Assessing the Disaster Risk Reduction Knowledge of Local People in Gorkha District, Nepal

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Abstract

Nepal has actively participated in and contributed to various international disaster risk reduction (DRR) activities. Its combination of rugged topography, steep slopes, intense monsoons, active tectonics and seismic processes has made it vulnerable to a variety of natural disasters. Disaster statistics in Nepal highlight the urgent need for DRR efforts, as these disasters have had a devastating impact on the lives, livelihoods and infrastructure of local communities. Assessing the level of disaster risk reduction knowledge among the local population is crucial for understanding their knowledge, preparedness, risk perception and adaptation to disasters.

185 respondents were purposefully interviewed over a span of 15 days. The collected data were analyzed using descriptive statistics such as frequency, percentage, mean (M) and standard deviation (SD) with the results interpreted under separate headings based on the objectives of the study. The level of disaster-related knowledge among the local population was found to be unsatisfactory. Both males and females had limited knowledge of disaster-related facts, although they were well-prepared, aware and adapted to disasters. The local population often overestimated disaster risk and lacked full knowledge of even basic disaster issues.

Keywords: Disaster risk, Disaster risk reduction, DRR knowledge, Gorkha, Nepal.

Introduction

A disaster is a sudden, calamitous event that disrupts the functioning of a community or society at any scale, causing human, material, economic and environmental losses[27]. Disaster risk refers to the probability of a disaster occurring and its potential consequences on a community or society. To reduce this risk, effective disaster risk management efforts are required which involve identifying hazards, evaluating vulnerabilities and analyzing the possible impact on human, environmental and social infrastructure[5]. Disaster risk reduction (DRR) is a systematic approach that helps to identify and reduce disaster risk, to minimize vulnerability and to mitigate the adverse effects of natural disasters[2].

DRR efforts must be framed within a community's social, cultural, environmental and economic context, aiming to minimize both the likelihood and impact of disasters[2,16]. Disaster-related knowledge equips individuals and communities with essential information about potential hazards, their characteristics and associated risks. Awareness activities promote better preparedness including the development of emergency plans and the establishment of procedures. When individuals have a realistic perception of the risks they face, they are more likely to take appropriate actions to mitigate those risks[4].

Nepal has actively participated in and contributed to various international disaster risk reduction (DRR) activities. The primary aim of these programs is to reduce disaster risk, to enhance community resilience and capacity building and to promote sustainable development[13,14]. The formulation and implementation of the National Strategy for Disaster Risk Management in 2009 marked a significant milestone in mainstreaming DRR activities in Nepal[11,17]. Furthermore, the new constitution of Nepal, enacted in 2015, led to the establishment of the Disaster Risk Reduction and Management Act in 2017 which aims to address disaster risk reduction and management effectively while mandating shared responsibilities across all levels of Government. To minimize the impact of disasters, good governance, political stability, economic prosperity and a sustainable development approach are essential[8,12].

Nepal is a mountainous country situated in recently formed orogenic belts, which are among the most active and fragile mountain ranges in the world. This combination of rugged topography, steep slopes, intense monsoons, active tectonics and seismic activity has rendered the country vulnerable to various natural disasters[9]. Nepal ranks as the most multi-hazard-prone country, 4th in terms of the climatic risk index, 11th in global earthquake risk and 30th in global flood risk[26]. More than 80% of the Nepalese population is directly or indirectly exposed to disaster risk[13].

The Nepal Disaster Report-2019 indicates that floods, fires, landslides, earthquakes, avalanches, droughts, lightning, heavy rainfall and epidemics are the major disasters occurring in Nepal. A total of 6,381 small and large disaster incidents were reported, claiming the lives of 988 people, with an additional 3,639 injuries and approximately 6.84 billion Nepali rupees in losses during 2017 and 2018 alone[11,13]. On April 25, 2015, a Mw 7.8 earthquake struck Barpak village in Gorkha district at 11:56 am local time.

This event resulted in the loss of 8,773 lives, 23,304 injuries and the complete or partial destruction of 785,000 houses[15,19,28]. The disaster statistics of Nepal consistently

underscored the urgent need for disaster risk reduction (DRR) efforts.

Given the country's high vulnerability to various natural disasters, DRR knowledge is crucial for local communities. It helps them to understand the potential risks they face and empowers them to take necessary preventive measures. This knowledge also fosters community engagement and participation in disaster management processes.

Recent Government data shows that the frequency of natural disasters such as floods, landslides, fires and earthquakes has increased, particularly over the past three decades. Factors such as lack of awareness among the local population, insufficient enforcement of clear policies and guidelines, haphazard urbanization, unplanned development activities, improper land use, encroachment on open spaces and deforestation have transformed hazards into devastating disasters[6]. Disasters can significantly impact local livelihoods, especially in agricultural-dependent countries like Nepal. DRR knowledge empowers communities to protect themselves from the effects of disasters and enables them to build resilience, contributing to sustainable development in the face of ongoing and future hazards.

The disaster statistics of Nepal highlight the urgent need for disaster risk reduction (DRR) efforts, as these disasters have had a devastating impact on the lives, livelihoods and infrastructure of local communities. Assessing the level of DRR knowledge among the local population is crucial for understanding their preparedness levels, risk perception and response abilities toward disasters.

In the Gorkha district, the level of DRR knowledge among the local people remains unclear. To date, only a few research efforts have been made to generalize the overall scenario at the national level[1,24,25]. Compared to urban areas, disaster and poverty often coexist in rural regions where lack of knowledge, skills and human resources can exacerbate the impact of disasters.

Research on DRR knowledge at the local level, particularly in the Gorkha district, which has experienced a major earthquake disaster in the past, provides an in-depth understanding of the local context including specific risks, vulnerabilities and community capacities. This research contributes to the generation of new knowledge and evidence-based information and helps to uncover specific needs and gaps in DRR knowledge that require attention. The findings can be shared with local Governments, policymakers and related stakeholders, providing valuable references for the formulation of relevant policies in DRR and disaster management at the local level.

Study area

A descriptive cross-sectional community-based study was conducted to assess the disaster risk reduction (DRR) knowledge of local people in the Gorkha district of Nepal. This district, the epicenter of the 2015 Gorkha earthquake, is situated 77 km northwest of Kathmandu, the capital of Nepal. The study was carried out in Ajirkot rural municipality and Barpak-Suliot rural municipality, located in the central north of the Gorkha district, Gandaki province, Western Nepal (Figure 1).

The study population consisted of individuals aged 18 years or older from diverse socio-economic and cultural backgrounds. This study was based on the assumption that the local people were aware of disaster-related issues and had been gaining DRR knowledge through various training programs, workshops and awareness campaigns organized by different governmental, national and international organizations.

Material and Methods

A well-structured questionnaire was used for the survey to collect primary data from respondents who were purposefully selected for face-to-face interviews. 185 local residents from various wards of Ajirkot rural municipality and Barpak-Sulikot rural municipality were interviewed. The questionnaire consisted of two parts: The first part gathered socio-demographic information about the respondents such as age, gender, caste, education, occupation and family type. The second part included a series of questions related to disaster risk reduction (DRR) issues.

For this study, descriptive statistical analysis, histogram analysis and distribution analysis were conducted to examine the relationship between participation in disaster education programs and key DRR-related variables such as disaster-related knowledge, disaster preparedness and readiness, disaster adaptation, disaster awareness and disaster risk perception. The criteria for the questionnaire survey were adapted from suggestions found in relevant books, literature and previous studies[3,22-25]. A five-point Likert scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree) was used to capture the responses of local people on DRR issues. The phrasing of the survey questions was adjusted to align with DRR terminology, based on the study by Tuladhar et al[24,25].

Results

In the survey, 42.2% of respondents were female and 57.8% were male. The majority of respondents were between the ages of 30 and 50, with a mean age of 44.27 years (S.D = 16.26). Of the 185 respondents, 34.0% were illiterate, 57.3% belonged to the janajati ethnicity and the majority lived in nuclear families (Table 1). The most frequently occurring disasters reported were earthquakes, landslides, floods, fires, droughts and avalanches. Among these, earthquakes were the most commonly experienced disaster, with 97.8% of respondents having faced one, followed by landslides at 53.5% in the Gorkha district (Table 2).

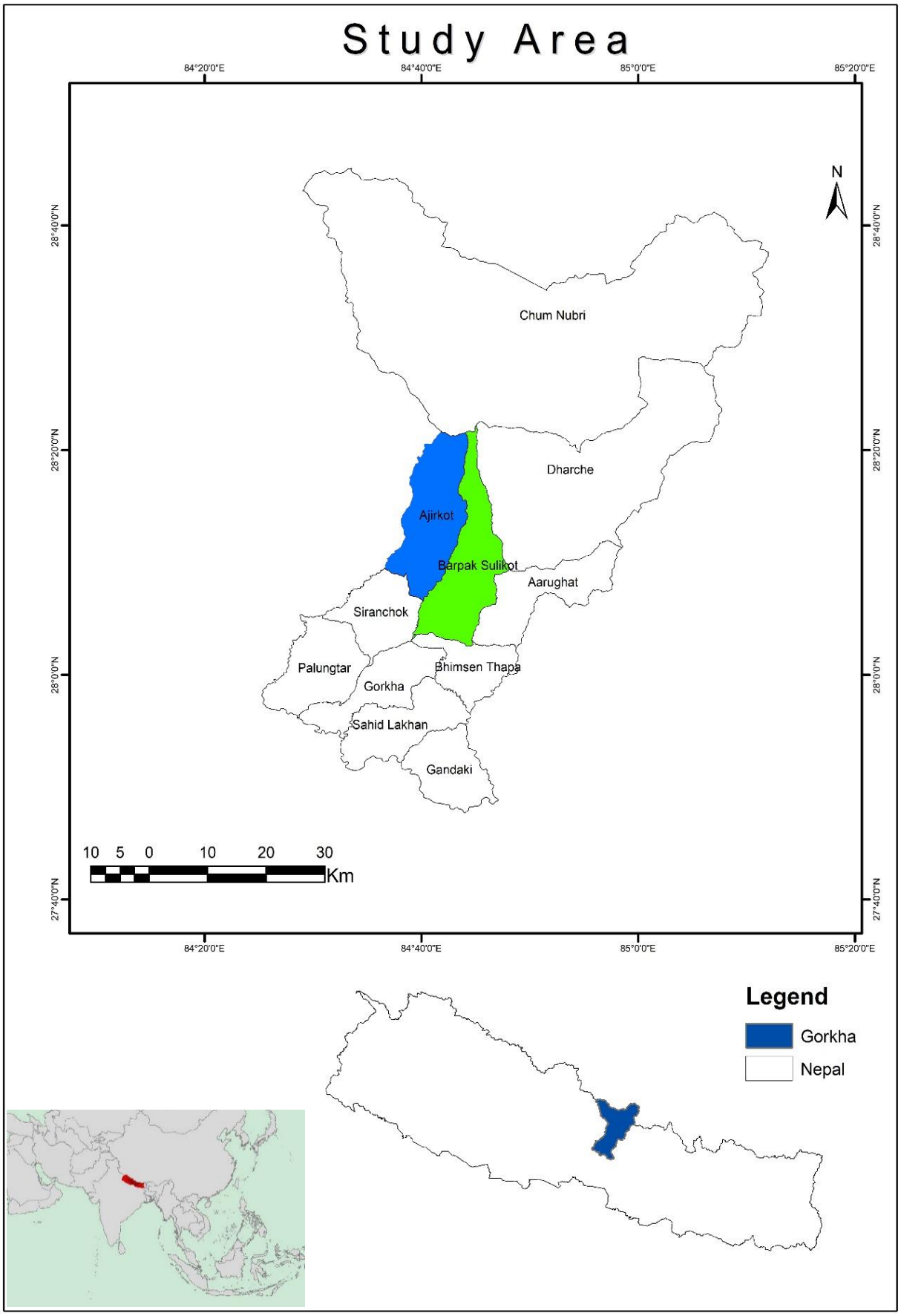

Figure 1: Location map of the study area

Table 1
Distributions of socio-demographic characteristics of the respondents (n=185)

Characteristics		Frequency (n)	Percent
Age in years			
	<20	10	5.4
	20-29	25	13.5
	30-39	42	22.7
	40-49	39	21.1
	50-59	36	19.5
	>60	33	17.8
	Mean ± S.D	44.27±16.267	
Sex			
	Male	107	57.8
	Female	78	42.2
Education			
	Illiterate	63	34.0
	Primary	39	21.1
	Secondary	58	31.4
	Higher Secondary	18	9.7
	Bachelor's or above	7	3.8
Ethnicity			
	Brahmin	55	29.7
	Chhetri	10	5.4
	Janajati	106	57.3
	Dalit	12	6.5
	Muslim	2	1.1
Family Type			
	Nuclear	131	70.8
	Joint	54	29.2
Total		185	100

Table 2
Distributions of the disaster events faced so far by the respondents.

Disaster types	Disaster event faced		Disaster event not faced	
	Frequency (n)	Percent	Frequency (n)	Percent
Earthquake	181	97.8	4	2.2
Landslide	99	53.5	86	46.5
Flood	40	21.6	145	78.4
Fire	15	8.1	170	91.9
Drought	9	4.9	176	95.1
Avalanche	1	0.5	184	99.5
Total	**185**	**100**	**185**	**100**

Gender effect in DRR issue: Demographic factors often influence the disaster risk reduction (DRR) process within a community. An independent t-test was performed to examine gender-based responses to DRR issues.

The descriptive analysis of DRR issues by gender revealed that both male and female respondents had similar levels of knowledge, with both groups demonstrating a fair understanding of disaster-related topics. In terms of disaster awareness and disaster perception, both genders exhibited similar responses, showing excellent and good knowledge respectively. However, when it came to disaster preparedness and readiness, male respondents appeared more confused than their female counterparts. On the other hand, male respondents were found to adapt better to disaster situations than female respondents (Table 3).

Descriptive Analysis - Responses to the DRR issues: In a well-structured questionnaire survey, respondents were asked several disaster-related questions. After gathering socio-demographic information, all respondents were asked if they had ever experienced a disaster in their lives. Disaster risk reduction (DRR) issues such as disaster-related knowledge, disaster preparedness and readiness, disaster awareness, disaster adaptation and disaster perceptions were evaluated using a five-point response scale: (1) strongly disagree, (2) disagree, (3) do not know, (4) agree and (5) strongly agree. The results for each issue are described in the subheadings (Table 4).

Table 3
Descriptive analysis of DRR issues with gender (n=185).

DRR issues	Gender	N	Mean	Std. Deviation	Interpretation
Disaster related knowledge	Male	107	2.86	.818	Fair
	Female	78	2.96	.729	Fair
Disaster preparedness and readiness	Male	107	4.06	.811	Good
	Female	78	4.32	.764	Excellent
Disaster adaptation	Male	107	4.26	.744	Excellent
	Female	78	4.01	.814	Good
Disaster awareness	Male	107	4.63	.505	Excellent
	Female	78	4.58	.497	Excellent
Disaster perception	Male	107	3.64	.894	Good
	Female	78	3.60	.875	Good

Table 4
Mean percentage of each response on different disaster risk reduction (DRR) issues (n=185).

DRR Issues	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
1.Disaster related knowledge					
I know when a disaster will occur.	2.7%	21.1%	0.0%	71.4%	4.9%
I know disasters cannot be prevented.	64.9%	14.6%	5.0%	16.8%	3.2%
I have participated in disaster risk education, training or workshop.	8.6%	11.9%	1.1%	5.4%	73.0%
2.Disaster preparedness and readiness					
I think to come across a disaster and remain alive depends on our luck.	60.5%	8.4%	3.0%	24.9%	3.2%
I know the importance of talking about disasters with neighbors, friends and colleagues.	34.6%	60.5%	0.0%	4.9%	0.0%
I am confident for reconstruction activities from the government after disaster.	20.0%	40.0%	3.8%	34.6%	1.6%
3.Disaster adaptation					
I am aware of the shelter areas and open space in case of a disaster.	75.7%	16.8%	0.5%	5.4%	1.6%
I have information about which government office needs to be contacted after the disaster.	15.1%	23.8%	2.2%	48.1%	10.8%
I have knowledge about disaster prone area.	25.9%	62.2%	0.5%	11.4%	0.0%
I know the important of community activities for disasters risk reduction.	55.7%	31.4%	0.0%	12.4%	0.5%
4.Disaster awareness					
I know recovery after disaster is a crucial work.	78.4%	16.8%	0.0%	4.9%	0.0%
I used to prepare emergency bag for disaster.	4.3%	13.0%	1.1%	74.6%	7.0%
I think repair of road blockage and transportation break are important.	81.1%	13.5%	2.2%	3.2%	0.0%
After disaster, I actively perform recovery and reconstruction activities.	94.6%	3.2%	1.2%	1.0%	0.0%
When some of my relatives and friends are affected by disaster, I am willing to help them.	94.1%	3.2%	0.0%	2.7%	0.0%
5.Disaster perception					
I am very sure that large-scale disaster will certainly occurs in next 10 years.	13.0%	14.1%	3.2%	60.5%	9.2%
My locality is safe from all kinds of disasters.	40.5%	22.7%	0.0%	31.1%	2.7%
I think my buildings is well designed and will withstand an earthquake event.	49.2%	25.4%	4.6%	20.3%	0.5%
I think the risk of earthquake is increases here in recent years.	27.0%	42.2%	0.5%	27.6%	8.7%

Disaster-Related Knowledge: Three main statements were used to measure the level of disaster-related knowledge. The mean percentage of each response showed that all responses were significantly different from each other. A majority of the respondents (71.4%) disagreed that they know when a disaster will occur, while 21.1% agreed that they have this knowledge. Interestingly, 64.9% of respondents strongly agreed that disasters cannot be prevented. Most of the respondents did not participate in disaster risk education, training, or workshops.

Disaster Preparedness and Readiness: Three main questions explored the respondents' preparedness and readiness for disasters. The majority of respondents reported being prepared for disasters, with 60.5% strongly agreeing that surviving a disaster is largely a matter of luck, while 24.9% disagreed with this view. Additionally, 60.5% agreed and 34.6% strongly agreed that discussing disasters with neighbors, friends and colleagues is important. Over half of the respondents agreed that they have confidence in the Government's ability to carry out construction activities after a disaster, though 34.6% expressed doubt.

Disaster Adaptation: To assess disaster adaptation, four main statements were presented, yielding varied responses. A significant 75.7% of respondents strongly agreed that they were aware of shelter areas and open spaces in case of a disaster and 62.2% agreed that they know about disaster-prone areas in their locality. Furthermore, 55.7% strongly agreed on the importance of community activities for disaster risk reduction. However, responses were mixed regarding awareness of which Government office to contact after a disaster, with half of the respondents having no knowledge of the responsible authority.

Disaster Awareness: Five main statements measured disaster awareness among respondents. A large majority (78.4%) strongly agreed that recovery actions are crucial after disaster events and 81.1% strongly supported the importance of repairing road blockages and restoring transportation. Almost all respondents indicated that they are well-prepared to participate in recovery and reconstruction activities after a disaster and are willing to help family and friends affected by the disaster. Despite this, about 75% agreed that they do not usually prepare an emergency bag for disasters, possibly due to lack of awareness or the perception that such preparation is impractical.

Disaster Risk Perception: Four main questions were asked to explore disaster risk perception among respondents with significantly varied responses. A majority (60.5%) disagreed with the notion that a large-scale disaster will certainly occur in the next 10 years, despite historical records indicating that major disasters tend to occur roughly every decade in Nepal. Additionally, 40.5% strongly agreed that their locality is safe from all kinds of disasters, while 31.1% disagreed. Nearly half (49.2%) strongly agreed that their building is well-designed to withstand an earthquake, though 42.2% agreed that the risk of earthquake disasters has increased in their locality in recent years, with about one-third disagreeing.

Discussion

Local people in Gorkha district lack accurate knowledge about disasters and the mitigation processes, with a significant proportion of respondents unaware of when disasters might occur, believing that disasters cannot be prevented. They did not participate in disaster risk education, training, or workshops. Despite this, Government resources are often spent more on discussions, workshops and hiring foreign consultants rather than taking immediate action in the field, utilizing available indigenous knowledge. Approximately 66% of respondents were unclear about disaster-related knowledge, indicating that Nepal has not effectively implemented DRR education initiatives and these activities are not as impactful as needed, echoing the findings of Tuladhar et al [25].

At the national level, there are ample opportunities to participate in relevant DRR activities regularly. However, at the district and local levels, these opportunities are limited[18], resulting in reduced participation in DRR education. The majority of respondents in the study area were female, illiterate and aged between 30-50 years, suggesting that reaching this demographic effectively may require focusing on children's education. School-aged children have significant potential to assist in disaster management and help to create disaster-resilient communities[20]. Disaster education should therefore be an integral part of the school curriculum to raise awareness and preparedness, thereby reducing the impact of disasters as much as possible[21,24].

In the Philippines, for example, the local population's disaster risk reduction knowledge was improved through continuous information dissemination campaigns supported by colleges, universities, local communities and various stakeholders which increased community involvement in disaster preparedness and mitigation[21]. There is a noticeable gap between policies and practices in public participation within disaster management and governance. Despite the Constitution of Nepal 2015 clearly outlining the roles and responsibilities of all levels of government, the local Government's involvement in the public participatory process has been passive, primarily due to limited capabilities and resources at the local level[20].

Government agencies can play a crucial role in disaster preparedness and awareness activities through training, seminars and various drill activities. However, in many rural municipalities like Ajirkot and Barpark Sulikot, local Governments are often the sole organizations responsible for these activities, yet they frequently lack the necessary knowledge on how to prepare an emergency bag for disasters and are unaware of which Government office to contact following disaster events. Socio-economic conditions significantly impact disaster preparedness, perception and

adaptation[30], with many people who are aware of disaster risks still ignoring the need for future disaster preparation[3].

Despite the low level of knowledge and risk perception, local people display a positive attitude towards disaster preparedness, awareness and adaptation. They show strong willingness to participate in recovery and reconstruction activities and express a desire to help their family, friends and relatives during disasters and after the disasters. This attitude is likely influenced by their past experiences with disasters where community support was crucial for survival. Previous exposure to disaster events has helped them to understand the risks and the necessity of DRR education. Various studies indicate that people's awareness has increased due to recent earthquake-related disasters, but they are still not familiar with how to adapt[3,25].

Respondents also recognized the importance of community activities and the need to share information with families, friends and neighbors about disasters. This positive attitude should be leveraged by involving local communities in post-disaster activities. There is a pressing need for comprehensive and targeted interventions to enhance disaster risk reduction knowledge, to improve preparedness and awareness levels and to foster community engagement. To effectively implement DRR practices, local people must be encouraged to learn about basic disaster-related knowledge, readiness behaviors, awareness programs, adaptation practices and risk identification techniques.

Conclusion

The results from the well-structured questionnaire survey conducted in the field highlight significant flaws and limitations in how Disaster Risk Reduction (DRR) knowledge is currently disseminated to Nepalese communities. The findings indicate that the level of disaster-related knowledge among local people is not satisfactory. Both male and female respondents demonstrated limited understanding of disaster-related facts, although they were relatively well-prepared, aware and adapted to facing disasters. Despite this, local people often overestimate disaster risks and lack knowledge about even basic disaster-related issues.

A key obstacle to effective DRR practices in rural countries like Nepal is the challenge of implementation at the individual level. Much of the Government's resources are allocated to discussions, seminars and workshops, resulting in DRR programs being less effective in practice. The Disaster Risk Reduction and Management (DRRM) Act of 2017 is the latest legislative effort aimed at addressing disaster risk reduction and management effectively. Additionally, the Constitution of Nepal 2015 clearly outlines that disaster risk management is a shared responsibility across all levels of Government. However, the lack of proper policies and guidelines hampers effective implementation, making it difficult to translate legislative intent into practical action.

This situation underscores the need for more direct and actionable approaches to DRR, emphasizing the importance of clear policies, effective guidelines and a focus on practical, community-based initiatives that empower individuals at the local level to better understand and respond to disaster risks.

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