



## Status of Post-traumatic Stress Disorder (PTSD) and Its Associated Factors among Secondary School Students after Fifteen Months of Earthquake in Bhaktapur District, Nepal

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### Authors' contributions

This work was carried out in collaboration between all authors. Author TBT designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MDHH and MAH managed the analyses of the study. Authors ABC, MHN and SZ managed the literature searches. Author GUA overall supervised the entire work. All authors read and approved the final manuscript.

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### ABSTRACT

**Background:** PTSD (post-traumatic stress disorder) is a mental health problem that some people develop after experiencing or witnessing a life-threatening event, like combat, natural disaster, accident, or sexual assault. Though several recent studies have focused on PTSD, its status and associated factors among secondary school students followed by huge natural disasters is not available. This study was conducted with the purpose of assessing those factors among secondary school students after fifteen months of a huge earthquake.

**Methods:** A descriptive cross sectional study was conducted among secondary school students. A

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total of 289 students were purposively selected from local government school which is located among districts most by affected earthquakes. Structured questionnaires were used to collect socio-demographic and earthquake exposure information. PTSD Checklist Civilian Version (PCL-C) was used to measure PTSD and its severity.

**Results:** Study found that 56% students have been suffered from PTSD after the earthquake. Among the students who have diagnosed as PTSD positive, most of them (71%) were mildly affected, 26% were moderately affected and only 3% were severely affected. This study also found significant association of PTSD with parent's education level, the parent's occupation, amount of property loss, monthly family income and status of health services received.

**Conclusion:** Our study found those who have lost their house or property, less educated, farmer in occupation, lost their family members during earthquake were more vulnerable of suffering from PTSD after earthquake. Effective interventions such as educational, behavioral and psychological counseling, extra-curricular activities with awareness program may reduce the development of PTSD after disaster among school students.

*Keywords: Disasters; earthquake; school students; PTSD and Nepal.*

## 1. INTRODUCTION

Post-traumatic stress disorder (PTSD) is a disorder that develops in some people who have experienced a shocking, scary, or dangerous event. PTSD may develop after a person is exposed to one or more traumatic events, such as major stress, sexual assault, terrorism, or other threats on a person's life [1,2]. Previous studies have shown that post-traumatic stress disorder (PTSD), depression and other mental health problems increase after such events [3,4]. "Large scale natural disasters involve not only the direct victims but also workers who perform rescue the recovery duties [5,6]. Many studies have focused on psychological sequel of police officers firefighters". Many studies have focused on the psychological sequel of disasters rescue workers or "traditional" first responders such as police officers firefighters, emergency medical technicians and military personnel, who are trained and have a responsibility to save citizens lives. Yet little is known about the prevalence of PTSD, depression, and high psychological distress and associated risk factors among local workers involved in relief and reconstruction activities. Previously, PTSD was considered as a psychological condition of combat veterans who were "shocked" by and unable to face their experiences on the battlefield [7]. In 1980, PTSD was recognized as a disorder with specific symptoms that could be reliably diagnosed and was added to the American Psychiatric Association's third edition of Diagnostic and Statistical Manual of Mental Disorders (DSM III). Post-traumatic stress disorder is diagnosed based on signs, symptoms and a psychological evaluation [2]. PTSD is sometimes associated with greater psychiatric co-morbidity and

attempted suicide, increased frequency of bronchial asthma, hypertension, peptic ulcer and impaired social support. [8,9]

A recent study using cutoff score and diagnostic criteria found the overall prevalence of PTSD among medical personnel after Nepal earthquake was 21.9% and 17.1% respectively [10]. Females scored significantly higher than males. No significant difference was observed according to age, marital status, profession, previous disaster experience, tragic events with relatives. Those who were present in the hospital during the initial influx of victims, witnessed patients suffering, worked extra time were at significantly high risk for development of PTSD. [10]. Survivors affected by disaster have more opportunities to develop post-traumatic stress disorder [11] and are more likely to have co-morbid somatic symptoms [12-14]. Previous studies have found that PTSD possibly associated with higher frequency of somatic symptoms compared with other psychiatric disorders [15,16]. Considering their potential impact on the course of PTSD and the functional disability associated with it, co-morbid somatic symptoms are a critical concern in PTSD [15]. A number of studies have explored the somatic conditions of survivors after various kinds of disasters [17]. In a National Vietnam Veterans Readjustment Study (NVVRS) conducted between November 1986 and February 1988, which interview 3,016 American Veterans who served in the armed forces during the Vietnam era, found the lifetime prevalence of PTSD is 30.9% for men and 26.9% for women. Study also found that, among the Vietnam Theater Veterans, 15.2% of males and 8.1% of females were diagnosed with PTSD at the time the study

was conducted [18]. The psychological and biological responses to a traumatic event are determined by the characteristics of both the event and the person involved [19]. Excessive use of alcohol or drugs may be a complicating factor [20]. Different types of disasters (e.g., floods, transportation accidents) are the traumatic events that are experienced by many people and may result in a wide range of mental and physical health consequences [21]. The PTSD and depressive reactions among the Nicaraguan adolescents after the hurricane Mitch had followed a dose of exposure pattern that was congruent with the rates of destruction [22]. Drawing upon a conditioning model of PTSD, we review risk factors for PTSD, including pre-existing individual-based factors, features of the traumatic event, and post-trauma social support. The prevalence of PTSD and MDD (major depressive disorder) was high in the people of Haiti after the earthquake [23]. History of traumatic experiences and low social support were found to be associated with the risk of PTSD [24].

## 2. METHODS

This descriptive cross-sectional study was conducted among secondary school students in Bhaktapur District, Nepal after fifteen months of an earthquake who have been experienced the disaster. Bhaktapur district is one of the most highly affected districts among the 14 districts of Nepal. It had experienced more number of aftershocks as epicenter beneath of it than any other district of Nepal. A total of 289 participants were purposively enrolled in this study. Participants who were secondary level school students and experienced the major Nepal earthquake during April 2015 were included in the study. Students who were unable to response and refused to participate in this study were excluded. Face to face interview with structured questionnaires was conducted. The questionnaires were first written in English and then translated in Nepalese. Questionnaires included the socio-demographic factors, earthquake exposure factors, relief materials and Health services received during the earthquake. Presence or absence of PTSD and its level of severity was measured by PTSD Checklist – Civilian Version (PCL – C).

### 2.1 The PTSD Checklist - Civilian Version (PCL – C)

The PCL is a standardized self-report rating scale for PTSD. This scale was composed by 17

items that correspond. Two versions of the PCL exist: 1) PCL-M is specific to PTSD caused by military experiences and 2) PCL-C is applied generally to any traumatic event. This standard 17-items self-rating scale for PTSD checklist symptoms developed by the Behavioral Science Branch of American PTSD research center according to DSM-IV in 1994 for evaluating experiences of ordinary people after trauma in normal life. Two studies of both Vietnam and Persian Gulf theater veterans show that the PCL is both valid and reliable. The PCL-C is composed of three dimensions; the first dimension is re-experiencing of the traumatic events, which includes intrusive thoughts, bad dreams, fears recurrence and distress at reminders; the second dimensions that is nominated is the avoidance of trauma-relevant stimuli and numbering of general receptiveness which includes feeling detached from other people and deriving markedly less pleasure from previously enjoyable activities; the third dimension includes symptoms such as irritability, hyper-arousal, and difficulties in sleep and concentration. Individuals would rate each item from 1 (not at all) to 5 (extremely) to indicate the degree to which they were bothered by that particular symptoms over the past months. The total possible scores range from 17 to 85 [25]. The individual who scored less than < 40 was considered as PTSD negative and those who scored > 40 were considered to be PTSD positive. The severity of symptoms was classified by levels of PTSD. The levels of PTSD was classified as mild (40 to 49), moderate (50 to 59) and severe ( $\geq 60$ ).

### 2.2 Ethical Considerations and Participant Selection

Ethical approval for this study was obtained from North South University, Dhaka, Bangladesh. In addition, informed written consent was obtained from students and their guardians. Permission was taken from the authority of the schools. Privacy and confidentiality were strictly maintained and students had rights to refused or withdraw from the study at any time.

### 2.3 Data Analysis

After collection, data were entered and coded manually in the software. Descriptive statistics were performed and associations were analyzed by Chi-square test using SPSS software (version 20.0).

### 3. RESULTS

Table 1 shows that the average age of students was about 15 years, where 47% (137) students were male and 53% (152) were female. The main occupation of their father was farming 30% (88), followed by 19% (55) service, 18% (53) labor, 15% (43) business and 17% (50) unemployed. Similarly, the main occupation of the mother was farming 39% (114), followed by 14% (41) service, 14% (40) labor, 11% (31) business and 22% (63) unemployed. In terms of monthly family income, 47% (135) of the respondent's monthly family income was between 5,000-15,000 Rupees, 15% (42) respondent's family income was (16,000-25,000) Rupees, 17% (49) of respondent's family income was (26,000-35,000) Rupees and 21% (63) of respondent's family income was more than 36,000 Rupees. The majority of respondents lost their residence i.e. 50% (144), followed by loss of daily uses things such as food, animal vehicles 6% (16), money 3% (9), loss all of their above property were 23% (65) and who did not lose any of their property were 19% (55). Regarding relief during earthquake, the majority of respondents 54% (157) did not receive any sort of reliefs. The respondents who received relief material were cloths, dish 20% (57), residence 3% (9) and 6% (16) of the respondents received all of the above relief materials. Regarding the health services, 45% (129) did not get any kind of health services whereas respondents who got health services were first aid service 24% (68), followed by all type of services 18% (53), emergency service 10% (29) and OPD (out patients department) or special health services 4% (10) respectively. According to PTSD checklist civilian version (PCL-C), status of PTSD and severity of PTSD have been also shown in the table. Among 289 students, 56% (163) were diagnosed as PTSD positive and 44% (126) PTSD negative. Among positive respondents, most of the respondents (71%) had mild level of PTSD, some of them (26%) had moderate, and very few (3%) of them had been suffered from severe form of PTSD.

Table 2 show that both male and female almost equally (56.9% and 55.9%) suffered from mild to moderate degree of PTSD. But sex difference has no significant relationship with PTSD (p value 0.90). The respondents, whose father has no school education or primary level education suffered more from PTSD (p value 0.00).

Similarly, mother's education level also found to be significantly associated with PTSD (p value 0.00). Low monthly family income found to be significantly associated with development of PTSD (p value 0.00). The status of PTSD gradually decreases with increasing income. The study also found parent's occupation has significant association with development of TSD (p value 0.00). It is found to be more if father is labor (81.1%), followed by unemployed (76%), farmer (72.7%), business (20.9%), and service (16.4%) and also statistically significant (p value 0.00). Similarly, PTSD among students found to be more if mother is labor (85%), followed by farmer (72.8%), unemployed (57.1%), business (16.0%) and service (12.2%) and also statistically significant (p value 0.00). In terms of relief, respondents those who received cloths, were less suffered from PTSD (33.3%) but interestingly who have received all kinds of relief materials, were more suffered from PTSD (70%) and also statistically significant (p value 0.00).

Table 3 shows that the majority of respondents who lost daily uses things (i.e. food, animal, and vehicle) suffered mostly from mild degree of PTSD (83.3%) and just a few had moderate degree. Similarly those who lost house also suffered from mild degree of PTSD (80.5%), followed by moderate degree (19.5%) but none of the respondents suffered from severe form of PTSD in those groups. The majority of the respondent (60%) who lost money suffered from mild degree of PTSD and some of them suffered from moderate degree (40%) of PTSD but none of them suffered from severe form of PTSD. Only the respondents who lost all the listed property suffered from all forms of PTSD, 55.2% in mild form, 37.3% in moderate form and 8.5% in severe form of PTSD. Study found the association between property loss and the severity of PTSD (p value 0.03). Study also showed that majority students (80%) who received first aid service suffered from mild degree of PTSD. 66.7% students who received emergency care suffered from mild degree of PTSD and 75.0% students who received OPD service suffered from mild degree of PTSD but none of this group had suffered from severe form of PTSD. On the other hand, Students who didn't receive any sort of health care services suffered from all form of PTSD, 68.9% in mild form, 26.7% in moderate form and 4.4% in severe form but healthcare service did not show any significant relationship with PTSD (p value 0.76).

**Table 1. Socio-demographic, earthquake, PTSD and health characteristics of the study participants**

<b>Variables</b>		<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Age</b>	<b>Mean + SD = 14.98 ± 1.046</b>		
Gender	Male	137	47
	Female	152	53
Father's education	No school background	32	11
	Primary level (1-5)	45	16
	Lower secondary level (6-7)	40	14
	Secondary level (8-10)	66	23
	Higher education (+2 above)	106	37
Mother's education	No school background	89	31
	Primary level (1-5)	46	16
	Lower secondary level (6-7)	27	9
	Secondary level (8-10)	51	18
	Higher education (+2 above)	76	26
Father's Occupation	Farmer	88	30
	Service	55	19
	Business	43	15
	Labor	53	18
	Unemployed	50	17
Mother's occupation	Farmer	114	39
	Service	41	14
	Business	31	11
	Labor	40	14
	Unemployed	63	22
Monthly family income	5,000-15,000	135	47
	16,000-25,000	42	15
	26,000-35,000	49	17
	More than 36,000	63	21
Property loss	Daily uses things i.e. food, animal, vehicle	16	6
	Residence	144	50
	Money	9	3
	Not at all	55	19
	All of the above	65	23
Relief materials received	Daily uses items i.e. food water, cloths, dish	50	17
	Residence	57	20
	All of the above	9	3
	Not at all	16	6
		157	54
Health service received	Emergency service	29	10
	First aid service	68	24
	OPD (special) health service	10	4
	All type of services	53	18
	Haven't received any of them all	129	45
PTSD	Positive	163	56
	Negative	126	44
Severity of PTSD	Mild	116	71
	Moderate	42	26
	Severe	5	3

**Table 2. Association of PTSD with different socio-economic and earthquake related variables**

Variables		Status of PTSD		p-value
		Yes N(%)	No N(%)	
Sex	Male	78 (56.9)	59 (43.1)	0.906
	Female	85 (55.9)	67 (44.1)	
Father's education	No school background	29 (90.6)	3 (9.4)	0.000
	Primary level	40 (88.9)	5 (11.1)	
	Lower secondary level	36 (90.0)	4 (10.0)	
	Secondary level	47 (71.2)	19 (28.8)	
	Higher education and above	11 (10.0)	95 (90.0)	
Mother's education	No school background	79 (88.8)	10 (11.2)	0.000
	Primary level	40 (87.0)	6 (13.0)	
	Lower secondary level	23 (85.2)	4 (14.8)	
	Secondary level	14 (27.5)	37 (72.5)	
	Higher education and above	7 (9.2)	69 (90.8)	
Monthly family income	5,000-15,000 (NRS)	119(88.1)	16 (11.9)	0.000
	16,000-25,000 (NRS)	26 (61.9)	16 (38.1)	
	26,000-35,000 (NRS)	10 (20.4)	39 (79.6)	
	More than 36,000 (NRS)	8 (12.7)	55 (87.3)	
Father's occupation	Farmer	64 (72.7)	24 (27.3)	0.000
	Service	9 (16.4)	46 (83.6)	
	Business	9 (20.9)	34 (79.8)	
	Labor	43 (81.1)	10 (18.9)	
	Unemployed	38 (76)	12 (24.0)	
Mother's occupation	Farmer	83 (72.8)	31 (27.2)	0.000
	Service	5 (12.2)	36 (87.8)	
	Business	5 (16.1)	26 (83.9)	
	Labor	34 (85.0)	6 (15.0)	
	Unemployed	36 (57.1)	27 (42.9)	
Relief materials received	Food	25 (50.0)	25 (50.0)	0.000
	Cloths	19 (33.3)	38 (66.7)	
	Residence	1 (11.1)	8 (88.9)	
	Not at all	7 (43.8)	9 (56.3)	
	All of the above	111 (70.7)	46 (29.3)	

*Analysis was done by Chi-square test*

**Table 3. Relationship between severity of PTSD with property loss and health service received**

Variables		Severity of PTSD			p-value
		Mild	Moderate	Severe	
		N(%)	N(%)	N(%)	
Property loss	Daily uses things like food, animal	5 (83.3)	1 (27.2)	0 (0.0)	0.03
	House	70 (80.5)	17 (19.5)	0 (0.0)	
	Money	3 (60.0)	2 (40.0)	0 (0.0)	
	Not at all	6 (100.0)	0 (0.0)	0 (0.0)	
	All of the above	32 (55.2)	22 (37.3)	5 (8.5)	
Health service received	Emergency service	10 (66.7)	5 (33.3)	0 (0.0)	0.757
	First aid service	32 (80.0)	8 (20.0)	0 (0.0)	
	OPD (special) health service	3 (75 .0)	1 (25.0)	0 (0.0)	
	All type of services	9 (64.3)	4 (28.6)	1 (7.1)	
	Not at all	62 (68.9)	24 (26.7)	4 (4.4)	

*Analysis was done by Chi-square test*

#### 4. DISCUSSION

This study found that 56% secondary school students had suffered from PTSD after 15 months of earthquake. Among them, the majority of the students suffered from mild (71%) to moderate (26%) degree of PTSD and a very few of them (3%) were severely affected. Previous study showed a high percentage of PTSD symptoms among adolescents after earthquake, especially distress at reminders (74.5%), being easily startled (68.8%), intrusive thoughts (60.9%) and physiologic reactivity (66.7%) [24]. Another study of PTSD after a major earthquake showed that the most commonly occurring symptoms were difficult sleeping, being easily startled, and re-experiencing the event in a distressing way [26]. These results were similar with our study. Being suffered from intense fear, helplessness and horror, the adolescents had distressing recollections of the disaster with images and feelings of quakes, the percentage of distress at reminders is high (64.5%) [27,28]. Symptoms like difficulty with concentration (59.1%), being easily startled (58.6%), and intrusive thoughts (56.3%) were also found in three years after earthquakes among adolescents in our study, which means that PTSD symptoms especially re-experiencing and increased arousal would persist for a long time even many years later [29,30].

The mean age of students was 15 years with standard deviation (SD)  $\pm$  1.046. Previous study by Fullerton showed that the prevalence of PTSD was more in younger age. However in our study it was not statistically significant, it suggest age is not a dependent factor for developing PTSD in our study. There was no significant difference in the rate of PTSD according to marital status in our study which is consistent with previous study [25]. Those who were single were more likely to develop PTSD in other studies. School students involved in a disaster are not immune to the stressors. However, little attention given on the psychological consequences among secondary level school students. The study has explored frequency of post-traumatic stress disorder (PTSD) among them after fifteen months of earthquake Nepal. In this study both male and female respondents suffered almost equal percentage of PTDS and there is no statistical significant relationship with post-traumatic stress disorder and gender. This result is similar with a study conducted in china [31].

The study has shown that there is a relationship between parent's education and post-traumatic

stress disorder. Children of less educated parents are more likely to suffer from PTSD compared with children with highly educated parents. This study revealed that father and mother education both was statically significant with students PTSD. It is assumed that educate parents are more responsible with students' education, behavior, and condition, hence their children are protected from different types of diseases and disorder.

##### 4.1 Those Who Have Low Economic Status are Suffering from PTSD

The study found parents who are farmer and who don't have specific occupation, their children were more suffering from PTSD. One of the previous study indicated similar to our study. The study indicates that disaster workers have an increased risk of acute stress disorder, PTSD, and depression. In addition, disaster workers who were farmer and who were un-employed seek are for emotional problems at a rate nearly four times that of the comparison group. Nearly 40.5% of the exposed disaster workers in this 13-month study met criteria for at least one diagnosis [25]. Similar with former studies [32], loss of house and property was one of the major risk factors of PTSD in our study. With loss of houses and property, adolescents and their family members were faced with problems like persistent financial crisis and difficulties with living arrangements even fifteen months after earthquake. The strong link between earthquake-related exposures and the evolution of PTSD indicates that earthquake exposures may increase symptomatology, the long-term course of posttraumatic stress disorder symptoms. It may depend on the duration of exposure to stressors.

##### 4.2 Limitation of the Study

Some limitations of this study are important to be highlighted firstly, most adolescents were from particular region, and cultural, society background, therefore the results may not be generalizable to another Nepalese students. The data on important variables such as history of psychiatric illness and family psychiatric illness were not collected.

#### 5. CONCLUSION

This study revealed that the rate of development of PTSD among secondary school students after fifteen months of Nepal earthquake is very high.

Therefore, this is an urgent need to better understand the risk and risk mitigating factors of PTSD among this high-risk school students. There is a need for efficient screening of PTSD in disasters-exposed high risk groups. Targeted preventive psychological and supportive interventions in the school, college and study hall should be initiated early and continued over time to lessen the development of PTSD. Educational, behavioral and effective interventions are also needed to reduce the development of PTSD among school students or adolescents after the earthquake, especially, for those who lost their house or property and lost their family members and witness death.

### CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

### ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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