018. Policies and Institutions for Disaster Risk Management in Nepal: A review. The Geography Journal of Nepal, **11**: 1-24.

Noji, E.K., 2005. Public Health in the Aftermath of Disaster. Br Med J, **330**:1397-1381.

Pandey, J., 2019, April 26. Each Tornado hit household to get Rs 5.82Lakh. The Himalayan Times.

Pearce, L., 2003. Disaster Management and Community Planning, and Public Participation: How to Achieve Sustainable Hazard Mitigation. Natural Hazards, **18** (2): 211-228.

Perry, R.W. and Mushkatel, A.H., 1984. Disaster Management: Warning Response and Community Relocation. Quorum Books.

Picazo, M., 2019, April 16. Nepal Records First-ever Tornado Touchdown. The Weather Network.

Qu, G., Liu, S.M. and Sun, G., 2012. Capacity Assessment for Nepal- Urban Search and Rescue, Sustainable Development and Resilient Disaster Management. Orlando: Kanada, 1123 -1187 http://www.flagship2.nrrc.org.np/sites/default/files/knowledge/Nepal%20Capacity%20Assessment%20Final%20Report%20.pdf

Quarantelli, E.L., 1988. Disaster Crisis Management: A Summer of Research Findings. Journal of Management Studies, **25** (4):373-385.

Reliefweb, 2017, August 18. Nepal: Annual Household Survey 2015/16.

Reliefweb, 2019, April 23. Tornado victims receive emergency rehabilitation care.

Rimal, P., 2019, May 29. Bara Parsa was hit by Nepal's first recorded tornado. My Republica.

Ronan, K., Crellin, K. and Johnston, D., 2010. Correlates of hazards education for youth: a replication study. Nat Hazards, **53** (3): 503-26.

Sanderson, D. and Ramalingam, B., 2015. Nepal Earthquake Response: Lessons for operational agencies. ALNAP Lessons Paper, London: ALNAP/ODI: 6-25.

Sapkota, R., 2019, April 9. Local levels ill-equipped to respond to calamities. The Himalayan Times.

Tessema, M.T. and Soeters, J.L., 2006. Challenges and Prospects of HRM in Developing Countries: Testing HRM performance Link in the Eritrean Civil Service. The international Journal of Human Resource Management, **17** (1): 86-105. http://dx.doi.org/10.1080/09585190500366532

Thapa, M., 2016. Out of Barracks: Civil-Military Relations in Disaster Management, A Case Study of Nepali Army's Humanitarian Response during 2015 Earthquake in Nepal. University of Peace, Costa Rica.

UNDP, 2004. Reducing Disaster Risk- A Challenge for Development. United Nations Development Programme, New York.

UNISDR, 2009. UNISDR Terminology on Disaster Risk Reduction, United Nations International Strategy for Disaster Reduction (UNISDR). Geneva and Islamabad.

Watson, J.T., Gayer, M. and Connolly, M.A., 2007. Epidemic after natural disasters, Emerg Infect Dis, **13** (1): 1-5.

Wisner, B., Balaikie, P., Cannon, T. and Davis, I., 2004. At Risk: Natural Hazards, Peoples' Vulnerabilities and Disasters. London: Routledge.