

The effectiveness of planned teaching programs on knowledge of disaster preparedness and mitigation among school teachers

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ABSTRACT

Background: A disaster is an incident or series of incidents that disrupts the environment and poses threats to lives and property, with immediate or long-term consequences. Teachers have a major role in strategic planning of disaster preparedness and mitigation, their knowledge and skill regarding disaster prevention should be upgraded and evaluated regularly. **Method:** It was a pre-experimental study consisting of the same group before and after the intervention. The study assessed the potential effectiveness of planned teaching program (PTP) on knowledge of disaster preparedness and mitigation among school teachers. The level of knowledge of school teachers was assessed using a self-structured questionnaire. Planned teaching program was implemented and post-test was conducted after 7 days using the same questionnaire. The effectiveness of the planned teaching program was evaluated by comparing the knowledge score in pre-test and post-test using descriptive and inferential statistic. **Results:** Sixty-six teachers from selected schools were included in the study, majority (62.1%) were female, and the mean age (SD) of the respondent was 35.41(10.42). There was no association between the level of knowledge and demographic variables like age, sex, level of education and teaching experience. Most of the respondents had moderate knowledge before the planned teaching program (PTP), and after PTP, most of them had adequate knowledge. The mean post-test score was 33, while the mean pre-test score was 25.35; the difference was statistically significant ($p < 0.01$). **Conclusion:** The findings of the study showed that the planned teaching Program was potentially effective in improving the knowledge of school teachers regarding disaster preparedness and mitigation.

KEYWORDS

Disaster, Effectiveness, Knowledge, Mitigations, Planned Teaching Program

INTRODUCTION

Disasters occur suddenly, posing a continuous threat to living beings, resulting from the interplay between exposure to hazards and an inability to cope with their negative consequences (Schneider, 2011). They are either natural or manmade, particularly affect densely populated developing countries (Schneider, 2011; Park, 2017). During the period between 1998 and 2017, natural disasters claimed 1.3 million lives and displaced or injured approximately 4.4 billion individuals (Giorgadze et al., 2011; Government of China National Disaster Reduction Center, 2020). China and India accounted for 70% of the global disaster-affected from 2000 to 2019 (UNDRR, 2020).

Because of its challenging geophysical and social-economic circumstances Nepal is highly vulnerable to natural disasters, and faces frequent events such as floods, landslides, and earthquakes (Poudyal Chhetri, 2001). The 2015 earthquake highlighted the urgent need for preparedness and mitigation (Sanderson & Ramalingam, 2015). This involves a continual, systematic process, training citizens to minimize disaster impact. The goal is to enhance readiness by strengthening technical and managerial capacities in governments, organisations, and communities (Sheikhbardsiri et al., 2017; Sheikhi et al., 2021). Teachers, crucial in disaster education, necessitate regular knowledge and skills upgrades and evaluations (Uhm & Oh, 2018). The study aims to generate preliminary evidence regarding the potential effectiveness of a planned teaching program in improving school teachers' knowledge of disaster preparedness and mitigation.

METHODOLOGY

It was a pre-experimental study (one group pre-test-post-test research design), conducted with the objectives to assess the background knowledge of school teachers regarding disaster preparedness and mitigations and to assess the potential effectiveness of structured teaching program to enhance the background knowledge. It was conducted over a period of three months (April 1st to June 30th, 2022), at selected schools of Pathari Sanischare municipality, Nepal. The study was carried out following ethical clearance from the Institutional ethical committee, with written informed consent obtained from each participant. Convenient non-probability sampling technique was applied to collect the data. Teachers who were willing to participate and present during the data collection period were enrolled in the study, whereas those who were absent or declined to give consent were excluded.

Following an extensive literature review and experts consultations, self-structured knowledge questionnaires were developed. Content validity was ensured through expert evaluation, with suggestions incorporated. Reliability of the instruments after pilot study was found to be highly reliable and easy to administer for the main study (Cronbach's alpha 0.92). The instruments consisted of two parts, Part A consisted of demographic variables of the respondents, while part B included forty items covering various aspects of disaster preparedness and mitigations of common disasters. These items were presented as closed ended statements of the multiple response type. The tool was prepared both in English and Nepali. Each item in part B carried 1 mark for the correct answer and none for an incorrect one. The maximum obtainable score was 40.

Knowledge of the participants was grouped into three categories (Ganpatrao, 2014):

Level of knowledge	Score	Percentage
Inadequate	0-20	0-50%
Moderate	21-30	51-75%
Adequate	31-40	76-100%

The study was carried out over three phases:

Phase I: Pre-test to assess the background knowledge of school teachers regarding disaster preparedness and mitigation.

Phase II: Administration of Planned Teaching Program to school teachers.

Phase III: After 7 days of planned teaching program, the same questionnaires were administered to assess the effectiveness of planned teaching program and knowledge retention.

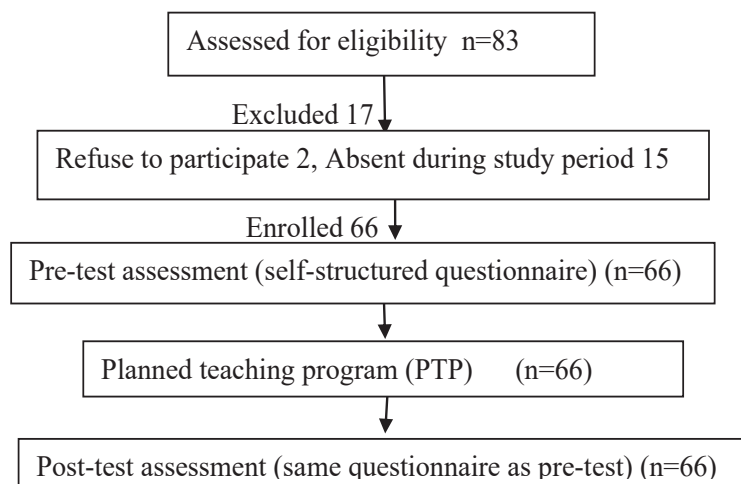
Sample size calculation

No formal power analysis was conducted due to the study's exploratory nature and the absence of prior effect size estimates for Nepalese school teachers. The sample size ($N = 66$) was determined by feasibility during the three months. However, the study achieved $>90\%$ post-hoc power to detect the observed large effect (Cohen's $d = 2.24$) at $\alpha = 0.05$, indicating that the sample size was sufficient for the primary outcome analysis.

Statistical analysis

MS-Excel 2010 was used for data entry, while analysis was conducted using SPSS version 24. Mean, median, frequency and percentage were used for descriptive statistics, Paired t-test, Chi square tests/Fischer's exact test were used for inferential statistics. P value < 0.05 was considered significant.

Flow Diagram



Analyzed 66

RESULTS

A total 66 school teachers were enrolled in the study, with the mean age (SD) of 35.41(10.42) years, and the most common age group was 20 – 30. Female were predominant in our study, with a ratio of female to male 1.6:1. A majority of the teachers (30.3%) held a bachelor's degree. Almost half of the teachers had teaching experience of more than 10 years. Most of the teachers had previous knowledge of disasters, with social media being the most common source of information. Over 90% of the teachers had not received any training in disaster preparedness and mitigation and none had undergone any drills. (Table 1)

Table1. Base line demographic attribute of the schoolteachers

N=66

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	25	37.9
Female	41	62.1
Age group		
20 – 30 years	26	39.4
31 – 40 years	25	37.9
41 – 50 years	7	10.6
51 – 60 years	8	12.1
Religion		
Hindu	50	75.8
Buddhist	5	7.6
Muslim	4	6.1
Christian	2	3.0
Others	5	7.6
Residency		
Urban	36	54.6
Rural	30	45.4
Teaching experience		
<1 year	9	13.6
1 – 5 years	15	22.7
6 – 10 years	10	15.2
>10 years	32	47.0
Education level		
SLC or equivalent	16	24.2
Intermediate level	18	27.3
Bachelor level	20	30.3
Master and above	12	18.2
Previous knowledge of disaster		
Yes	58	87.9
No	8	12.1
Source of information (n=58)		
Social media	27	46.5
Self-study	14	24.1
Friends and relatives	10	17.2
Others	7	12.1
Training about disaster		
Yes	6	9.1
No	60	90.9
Monthly income (NPR)		
<20,000	20	30.3
20,001 – 40,000	25	37.9
>40,000	21	31.8

No association was observed between knowledge level on disaster preparedness and mitigation, and associated demographic variables: gender, age group, education level, teaching experience, previous knowledge, and training status. (Table 2)

Table 2: Association between Demographic variables with knowledge level. N=66

Characteristics	Number	Degree of freedom	Chi square value	Fischer's exact (P value)
Gender				
Male	25	2	4.88	0.11
Female	41			
Age group				
20 – 30	26	6	3.70	0.83
31 – 40	25			
41 – 50	7			
51 – 60	8			
Education Level				
SLC or equivalent	16	6	8.43	0.26
Intermediate level	18			
Bachelor level	20			
Master and above	12			
Teaching Experience				
<1 year	9	6	7.01	0.40
1 – 5 years	15			
6 – 10 years	11			
>10 years	31			
Previous knowledge of disaster				
Yes	58	2	0.45	0.83
No	8			
Training				
Yes	6	2	1.78	0.62
No	60			

Note: All reported p-values are from Fisher's exact test.

The knowledge levels were classified as inadequate, moderate and adequate. In the pre-test, 10.6% of the teachers had inadequate knowledge, 84.8% of the teachers had moderate knowledge and only 4.5% of the teachers had adequate knowledge. In the post-test, none had inadequate knowledge, 18.2% had moderate knowledge and 81.8% had adequate knowledge.

Fig 1.

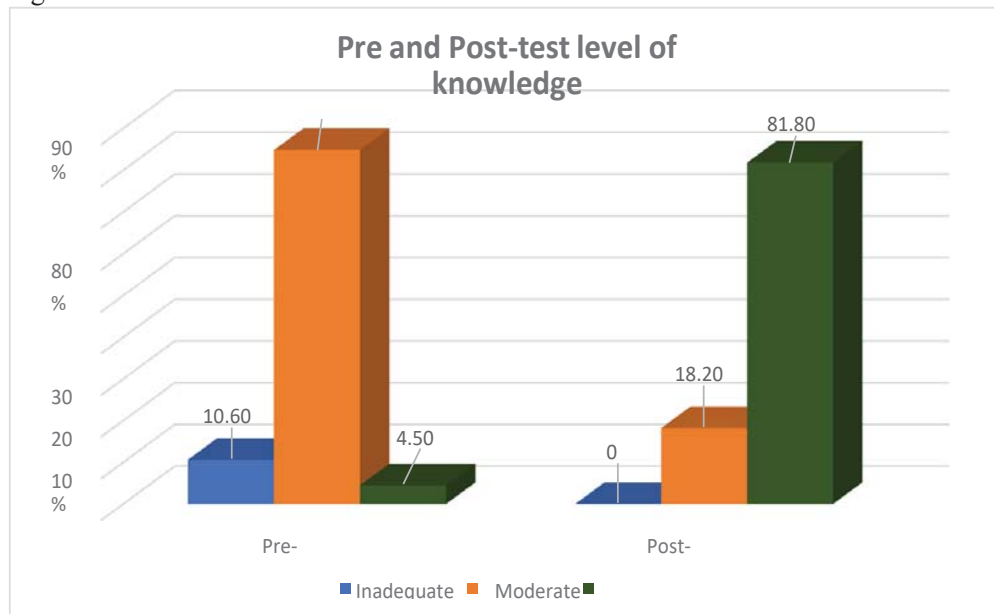


Figure 1: Pre and post level knowledge level

To evaluate the effectiveness of the structured teaching programme, a paired “t” test was performed. The mean pre-test score (SD) was 25.35 (3.88), whereas the post-test score was 33.00 (2.88). The post-test score was significantly higher than the pre-test score ($p < 0.01$), with a very large effect size (Cohen’s $d=2.24$), indicating the success of the structured teaching programme in improving the knowledge level among school teachers. (Table 3)

Table 3. Pre-test and post-test score of knowledge among school teachers. N=66

Assessment	Mean (SD)	Minimum Score	Maximum Score	Standard Deviation (SD)	Effect size Cohen’s d (95% Confidence interval)	P value
Pre-test	25.35 (3.88)	15	34	3.88	2.24(1.78-2.66)	<0.01
Post test	33.00 (2.88)	25	38	2.88		

DISCUSSION

In our study the most of the participants were female, with a female to male ratio of 1.6, the mean (SD) age of the teacher was 35.41 (10.42) years, with the most common age group being 20–30 accounting for 39.4% population. Similarly, Elangovan and kashi (2015) conducted a study to enhance psychosocial disaster preparedness among school children through trained teachers, where the mean age of the teachers was 37.30 years and 90% were female. The demographic characteristics of our study are also similar to those reported by Ganpatrao et al. (2014) and Lodha et al. (2020). Our study included experienced teachers, with 47% having over 10 years of experience, similar findings were observed by Chung and Yen (2016) where 48% had over 15 years of experience, conversely Kharat and Khadke (2022) observed majority of teachers with 6-10 years of experience. In terms of education, 30.3% of our teachers studied up

to the Bachelor level while Chung Chung and Yen (2016) had a higher proportion of teachers with advanced degrees. The differences could be attributed to differing educational qualification requirements in different countries. However, a study from Kanpur, India reported findings consistent with our study, with the majority (46.6 %) of teachers had completing a bachelor's level (Lodha 2020).

The primary source of information on disaster management and mitigation for school teachers was social media (46.5%), followed by self-study (24.1%) among school teachers. The findings were consistent with those of Lodha (2020) where 46.6% of the respondents obtained information through mass media. Over 90% of the teachers in our study had not received any training in disaster management and mitigation, but Chung and Yen (2016) found that 59.11% teachers in their study had undergone some form of training related to disasters management and first aid.

Our study revealed a significant knowledge gap regarding disaster preparedness and mitigation, with 84.8% of teachers having moderate knowledge, 10.6% having inadequate knowledge, and only 4.5% possessing adequate knowledge before the structured teaching program. Similarly, Chondekar (2019), reported that 65% of teachers had average knowledge, with 22% having good knowledge, and 13% having poor knowledge of disaster management. The findings are in line with previous studies (Ganpatrao, 2014; Kharat & Khadke, 2022; saranya, 2022; Shetty, 2019).

We observed no significant association between the demographic variables such as age, gender, education level, teaching experience, and training status regarding disaster preparedness and mitigation with knowledge level score. Interestingly, our findings suggest that an increase in teaching experience may not necessarily contribute to enhanced knowledge of disaster management. This is likely due to the absence of regular training sessions or drills related to disasters in schools, and lack of inclusion of disasters preparedness and mitigations in the school's curriculum.

In our study, having received previous training in disaster management was not linked to higher knowledge about disaster. While previous training undoubtedly contributes to the knowledge, our findings may be influenced by limited samples, given that only 9.1% of the teachers in our study had received disaster training. Similarly, Patel (2021) found no significant relationship between pre-test knowledge scores and factors such as age, sex, education, occupation, or prior disaster experience. Lodha (2014) found a significant relationship between pre-test disaster knowledge scores and both educational level and source of information. However, no such association was observed with age, religion, or years of experience.

In the present study we try to assess the effectiveness of the structure teaching program. We initially assessed the background knowledge with self-structured questionnaires in pre-test assessment followed by implementation of structured teaching program. Subsequently, a post-test assessment was conducted using the same questionnaires. The mean post- test score 33.00 was significantly better than mean pre-test score 25.33 ($p < 0.001$), indicating that the structured teaching program was potentially highly effective in enhancing the knowledge of school teachers concerning disaster preparedness and mitigation. Moreover effect size of Cohen's d of 2.24

demonstrate substantively significant and robust improvement. Consistent observations are widely made in the literature, with most of the studies asserting that awareness programs possess significant potential for promoting understanding of disaster preparedness and mitigation. It is advocated that such programs be integrated into the curriculum and regarded as crucial component of the ongoing professional development of students across various domains (Lodha, 2020; Kharat & Khadke, 2022; Saranya, 2022; Shetty, 2019; Patel, 2021).

LIMITATION

Limited sample size of the study precluded the generalization of the finding. Additionally, the lack of a priori power analysis means that the finding of the study should be considered exploratory. We recommend for further studies with large sample size. Moreover, the study exclusively focused on knowledge assessment, with the aspects of attitude and practice left unexamined.

CONCLUSION

The structure teaching program was potentially effective for raising awareness and knowledge about disaster preparedness and mitigation among school teachers. Notably, no significant association was identified between demographic variables with level of knowledge concerning disaster management and mitigation.

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CONFLICT OF INTEREST

None

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