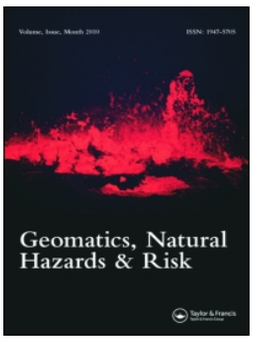

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Knowledge of disaster risk reduction among school students in Nepal

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Because of extreme vulnerability to natural disasters, Nepal is considered a disaster hotspot in the world. For a small country with just a little less than 30-million population, the disaster statistics are always frightening. School students of Nepal are also in extreme risk of natural disasters, especially when they are in schools. In this context, a few education programmes for disaster risk reduction (DRR) have already been initiated and the results have also been already documented. However, an evaluation of the real scenario with the help of an independent research is still lacking. Therefore, this research aims to explore benefits of existing education programmes of DRR in Nepal. Altogether, 124 students from 17 districts were interviewed and various questions related to disaster information, disaster knowledge, disaster readiness, disaster awareness, disaster adaptation, and disaster risk perception were asked. Statistical analysis such as histogram analysis, distribution analysis, bivariate correlations, and independent sample *t*-tests were conducted to examine the relationship between students in disaster education-related programmes and the key DRR issues-related dependent variables. Findings of this independent research confirmed that initiatives taken for disaster education in Nepal are not enough and a major challenge for DRR in a school community for a country like Nepal is implementing methods, especially at the individual level. Likewise, the disaster education should not only be confined within the school students, but it must also be promoted to families and communities, which is very essential to elaborate knowledge of DRR and to contribute to a disaster safe society in the country.

1. Introduction

Every year, natural disasters such as landslides, earthquakes, floods, wind and ice storms, droughts, volcanic eruptions, and tsunamis around the world lead to more than 400 national level natural disasters that kill an average of 74,000 and affect more than 230 million people (CRED 2008). The situation of local level disasters is even worse. UNISDR (2007) reported that more than three-quarter of the world's population were affected by natural disasters at least once between 1980 and 2000.

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Among the various natural disasters, earthquakes, tsunamis, cyclones, typhoons, and hurricanes are the deadliest and costliest, which are also responsible for a huge loss of lives and properties every year in the world. Also, as a matter of fact, each time a disaster occurs, masses of school children are victimized and many of them never return. For example, in 1988 Spitak Earthquake (Armenia) killed more than 17,000 students while in schools, which was 2/3 of total earthquake fatality. Likewise, in 2001, 971 students and 31 teachers were killed by Bhuj Earthquake in India. In 2004, a fire tragedy due to explosion of a cooking gas cylinder in Tamil Nadu (India) killed 93 school children. Most terrible disaster in school was recorded in 2005 after Kashmir Earthquake (northern Pakistan), which killed 17,000 students at different schools while 50,000 more were seriously injured. In 2006, an elementary school in the Philippines was buried in a landslide and 245 children and teachers were killed. Moreover, in 2008, more than 10,000 children were killed during the Sichuwan Earthquake in China.

As a Himalayan mountainous territory, Nepal is also extremely vulnerable to natural disasters and is a disaster hotspot of the world. Due to predominant mountainous terrains in the north and low lying plains in the south drained by some of the large rivers on the earth originating from the Himalaya, and due to dominant strong monsoonal rains, the country is overwhelmed by floods and landslides. Likewise, situated at the boundary of the colliding Indian and Eurasian plates, the Himalaya and its neighbourhood are geologically one of the most earthquake prone regions of the world, which have experienced devastating earthquakes in the past and do expect a large earthquake within this century (Bilham et al. 1995; Paudyal et al. 2012). All over the world, Nepal is placed in the seventh position in terms of number of deaths as a combined consequence of floods, landslides, and avalanches, and in the eighth position in terms of number of flood-related deaths alone (Nepal Disaster Report 2009). For a small country with its population a little less than 30 million, these disaster statistics certainly draw a worldwide attention, especially from the disaster scientists and practitioners.

The school-related disaster data of the world and the past disaster scenario in Nepal clearly suggest that the school children of Nepal are also in extreme risk of natural disasters, especially when they should be in schools. A disaster is not only a threat to lives of the children but it also impacts the education, economy, and psychology of the children and their families. When the schools are hit by a disaster in Nepal, the hard won educational right of the children is always disrupted. Moreover, the instruction time is largely lost after a disaster, which results in an irrecoverable drop in education quality. Sometimes, some children cannot even continue their schooling leading to permanent drop out. When the educational records miss due to the disaster loss, students often fail to enrol again, which leads to their discontinued education. Damage in school buildings and loss of income and lack of reinvestment may also affect the continuation of the children's education. Lack of resiliency development and prior empowerment may also collapse deliverable and established systems of the school communities. These effects were well observed in the eastern Nepal after the 1988 Udaypur Earthquake and 2011 September 18 Sikkim–Nepal Boarder Earthquake. Following a natural disaster event, the reactions of school children have been found to vary greatly whether it is a hurricane or a volcanic or an earthquake disaster (Ronan 1997; Stoppelbein & Greening 2000; La Greca & Prinstein 2002). Research findings have revealed that post-traumatic stress symptoms in school students are usually moderate to severe. Therefore, disaster risk reduction

(DRR) education to school students and teachers is very important for building an understanding of the teachers and students about the causes, nature, and effects of natural hazards. It also fosters a range of competencies and skills to enable teachers and students to contribute proactively for the prevention and mitigation of disasters.

Many research works have also examined that the effect of student's participation in disaster education programmes is always promising, and the outputs have been very effective (Ronan et al. 2010). Likewise, school-based disaster education programmes were useful for increasing community disaster preparedness (Nathe 2000; Shaw et al. 2004). In 2006, the UNISDR (United Nation International Strategy for Disaster Reduction) initiated a campaign called "Disaster Risk Reduction Begins at School" to encourage the integration of disaster risk education into school curricula in the countries vulnerable to disasters. This and many other campaigns were also initiated in Nepal to reduce the disaster vulnerability in schools. Few DRR education programmes were also initiated and results were well documented (Shiwaku et al. 2007; ActionAid 2011a, 2011b). Recently, Nepal has included DRR into its education system and curricula (UNESCO & UNICEF 2012).

In this context, this research aims to explore the benefits of education programmes related to DRR in Nepal. More specifically, it examines the following aspects of DRR knowledge among the school children:

- Existing source of disaster-related information;
- The relationship between opinion of school students and the disasters;
- The structure of the commonly available key DRR issues in the community and understanding of school students.

2. Schools in Nepal

Nepalese education system can be primarily classified into two categories: school education and higher education. The school education includes primary level of grade 1 to 5, lower secondary of grade 6 to 8, secondary level of grade 9 to 10, and higher secondary level of grade 11 to 12. In many urban areas, private schools provide an integrated education from grade 1 to 12, but in rural and sub-urban areas, public schools are the main centre of education responsible for compulsory education from grade 1 to 12. Broadly, the schools in Nepal belong to one of the following four categories in terms of ownership and funding:

(a) *Community aided*: schools that are fully supported by the government for teachers' salary and other funds,
(b) *Community managed*: schools that are fully supported by the government for teachers' salary and other funds but their management responsibility is taken up by the community,
(c) *Community unaided*: schools that either receive partial support or no support from the government, and
(d) *Private/Institutional*: supported by parents and trustees.

In total, there are 31,156 schools in Nepal, out of which 20,345 are primary level schools. In this research, all kinds of schools are selected for data collection. Both geographical distribution and types of schools are taken into consideration for random sampling. A maximum of three students were interviewed from each school.

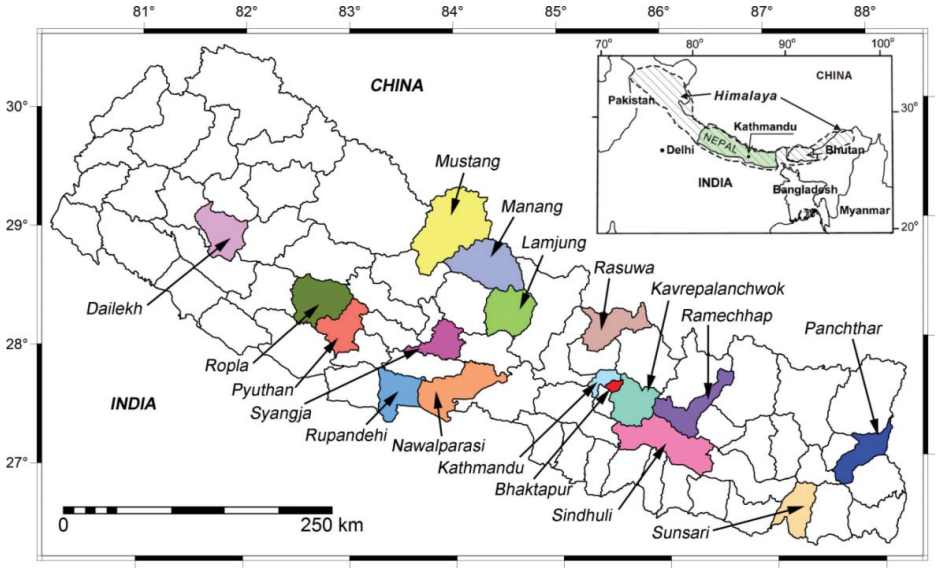

Figure 1. Location of sample districts where randomly selected students were interviewed for data collection.

The 17 districts selected randomly for the data collection are shown in figure 1. While selecting the districts, existing or ongoing activities of various non-governmental organizations, disaster history (Aryal 2012), rainfall distribution and associated disasters (Dahal & Hasegawa 2008), and recent earthquake disaster (Dahal et al. 2012) were mainly taken into account. Moreover, the study was conducted in assumptions that all school students now receive disaster education in the form of various curricula and DRR activities and programmes of both national and international non-governmental organizations (Shiwaku et al. 2007; Action Aid 2011a, 2011b; UNESCO & UNICEF 2012).

3. Methodology

3.1. Research overview

This research is intended to explore the DRR knowledge of school students in Nepal. Moreover, this is an impact study intended to examine the effect of pre-disaster education programmes on a number of aspects including risk perceptions, emotion-focused components (e.g., disaster-related fear in students, present coping ability in the event of a disaster), knowledge on available safety system in the event of a disaster, disaster preparedness of the families and communities, and the disaster adaptations up until today. This study also explores future perspectives, and demands the underpin relationship between existing education programmes and perception of the students towards disaster risk.

3.2. Data collection

For the survey, a questionnaire data sheet was prepared (figure 2), and a total of 124 students (participants) from the randomly selected schools were interviewed. There

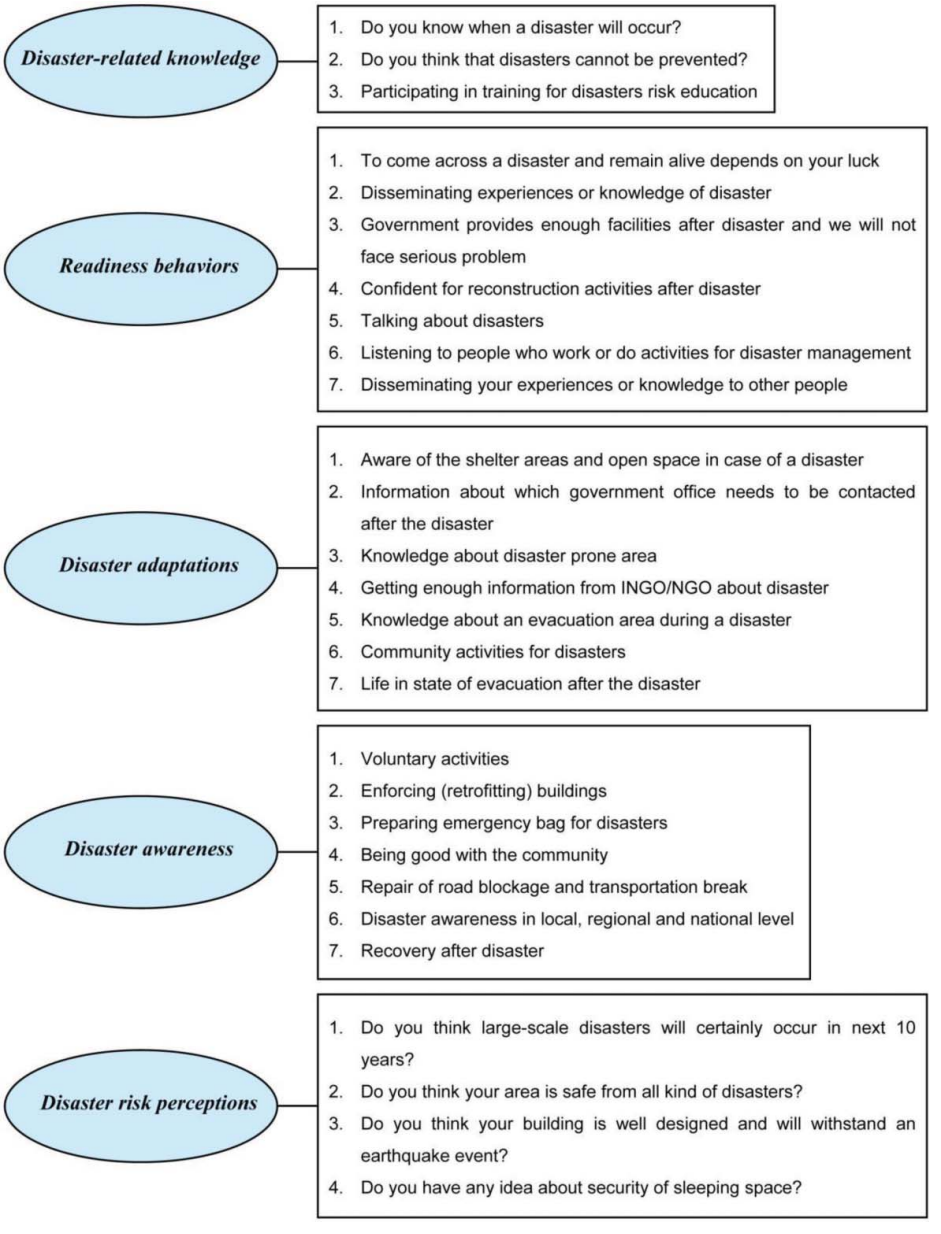

Figure 2. Major questions asked to the students in the questionnaire survey.

were equal numbers of female and male students that ranged in age from 10 to 22 years with a mean value of 15.61 years and a standard deviation (SD) of 2.07. In Nepal, the age group for secondary and higher secondary schools is usually from 10 to 18, but in remote villages, many students join schools in later ages. Therefore, the upper age boundary was set at 22 years. Moreover, the interviewed students were found to have come from a variety of socioeconomic and cultural backgrounds.

The survey criteria used in this study were adapted from the suggestions available in literature (such as Arya 1993; Kuroiwa 1993; Ronan & Johnston 2001, 2003; Tanaka 2005; Shiwaku et al. 2007; Ronan et al. 2010), and are embedded together within a single survey. The following parameters were considered while developing the questionnaire.

3.2.1. Disaster experience. The students were asked to indicate whether or not they had any experience of disasters in their life and any specific terrible disaster they experienced. Additionally, the students were asked to indicate the source of disaster information in their area.

3.2.2. Evaluation of readiness of the students. Questionnaires about various natural disasters were used to assess the knowledge of the students and the best course of action they would take in an event of disaster. Questions in relation with their knowledge over eight types of disasters (i.e., floods, landslides, earthquakes, fires, high winds, hailstorm, drought, and extreme rainfall) were asked to obtain the answer in (1) Never, (2) Rarely, (3) Sometime, (4) Often, (5) Always format. For various kinds of disasters, the students were also asked to indicate which behaviour or behaviours they would endorse in an event of certain disaster as per the disaster education they receive in their schools.

3.2.3. Disaster awareness, adaptations, and risk perceptions. The students were asked a series of 20 questions that addressed their knowledge on a number of issues related to disasters. Disaster-related psychological issues were also asked. Questionnaires related to food security to evacuation area and likelihood of occurrence of disasters to understanding of disaster prone areas were also endorsed. The students replied in 5 categories of answer as (1) strongly disagree, (2) disagree, (3) agree, (4) strongly agree, and (5) I do not know.

3.2.4. Survey procedure. The process of interviewing the school students especially from the remote districts of Nepal was comparatively difficult. However, the representatives of local political parties who have basic knowledge of disasters were selected as enumerators and the help of the school teachers was also taken. The enumerators picked out a maximum of three students from each school, and asked the selected students to complete the survey sheet by reading to themselves. If the students had any difficulty understanding a particular item, they were helped by the teachers. The overall time required for completing the survey on one student was reported to be 15–20 min.

3.3. Method of analysis

The main aim of this study is to examine the DRR knowledge of school students in Nepal. Therefore, histogram analysis, distribution analysis, bivariate correlations, and independent sample *t*-tests were conducted to examine the relationship between the students in disaster education-related programmes and the following key DRR

issues-related dependent (criterion) variables: disaster-related knowledge, readiness behaviours of students, disaster awareness, disaster adaptations, and risk perceptions. A series of independent sample *t*-tests were conducted to examine the effects of age, gender, and disaster events on the dependent variables.

The various questionnaires asked during the survey were accommodated within various groups of DRR issues and statistical analyses were performed.

4. Analyses and results

4.1. Gender and age effect in DRR issues

Demographic factors always possess some relationship with the DRR process in a community. In Nepal, 50.01% are male students and 49.99% are female students out of 7,444,134 school children (MoE 2012). To explore these issues in terms of relationship of disaster concept with gender and age of the school students, a preliminary analysis was conducted, as described in the following sub-sections.

4.1.1. Effect of gender. An independent *t*-test (table 1) suggested that there is no statistically significant difference between disaster knowledge, disaster readiness, disaster awareness, and disaster risk perception of the female and male students because the significance of *t*-test results are greater than 0.05 (two-tailed) for almost

Table 1. Impact of gender on key DRR issues.

Key DRR issues		Female		Male			
		Mean	SD	Mean	SD	*t*(124)	Sig.
1	Knowledge: Well understood	17.6	4.72	21.0	6.12	−0.98	0.35
	Knowledge: Understood	22.0	3.08	19.0	6.00	0.99	0.35
	Knowledge: Not clear	11.0	4.24	8.6	3.36	0.99	0.35
	Knowledge: Confusing	4.8	1.30	5.8	3.27	−0.64	0.54
	Knowledge: No idea	6.6	1.52	7.6	3.44	−0.60	0.57
2	Readiness: Well prepared	11.0	5.98	13.6	7.54	0.91	0.37
	Readiness: Ready	22.2	8.93	19.3	7.77	−0.81	0.42
	Readiness: Not ready	12.0	5.64	14.4	6.28	0.93	0.36
	Readiness: Confusing	9.7	6.62	7.1	4.87	−1.06	0.30
	Readiness: No idea	7.1	4.85	7.5	6.02	0.20	0.85
3	Awareness: Well aware	11.9	5.88	13.8	5.76	0.69	0.50
	Awareness: Aware	26.2	5.45	23.8	7.19	−0.81	0.43
	Awareness: Not aware	10.1	4.20	8.0	3.16	−1.21	0.25
	Awareness: Confusing	3.8	2.91	3.6	2.74	−0.17	0.87
	Awareness: No idea	10.0	6.98	12.9	9.01	0.76	0.46
4	Adaptation: Well adapted	13.4	6.38	15.2	7.34	0.71	0.48
	Adaptation: Adapted	21.0	6.34	16.4	6.46	−1.92	0.07
	Adaptations: Not adapted	14.1	7.08	12.1	5.75	−0.79	0.44
	Adaptation: Confusing	5.0	2.54	8.3	2.97	3.14	0.00
	Adaptation: No idea	8.6	5.17	10.0	5.60	0.70	0.49
5	Perception: Well perceived	6.4	4.28	5.0	5.05	0.47	0.65
	Perception: Perceived	16.0	8.00	16.2	8.32	−0.04	0.97
	Perception: Not perceived	15.2	10.83	16.6	8.99	−0.22	0.83
	Perception: Confusing	6.2	4.76	6.6	4.16	−0.14	0.89
	Perception: No idea	18.2	10.26	17.6	12.14	0.08	0.93

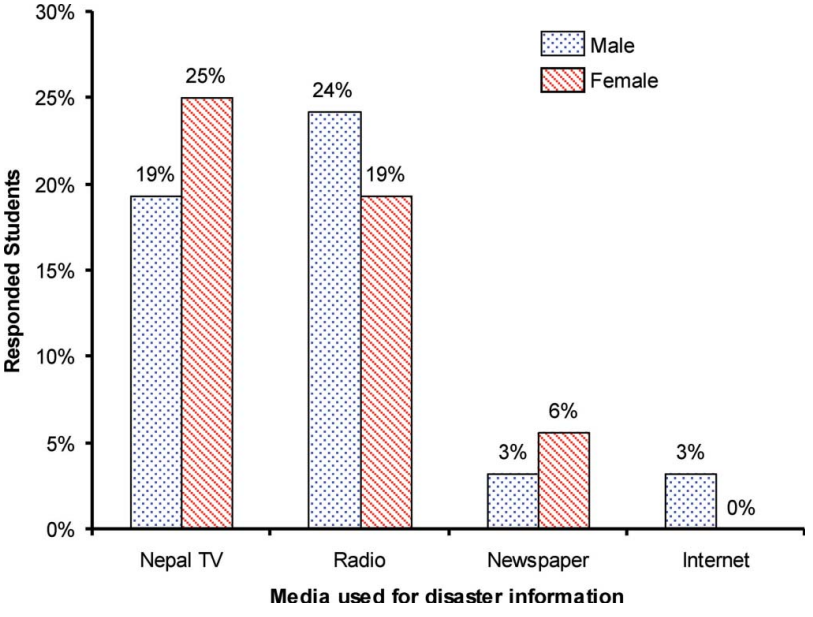

Figure 3. Use of media for disaster information among male and female school students.

all kinds of key disaster issues. Only for the case of adaptation, the male students are found to be more confused (significance of the *t*-test results are less than 0.05) than the female students.

Likewise, when the students were asked about the source of disaster information, a higher number of female students identified national television (i.e., Nepal Television) broadcast (figure 3). The male students were found to prefer FM radios as the major source of information. Frequency of use of Internet for the disaster information update was found to be very low among all students. None of the female students were found to have been using Internet for the disaster update. Except for Manang, Mustang, Dailekh, Rolpa, and Pyuthan districts, Internet is easily accessible to the students, and the parents do not put restriction over the use of Internet especially for education purpose either at school or at home. Although many students were found to have been using social network over the Internet, this study revealed that the students are reluctant to use Internet for disaster information update.

4.1.2. Effect of age. The interviewed students were categorized in two age groups (i.e., <15 years and >15 years) so as to evaluate the effect of age on the knowledge of key DRR issues. The analysis showed that younger students (i.e., <15 years) are surprisingly well familiar with disasters than the older students (i.e., >15 years). But, they were found confused about the disaster adaptation process than the older students (table 2). In other key DRR issues, both age groups were found to have similar opinions.

More or less an equal number of older and younger groups of students were found to have been using FM radio and television to obtain the disaster information. However, the younger students are more interested to have disaster information from newspaper than the older students (figure 4).

Table 2. Impact of age group on key DRR issues.

	Key DRR issues	<15 years		>15 years			
		Mean	SD	Mean	SD	$t(124)$	Sig.
1	Knowledge: Well understood	24.0	6.36	14.6	4.16	2.76	0.02
	Knowledge: Understood	20.4	5.98	20.6	1.14	−0.07	0.94
	Knowledge: Not clear	11.4	5.86	8.2	2.95	1.09	0.31
	Knowledge: Confusing	5.6	3.44	5.0	1.87	0.34	0.74
	Knowledge: No idea	7.6	2.70	6.6	2.41	0.62	0.55
2	Readiness: Well prepared	13.7	8.24	10.9	5.86	0.92	0.37
	Readiness: Ready	22.5	10.70	19.0	6.28	0.92	0.37
	Readiness: Not ready	13.9	7.52	12.5	5.37	0.52	0.61
	Readiness: Confusing	9.5	7.53	7.5	3.86	0.78	0.44
	Readiness: No idea	9.5	6.44	5.2	4.73	1.77	0.09
3	Awareness: Well aware	15.1	6.45	10.0	3.24	2.12	0.05
	Awareness: Aware	27.0	8.46	25.1	13.06	0.36	0.72
	Awareness: Not aware	10.6	4.72	8.2	4.52	1.07	0.30
	Awareness: Confusing	4.0	3.28	3.3	2.87	0.46	0.65
	Awareness: No idea	12.3	8.57	12.6	12.01	−0.05	0.96
4	Adaptation: Well adapted	16.3	7.76	12.3	5.69	1.56	0.13
	Adaptation: Adapted	19.6	7.83	17.7	4.79	0.79	0.44
	Adaptations: Not adapted	14.7	7.27	11.5	5.50	1.32	0.20
	Adaptation: Confusing	8.4	2.44	4.9	2.79	3.47	0.00
	Adaptation: No idea	10.0	6.13	8.6	3.96	0.73	0.47
5	Perception: Well perceived	6.6	4.28	4.8	4.97	0.61	0.56
	Perception: Perceived	17.6	9.45	14.6	6.88	0.57	0.58
	Perception: Not perceived	18.0	11.34	13.8	8.35	0.67	0.52
	Perception: Confusing	8.8	6.4	4.0	2.24	1.58	0.15
	Perception: No idea	18.0	11.47	17.8	11.08	0.03	0.98

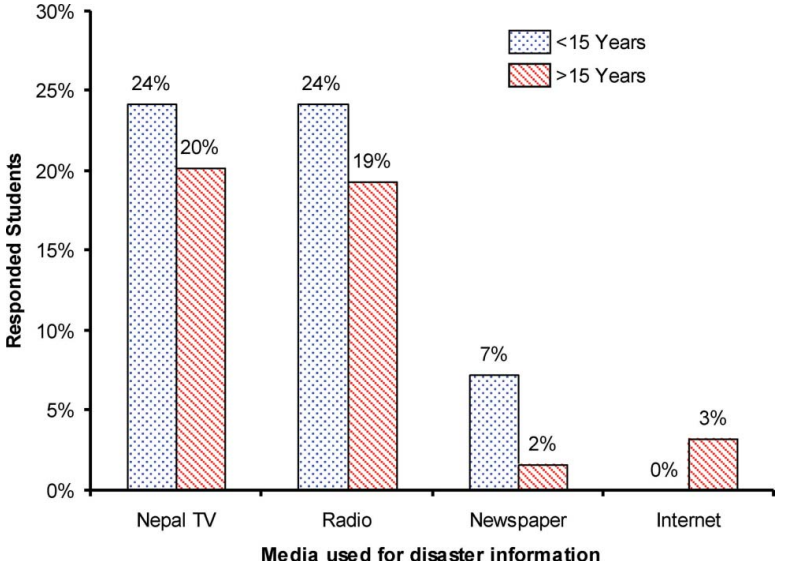

Figure 4. Use of media for disaster information among older and younger students.

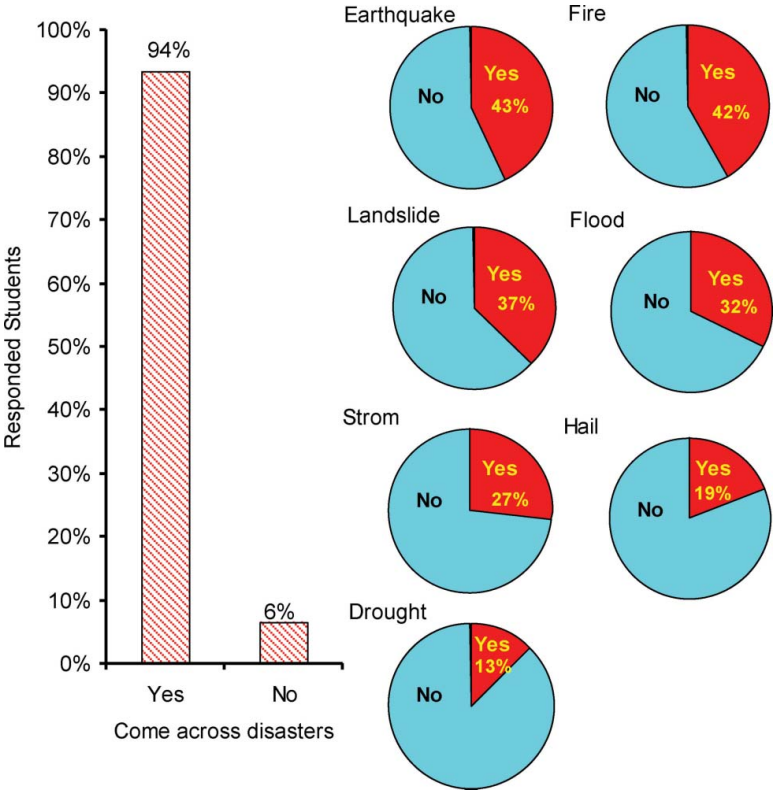

Figure 5. Disaster experiences of students.

4.2. Response to key DRR issues

In the interview, the students were asked a number of disaster-related questions. First of all, after getting background information, all students were asked whether they had come across any disaster in their life or not. Surprisingly, a total of 94% students said they had come across disasters, and most of them responded that earthquake, fire, and landslide disasters are the most prominent disasters (figure 5) they had ever felt in their life. About 13% students, however, responded that they had come across drought disaster.

Importance of five DRR issues (i.e., disaster knowledge, disaster readiness, disaster awareness, disaster adaptation, and disaster risk perception) was evaluated on the basis of five response indexes including (1) very important, (2) important, (3) not so important, (4) not important, and (5) confusing. Initially, a null hypothesis was set that the distributions of response indexes are similar in all five DRR issues. One sample non-parametric test suggested to reject the null hypothesis with low (0.003) significance level. The histogram given in figure 6 also exclusively supports this non-parametric test result. Likewise, the numbers of responses in each key DRR issue are not equal, and do not correspond to a decreasing trend from a higher to a lower importance. To obtain the histogram, normalized percentage of responses were used. For the normalization, each category of responses (such as "very important" or "confusing") were normalized to 100% as per the minimum and maximum number of responses in particular DRR issue. This normalization criterion was fixed as per

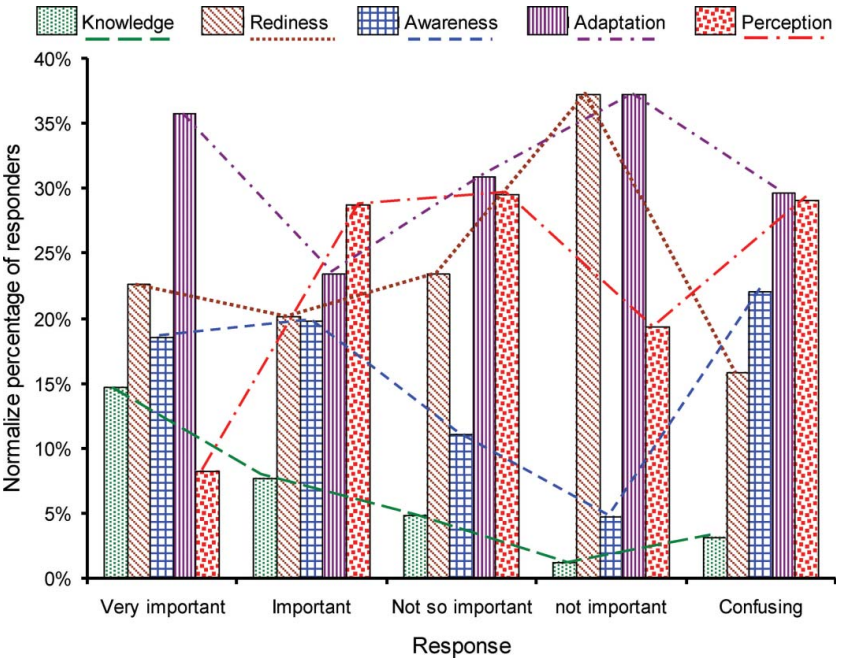

Figure 6. Distribution of response for importance of various key DRR issues.

the unequal number of responses in each DRR issue. For example, for the DRR issue of "Knowledge", only 5 responses were obtained, but for the DRR issue of "Readiness behavior", 11 responses were obtained. Therefore, to obtain biasless result, the data were normalized to 100% for each response. The histogram analysis suggests that nearly equal proportions of students think that disaster adaptation is "very important" as well as "not important". More than 35% of the students do not think that the readiness behaviour is important in DRR. Only "disaster knowledge" shows satisfactory results of ongoing disaster education programmes of the government institutions, non-governmental organizations, and international organizations because the trend of responses indicates a decreasing pattern from higher to lower importance indexes (figure 6).

The significance of all responses of each key DRR issue was also evaluated statistically with the predisposed disaster knowledge of the students. The students were asked about their exposure to any disasters in the past, such as flood, landslide, earthquake, fire, storm, hail, and drought. Their response was in "yes" or "no" format, which were used in independent sample *t*-tests with two groups of responses (i.e., pre-exposed group "yes" and pre-exposed group "no" in each disaster) and key DRR issues. The results of the analysis are described in following sub-sections.

4.2.1. Effect of pre-exposed disasters in key DRR issues. In general, a responder who had experience of some disaster in the past might be aware of disaster education and key DRR issues. Any previous exposure of the students in any type of disaster can be a proxy parameter of disaster education. But, independent sample *t*-tests between "yes" and "no" pre-exposed groups in disasters revealed that pre-exposing

Table 3. Disaster knowledge and effects of pre-exposed disasters.

		Yes		No			
Disaster types	Respond	Mean	SD	Mean	SD	$t(124)$	Sig.
Flood	Well understood	11.20	4.87	27.40	5.68	4.84	0.00
	Understood	13.80	3.70	27.20	4.09	5.43	0.00
	Not clear	5.80	2.17	13.80	5.59	2.99	0.02
	Confusing	5.00	2.92	5.60	1.52	0.41	0.69
	No idea	4.20	1.30	10.00	3.24	3.71	0.01
Landslide	Well understood	13.80	3.27	24.80	7.43	3.03	0.02
	Understood	15.40	4.39	25.60	4.04	3.82	0.01
	Not clear	7.80	3.27	11.80	3.90	1.76	0.12
	Confusing	4.20	2.17	6.40	3.71	1.14	0.29
	No idea	4.80	2.59	9.40	4.51	1.98	0.08
Earthquake	Well understood	17.80	4.92	20.80	5.89	0.87	0.41
	Understood	16.20	4.76	24.80	2.77	3.49	0.01
	Not clear	6.80	3.96	12.80	3.49	2.54	0.03
	Confusing	4.40	3.36	6.20	2.17	1.01	0.34
	No idea	7.80	2.49	6.40	2.70	−0.85	0.42
Fire	Well understood	15.40	5.13	23.20	4.87	2.47	0.04
	Understood	16.20	3.63	24.80	5.02	3.10	0.01
	Not clear	10.00	4.00	9.60	3.21	−0.17	0.87
	Confusing	5.60	2.88	5.00	2.12	−0.38	0.72
	No idea	4.80	1.48	9.40	4.34	2.24	0.06
Strom	Well understood	9.00	4.12	29.60	7.02	5.66	0.00
	Understood	9.60	3.44	31.40	4.83	8.23	0.00
	Not clear	6.00	2.55	13.60	5.37	2.86	0.02
	Confusing	4.40	2.70	6.20	2.86	1.02	0.34
	No idea	4.00	1.22	10.20	4.49	2.98	0.02
Hail	Well understood	7.00	2.83	31.60	7.83	6.61	0.00
	Understood	7.40	2.97	33.60	5.18	9.82	0.00
	Not clear	4.60	2.79	15.00	5.00	4.06	0.00
	Confusing	2.60	1.14	8.00	3.00	3.76	0.01
	No idea	2.40	0.89	11.80	5.26	3.94	0.00
Drought	Well understood	3.80	1.10	34.80	9.36	7.35	0.00
	Understood	4.80	2.49	36.20	5.76	11.19	0.00
	Not clear	2.40	1.14	17.20	6.46	5.05	0.00
	Confusing	2.60	1.82	8.00	4.18	2.65	0.03
	No idea	2.40	2.30	11.80	5.40	3.58	0.01

does not have an effect on the key DRR issues, such as disaster knowledge, disaster readiness behaviour, disaster awareness, disaster adaptation, and disaster risk perception of school students because in many cases, pre-exposed group "no" has shown significance of *t*-test results. An example of the independent sample *t*-tests of disaster knowledge is given in table 3. These tests suggest that various types of pre-exposed disasters could not sensitize the DRR issues among the school students of Nepal.

4.2.2. Insecurity from disasters. The students were also asked about the level of insecurity from seven kinds of common disasters in Nepal. They responded in terms of five levels of insecurity from the disasters. Their responses clearly indicate their level of disaster risk perception. Most of the students were found to feel that they are insecure sometimes from all kinds of disasters (figure 7), but they feel a maximum

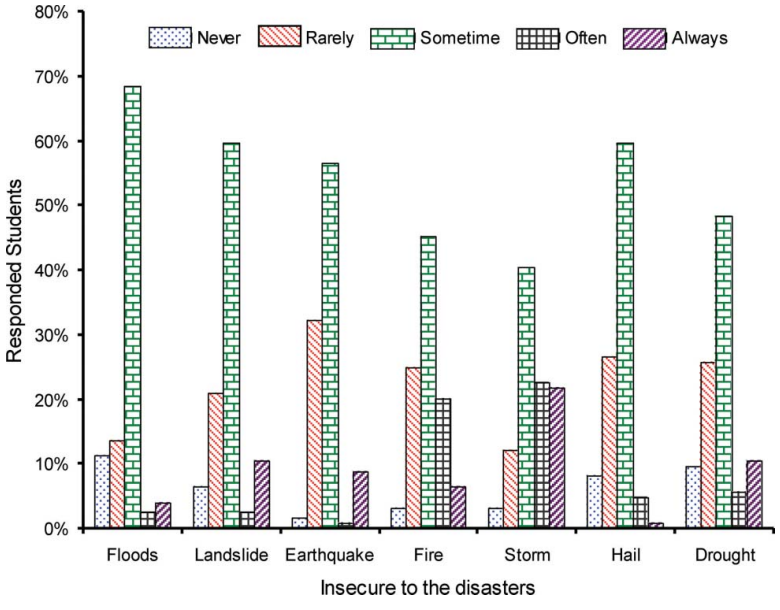

Figure 7. Level of anxiousness from various kinds of disasters.

level of insecurity from floods, landslides, hails, and earthquakes, while more than 20% of the students were found to worry always about storms.

Disaster risk perception of the students was also evaluated using correlation matrix (table 4). Pearson correlation of the responses between various kinds of disasters suggests that the students having fears of flood equally have fears of landslide, earthquake, fire, and hail. Similarly, the students who felt insecurity from earthquakes were also frightened by fire.

5. Discussion

The findings of this study support the value of DRR knowledge in school students of Nepal. Although line agencies (i.e., the organizations working in DRR sector) claim that DRR concept and disaster education are already incorporated in the school curricula and the students receive DRR knowledge through awareness campaigns, trainings, meetings, and so on, the real scenario is different. In this work, we have attempted to explore the level of knowledge on five key DRR issues of the school students, but we have found that the achievements are not very encouraging. The students still seem to be confused about disaster adaptation and risk perception. Only one satisfactory result was obtained in the status of disaster knowledge of the students. A greater number of students think that disaster knowledge is very important, but only a few students were found to have conceived no importance of disaster knowledge. Although the levels of knowledge of both male and female students on DRR issues are not much different, the male students are more confused about disaster adaptation procedure than the female students. The sources of disaster information to male and female students distinctly differ from each other. A higher number of female students seem to have been using a television as the major source of disaster information, whereas the male students depend more on the FM radio. Regardless of

Table 4. Correlation matrix of responses on various kinds of disasters.

Disasters		Floods	Landslide	Earthquake	Fire	Strom	Hail	Drought
Floods	Pearson Correlation	1	0.303**	0.091	0.266**	0.171	0.269**	0.174
	Sig. (2-tailed)		0.001	0.317	0.003	0.058	0.003	0.053
Landslide	Pearson Correlation	0.303**	1	0.074	0.345**	0.368**	0.465**	0.198*
	Sig. (2-tailed)	0.001		0.414	0	0	0	0.027
Earthquake	Pearson Correlation	0.091	0.074	1	0.207*	−0.068	0.004	−0.085
	Sig. (2-tailed)	0.317	0.414		0.021	0.455	0.966	0.35
Fire	Pearson Correlation	0.266**	0.345**	0.207*	1	0.265**	0.143	0.096
	Sig. (2-tailed)	0.003	0	0.021		0.003	0.112	0.288
Strom	Pearson Correlation	0.171	0.368**	−0.068	0.265**	1	0.221*	0.252**
	Sig. (2-tailed)	0.058	0	0.455	0.003		0.014	0.005
Hail	Pearson Correlation	0.269**	0.465**	0.004	0.143	0.221*	1	0.263**
	Sig. (2-tailed)	0.003	0	0.966	0.112	0.014		0.003
Drought	Pearson Correlation	0.174	0.198*	−0.085	0.096	0.252**	0.263**	1
	Sig. (2-tailed)	0.053	0.027	0.35	0.288	0.005	0.003	

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

the age group, no students seem to have been reading newspapers and surfing Internet as the sources of disaster information. Lack of availability of newspaper and limited access to the Internet facility in few selected districts might also have been causing this limitation in the source of disaster information.

The analysis shows that most students do not have a correct knowledge of disasters and their mitigation methods. Although 94% of the questioned students have experienced a disaster, their opinions towards disaster adaptation and readiness behaviours are somewhat unexpectedly surprising. They do not think that disaster readiness behaviours and disaster adaptation are important tools for DRR. Nearly two-third of the students think that disaster risk perception is not really important, and they are kind of confused about it. Likewise, they are not aware of associated or secondary disasters that usually follow a major disaster. For example, after a landslide disaster, there always are high risk of flood in the Nepal Himalaya, especially in the form of landslide dam outburst flood or debris flow. But, the students equally feel insecure of fire and hail together with landslides. If they were aware of the associated or secondary disasters, they would have never responded in this way. However, only for earthquakes, they responded correctly about the associated disaster of fire.

Additionally, despite the fact that disaster education programmes are performing satisfactorily in Nepal (UNESCO & UNICEF 2012), the students have reported of perceiving a greater likelihood of being insecure in all kinds of disasters. Yet, most of the students do not have site-specific disaster knowledge and the level of anxiety for various kinds of disasters is the same. More than half responders think that all seven kinds of disasters (i.e., flood, landslide, earthquake, fire, storm, hail, drought) can take place any time in their area. In fact, this is not realistic because when landslide, flood, storm, and hail are there, drought cannot be a frequent disaster event.

DRR knowledge of the students was also evaluated in relation with their exposure to past disasters. It was believed that the pre-exposure in disaster events gives a lesson on DRR issues indirectly. Therefore, exposure of the students in previous disasters was taken as a proxy parameter of disaster education. The result shows that previous exposure of students to various types of disasters has not helped them elaborate their knowledge of DRR issues.

The major limitation of this study is its correlational and cross-comparison methodology. However, given the limitation of less number of samples, the major findings of this research point out at unsuitability or less suitability of the current disaster education system in Nepal. The current findings must encourage the line agencies, who have been working in disaster education sector in Nepal for further modification in their programmes because this kind of independent research clearly shows the general status of DRR knowledge among school students.

6. Concluding remarks

National Strategy for Disaster Risk Management promulgated by the Ministry of Home Affairs (MoHA) under the Government of Nepal in March 2008 has pointed out that the level of DRR is conspicuously low at all levels of schools in Nepal. Although few exceptions of DRR education programmes have been initiated, it was not included thoroughly in the formal curriculum at any level of school through university. As a result, MoHA has recommended strategic activities to develop and modify national policy on education and implementing it such a way as to recognize

schools as important centre for propagating knowledge of DRR issues (MoHA et al. 2008). Afterward, various programmes for disaster education in schools have been initiated (UNESCO & UNICEF 2012). Meanwhile, Nepal has also adopted the Hyogo Framework for Action 2005–2015 formulated during the World Conference on Disaster Reduction (UNISDR 2004; UNISDR 2011). The framework emphasizes the role of education, especially, school disaster education for forming culture of disaster prevention. But, findings of this independent research confirmed that initiatives taken for disaster education in Nepal are not enough. A major challenge for DRR in school communities of a country like Nepal is implementation method, especially at individual level. Role of disaster education is to provide knowledge and information to students and promote DRR measures. To achieve this goal, school students can be encouraged to gain disaster-related basic knowledge, readiness behaviour, awareness programmes, adaptation process, and risk perception techniques. To raise disaster risk perception, more suitable information should be disseminated to the school students. Extra curricular activities and disaster education-related campaigns may provide self-education environment for the students. Likewise, the teachers can also give priority to disaster-related topics in the curriculum because most of the time the course is never taught to the students during the academic session (Shiwaku et al. 2007). This is high time for the teachers to think about disaster management so as to give information through lectures because pedagogy always has a key role in knowledge transmission and learning competencies. Moreover, community can participate in school disaster education and the students can participate in disaster awareness and adaptation activities of the community members. These activities may help students to make a good relationship with the community.

It is a well-known fact that for developing a Nepal-like country, the government alone cannot take all actions for DRR in the community. Thus, the disaster education should not only be confined within the school students, but it must also be promoted to families and communities, which is very essential to elaborate the knowledge of DRR, which will consequently contribute to developing a disaster safe society in the country.

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