International Journal of Medical and Health Sciences

Journal Home Page: http://www.ijmhs.net ISSN:2277-4505

Original article

Mental Health Impact of April 2015 Earthquake of Nepal : A Community Based Cross-sectional Study

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ABSTRACT

Introduction: Nepal is prone to a number of natural hazards like floods, landslides, earthquake, fire, epidemics, including earthquakes. The Kathmandu valley is located in one of the most seismically active areas in the world. Earthquakes in 1934 and 1988 killed more than 8,500 and 721 people, respectively. **Materials and methods:** A community based descriptive cross sectional study was conducted from 3rd May to 30th August using convenient sampling technique with a sample size of 300. A pre-tested structured questionnaire were used and data were analyzed using Statistical Package for Social Science(SPSS) for windows version 18.0. Descriptive statistics was computed for demographic characteristics, trauma exposure indicator and prevalence rates of probable Post Traumatic Stress Disorder(PTSD), anxiety, and depression. Bivariate logistic regressions screened for the risk factors of probable PTSD, anxiety and depression by exploring the roles of the above independent variables, consecutively. **Results:** Among 300 respondents, most of the respondents were in the age group 15 -30 years i.e., 39.7%. Most (64%) of the respondent were female. Ten percent have lost their house, 7.3% have loss the property. More than sixty percent of the respondents have initial fear regarding the earthquake. Thirteen percentage of the respondents were having anxiety, 10% post traumatic stress disorder and 8% depression due to repetitive experience of earthquake. **Conclusion :**This study demonstrated that the mental impact of earthquake is more among the people living in our study population.

KEYWORDS: Anxiety, depression, earthquake, post traumatic stress disorder

INTRODUCTION

Earthquakes represent a frequent kind of natural disasters throughout the world affecting numbers of people. Over the past decade, Asia has been the continent frequently and severely affected by earthquakes[1]. From the 225,000 deaths caused by the 2004 Indian Ocean earthquake and tsunami[2] to 73,276 deaths by the 2005 Pakistan earthquake[3], 69,200 deaths by the 2008 China Sichuan earthquake[4], and 15,839 deaths by the 2011 Great East Japan earthquake[5].

Nepal is prone to a number of natural hazards like floods, landslides, earthquake, fire, epidemics, including earthquakes. The Kathmandu valley is located in one of the most seismically active areas in the world. Earthquakes in 1934 and 1988 killed more than 8,500 and 721 people, respectively[6].

According to the Disaster vulnerability and risk assessment study report (UNDP/BCP 2004), Nepal ranks 11th globally among countries most vulnerable to earthquakes. A magnitude 7.8 earthquake occurred on Saturday April 25, 2015 at 11:56 local time (ca. 6.11 UTC) in Nepal. The epicentre of the earthquake was located approximately 77 km northwest of Kathmandu, Nepal's capital city, and 73 km east of Pokhara, another major population centre i.e Barpak, Gorkha district . The depth of the earthquake was estimated at between 10 -15 kilometres[7].

According to Nepal government official report, over 8844 people lost their lives, over 22000 were injured, over 150 went missing and hundreds of thousands lost their homes and property in the aftermath of the disaster[8]. The earthquake triggered an avalanche on Mount Everest, killing 21, making April 25, 2015 the deadliest day on the mountain in history[9]. The earthquake triggered another huge avalanche in the Langtang valley, where 250 people were reported missing[10].

Since the initial one on April 25, there have been well over 100 quakes registering at a magnitude of 4 or over. Those

living through it have invented their own coping mechanisms. Words have taken on new and sinister meanings. "Ayo", which roughly translates as "arrived", used to be the call of the neighbourhood's children for when the power came back after an outage[11].

Along with the physical and economical loss, such disasters can have devastating consequences in mental health. Among these, increased vulnerability to psychological problems such as depression, anxiety, post-traumatic stress disorder (PTSD) and complicated grief (CG) are specially common[12]. Even if only 1% of the 8 million people who experienced the earthquake have ongoing psychological distress, that means at least 80,000 people will be in need of psychosocial and mental health services. We must not ignore others who will need longer term care and support to restore their psychological well-being[8].

The physical effects of earthquake is easily visible to the concerned areas but the psychological effect may be seen in the adjacent area. So this study aims to investigate the short term psychological effects seen in them.

MATERIALS AND METHODS

A community based descriptive cross sectional study was conducted on Sukla Gandaki Municipality, Ward no. 4. The study was collected from 3rd July to 30th August(2 months after the earthquake) using convenient sampling technique. The sample size is 300 with age group of 15 & above. The data was collected using door to door interview. Semi-structure questionnaire including different independent variables was used to identify the various factors.

Assessment of *trauma exposure indicators*

Eight questions were used to evaluate respondents' earthquake exposures: Past history of psychiatric illness, injury of respondent's body parts, loss of family member, disability of any family member, loss of house, loss of property, witnessed of death, initial fear.

Assessment of mental health disorder

PTSD was assessed with the PTSD Checklist Civilian Version (PCL-C). The PCL-C is a valid and reliable standardized self-reported rating scale for screening PTSD symptoms[13, 14]. It comprises 17 items corresponding to key symptoms of PTSD that map onto diagnostic Criteria B (re-experiencing), C (avoidance/numbing), and D (hyper-arousal) for PTSD in the DSM-IV. Participants indicated the extent to which each symptom was correlated with the earthquake on a scale from 1 (*not at all*) to 5 (*extremely*).

In the present study, a score of forty-four was used as a measure to screen probable PTSD. In the present study, a score of forty-four was used as a measure to screen probable PTSD. The Hopkins Symptoms Checklist-25 (HSCL-25) The HSCL-25 screens for symptoms of anxiety and depression[15, 16] using 10 and 15 items subscales, respectively. Scores range from 1 (not at all)to 4 (extremely). Symptoms were assessed with regard to the past month. A mean cumulative score of subscales greater than 2.00 indicates anxiety or depression.

Collected data were entered into a master chart prepared in Microsoft Excel 2007 which is checked, verified and converted into SPSS 18.0 version for statistical analysis. Descriptive statistics was computed for demographic characteristics, trauma exposure indicator and prevalence rates of probable PTSD, anxiety, and depression. Bivariate logistic regressions screened for the risk factors of probable PTSD, anxiety and depression by exploring the roles of the above independent variables, consecutively.

Pretest was done in 10% of total sample size and necessary correction of questionnaire was done. Opinions and views were taken from experts. Logical sequence of questionnaire was maintained and checked for content validity. The questionnaire was translated into Nepali with consultation from experts.

The study purpose was explained to the study subjects and their informed consent were obtained before the interviews. The confidentiality was maintained and information was only used for purpose of study. Permission was taken from municipality office before conducting the study. Since, no formal ethical committee was available in that organization so the research was conducted according to the principles of the Declaration of Helsinki.

RESULTS

This study was conducted was conducted on Sukla Gandaki Municipality ward no. 4. The study was collected from 3rd May to 30th August using convenient sampling technique with a sample size of 300. Study shows that nearly 2/5th of the respondents were in the age group 15 -30 years i.e., 39.7%. Most (64%) of the respondent were female. Nearly thirty percent of the respondents were illiterate. Forty one percent of the respondents were earning Nrs. 10000 - 25000 (Table 1).

Table 1: Socio-demographic characteristics of respondents (n = 300)

Characteristics		Frequency(f)	Percentage(%)
Age(in years)	15 - 30	119	39.7
	31 - 45	88	29.3
	> 45	93	31.0
Sex	Male	108	36
	Female	192	64
Marital Status	Married	242	80.7
	Unmarried	58	19.3
Educational status	Illiterate	90	30.0
	Literate	210	70.0
Occupation	Unemployed	194	64.7

	Employed	106	35.3
Income (Nrs)	<10000	146	48.7
	10000-25000	124	41.3
	> 25000	30	10
Number of family member	< 5	118	39.3
	5 - 7	157	52.3
	>7	183	8.3

Almost 2% of the respondents have injury in the body parts after the earthquake. Around 0.3% had disability in the family member. Ten percent have lost their house, 7.3% have loss the property and 0.3% had witnessed of death. More than sixty percent of the respondents have initial fear regarding the earthquake (Table 2).

Table 2: Trauma exposure indicator of the respondents (n = 300)

Characteristics		Frequency(f)	Percentage(%)
Past history of psychiatric illness	Yes	3	1
	No	297	99
Injury of body parts	Yes	5	1.7
	No	295	98.3
Disability of family member	Yes	1	0.3
	No	299	99.7
Loss of family	Yes	1	0.3
	No	299	99.7
Loss of property	Yes	22	7.3
	No	278	92.7
Loss of house	Yes	30	10
	No	270	90
Witnessed of death	Yes	1	0.3
	No	299	99.7
Initial fear	Yes	186	62
	No	114	38

Mental Health related disorder

Study revealed that among 300 respondents, 12.7% of the respondents were having anxiety, 10% post traumatic stress disorder and 8% depression due to repetitive experience of earthquake (Table 3).

With reference family size > 7, family size with 5-7 member, < 5 member were 3 times more likely to have post traumatic stress disorder with Crude OR(95% CI) is 3.498(1.189 - 10.292) and 3.072(1.04 - 9.302) respectively. Loss of house is significantly associated with PTSD with Crude OR(95% CI) is 4.099(1.635 - 10.278) Respondent having initial fear of the earthquake is twenty times more likely to have PTSD with 20.873(2.8.2 - 155.48) (Table 4).

Table 3: Mental health impact of earthquake among the respondents (n = 300)

Characteristics		Frequency(f)	Percentage(%)
Anxiety	Yes	38	12.7
	No	262	87.3
Post traumatic stress disorder	Yes	30	10
	No	270	90
Depression	Yes	24	8.0
	No	276	92.0

With reference to literate people, illiterate people are two times more likely to have anxiety symptoms with Crude OR(95% CI) = 2.096(1.05-4.16) with p value 0.034. Respondent losing their house, property were more likely to develop anxiety related symptoms with crude OR(95% CI) = 10.74(4.66-24.72) and 3.72(1.407-9.826) respectively. Respondent having initial fear of occurrence of earthquake were more likely to have anxiety symptoms with Crude OR 13.4 (Table 5).

Illiterate people, loss of house, initial fear of earthquake were more likely to develop depressive symptoms with 3.054(1.312-7.110), 3.500(1.269 - 9.652) and 15.945(2.123-119.77) respectively (Table 6).

Table 4: Association of PTSD with different socio-demographic characteristic (n = 300)

Characteristics	Post traumatic stress disorder		p value	COR(95% CI)
	Yes (%)	No(%)		
Gender				
Male	8 (7.4)	100(92.6)	0.262	0.618(0.265-1.441)
Female	22(11.5)	170(88.5)		Ref.
Marital status				
Married	26(10.9)	212(89.1)	0.296	1.778(0.597-5.300)
Unmarried	4(6.5)	58(93.5)		Ref.
Family size				
< 5	11(9.3)	107(90.7)	**0.047**	**3.072(1.04 - 9.302)**
5 - 7	13(8.3)	144(91.7)	**0.023**	**3.498(1.189 - 10.292)**
> 7	6(24.0)	19(76.0)		Ref.
Loss of house				
Yes	8(26.7)	22(73.3)	**0.005**	**4.099(1.635 - 10.278)**
No	22(8.1)	248(91.9)		Ref.
Initial fear				
Yes	29(15.6)	157(84.4)	**0.000**	**20.87(2.802-155.480)**
No	1(0.9)	113(99.1)		Ref.

Number in parenthesis indicate percentage p value and COR in bold indicates significance

Table 5 : Association of anxiety with different socio-demographic characteristic (n = 300)

Characteristics	Anxiety related symptoms		p value	COR(95% CI)
	Yes	No		
Education				
Illiterate	17(18.9)	73(81.1)	**0.034**	**2.096(1.05-4.16)**
Literate	21(10.0)	189(90.0)		Ref.
Loss of house				
Yes	15(50.0)	15(50.0)	**0.000**	**10.74(4.66-24.72)**
No	23(8.5)	247(91.5)		Ref.
Loss of property				
Yes	7(31.8)	15(68.2)	**0.012**	**3.72(1.407-9.826)**
No	31(11.2)	247(88.8)		
Initial fear				
Yes	36(19.4)	150(80.6)	**0.000**	**13.4(3.17-56.997)**
No	2(1.8)	112(98.2)		

Number in parenthesis indicate percentage p value and COR in bold indicates significance

Table 6: Association of the depression with socio-demographic characteristics (n = 300)

Characteristics	Depression related symptoms		p value	COR(95% CI)
	Yes(%)	No(%)		
Education				
Illiterate	13(14.4)	77(85.6)	**0.007**	**3.054(1.312-7.110)**
Literate	11(5.2)	199(94.8)		Ref.
Loss of house				
Yes	6(20.0)	24(80.0)	**0.022**	Ref.
No	18(6.7)	252(93.3)		**3.500(1.269 - 9.652)**
Initial fear				
Yes	23(12.4)	163(87.6)	**0.000**	**15.945(2.123-119.77)**
No	1(0.9)	113(99.1)		Ref.

Number in parenthesis indicate percentage p value and COR in bold indicates significance

DISCUSSION

This cross sectional study was conducted with the objective to study mental health impact of April 2015 earthquake of Nepal and different socio-demographic variables.

Ten percent have lost their house whereas significantly higher 89% from China[17], 57.4% from Ichinoseki reported some house damage[18] and eighty per cent from Japan experienced the complete collapse of their house[19].

Mental health impact of earthquake among the respondents

Among total 300 respondents, prevalence of anxiety is 12.7% comparable results was obtain by Carter FA , Bell CJ[20], which was significantly lower than the data acquired by Messiah A, et al. is 36% (direct exposure) and 22% (indirect exposure)[21] and 43.8% by Zhang Z et al.[17].

The present study indicate that 10% had post traumatic stress disorder which agree with the conclusions of many studies i.e., 9.2%[22], 12.2%[23], 13.3%[24] and 11.2%[25]. Dr. Brandon Kohrt emphasizes that earthquake survivors who maintain and strengthen social bonds are less likely to develop PTSD contrary to widespread assumption that majority of the population who experienced the disaster will be traumatized.

This prevalence of PTSD is much higher than that in the general Chinese population, which was 0.2%[26]. Whereas considerably larger percentage i.e., 32.5% from Japan[27] and 33.7% developed PTSD from Yushu Earthquake [17]. About eight percent of the respondent were having depression which is in line with the study from New Zealand 7.5%[28], China 12%[20] and Japan 10.4%[27]. Whereas significantly greater proportion having depression were 38.6%[17] and 40.8% [23]. Though the percentage of respondent having anxiety, PTSD and depression were less than compared to other studies but the prevalence is still high as being the less affected area.

Association of different socio-demographic characteristics with Post-traumatic stress disorder, anxiety and depression

The current sub analysis of the result showed that gender (women) as an risk factor for PSTD however statistically it was not significant, which is in keeping with other findings[29, 30, 31]. Conversely this was not the case in other studies[25, 32, 33]. It seems that women exposed to traumatic events are more likely to develop PTSD than men. In addition, it is possible that women are more sensitive to negative events and more tend to express emotion. When faced with this unexpected disaster, men were probably just as frightened as women.

There was no significant difference in the rate of PTSD according to marital status in present study which coincides with the study by Shrestha R[33], whereas distinguish outcomes was acquire in other studies [31, 32].

Loss of house is significantly associated with PTSD with Crude OR(95% CI) is 4.099(1.635 - 10.278) similar finding was obtained from Yushu earthquake(OR=2.02, 95%CI=1.04–3.94, p<.05)[17]. The results of the present study indicated that the intensity of initial fear predicted positive symptoms of PTSD with 20.873(2.8.2 - 155.48). Consistent with the results of recent studies[34, 35, 36], the initial feeling of fear was a fairly robust predictor of psychological disorders. The intensity of this initial fear represents one's personal experience to a disaster and is included as PTSD Criterion A2 in the DSM-IV (1994).

The findings identified several related risk for anxiety like illiteracy (OR = 2.096, 95% CI = 1.05-4.16), property loss (OR = 3.72, 95% CI = 1.407-9.826) and initial fear during earthquake(13.4(3.17-56.997)) were more likely to develop anxiety related symptoms which is in line with the study from China showing elementary school or below education (OR =2.72, 95% CI=1.72–4.32), loss of property is OR=1.36, 95%CI=1.16–1.59, participants with stronger initial fears during the earthquake (OR=1.96, 95%CI=1.58–2.43, p<.01) were more likely to report anxiety[17].

Loss of house is significantly associated with anxiety with (OR = 10.74 95 % CI: 4.66-24.72) comparable result was obtained in study from Japan[18], while divergent results obtained in study from Sichuan Earthquake as house damage not being a risk factor is difficult to interpret as solely 14 persons (3%) reported no damage of their residence and we do not have information on the severity of the damage[37].

Illiterate people were more likely to develop depressive symptoms with 3.054(1.312-7.110). Similar results was obtained in the study by Zhang Z et al. showed that elementary school or below education were more likely to develop depression (OR =1.65, 95%CI=1.05–2.61) than higher education[17].

There are several limitations to this study. First, the sample size is small and the study was cross-sectional not prospective. Second, this survey was essentially a self-report assessment and psychiatric diagnostic interview was not conducted to confirm the results of the self-administered questionnaires. The study was conducted immediately 2 months after the main earthquake as the result the prevalence of PTSD, anxiety and depression could have been overestimated. Although it was notified that the results would remain confidential, it is nevertheless possible that some participants may not have answered honestly because of the stigma attached to poor mental health. The study sample was from a less affected area of Nepal thus the findings from the current analysis may not be applicable to scenarios of most affected areas.

CONCLUSION

The present study found that psychological impact(PTSD, anxiety and depression) after the earthquake is more among the people living in the study area.

Conflict of Interest/ Competing interests

The authors declare that they have no competing interests.

REFERENCES

1. Earthquakes caused the deadliest disasters in the past decade. The United Nation Office for Disaster Risk Reduction. [updated 2010 Jan 27; cited 2016 Jul 20]. Available from: http://www.unisdr.org/archive/12470.

2. Centers for Diseases and Control: Rapid health response, assessment, and surveillance after a tsunami--Thailand, 2004–2005. MMWR 2005; 54(3):61-64.

3. Sullivan KM, Hossain SM. Earthquake mortality in Pakistan. Disasters 2010; 34(1):176-183.

4. Jia Z, Tian W, He X, Liu W, Jin C, Ding H. Mental health and quality of life survey among child survivors of the 2008 Sichuan earthquake. Qual Life Res. 2010; 19(9):1381-1391.

5. Damage Situation and Police Countermeasures associated with 2011 Tohoku district. [updated 2016 June 10; cited 2016 August 2016]. Available from: http://www.npa.go.jp/archive/keibi/biki/higaijokyo_e.pdf.

6. Nepal Earthquakes 2015: Desk Review of Existing Information with Relevance to Mental Health & Psychosocial Support. [updated 2015 Jun 18; cited 2016 August 24]. Available from: mhinnovation.net/.../nepal-earthquake-2015-desk-review-existing-infor...

7. Humanitarian crisis after Nepal earthquakes 2015 Initial public health risk assessment and interventions – May 2015, WHO. [cited 2016 August 24]. Available from: http://www.searo.who.int/entity/emergencies/phra_nepal_may2015.pdf.

8. Sujen Man Maharjan. 3 months on: What is the status of mental health and psychosocial support in Nepal). [cited 2016 July 20]. Available from: https://sujenman.wordpress.com/2015/07/25/3-months-on-what-is-the-status-of-mental-health-and-psychosocial-support-in-nepal/.

9. nytimes.com 2015-04-27 katmandu-nepal-fear-loss-and-devastation. [cited 2016 June 28]. Available from : nytimes.com.

10. Shrestha S. "Langtang is gone". Nepali Times. [updated 2015 May 1 ; cited 2016 Aug 23]. Available from: http://nepalitimes.com/article/nation/langtang-destroyed-in-earthquake,2205.

11. Bennett C. Nepal earthquakes have unleashed a mental health disaster. [updated 2015 May 15; cited 2016 July 13]. Available from: https://www.theguardian.com/commentisfree/2015/may/15/nepal-earthquake-mental-health-disaster.

12. Xu Y, Herrman H, Tsutsumi A, Fisher J. Psychological and social consequences of losing a child in a natural or human-made disaster: A review of the evidence. Asia Pac Psychiatry 2013; 5: 237-48.

13. Elhai JD, Gray MJ, Kashdan TB, Franklin L. Which instruments are most commonly used to assess traumatic event exposure and posttraumatic effects?: A survey of traumatic stress professionals. Journal of Traumatic Stress 2005; 18: 541–545.

14. Weathers FW, Litz BT, Herman DS, Huska JA, Keane TM. The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. In annual convention of the international society for traumatic stress studies 1993 Oct 24. San Antonio: International Society for Traumatic Stress Studies.

15. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL): A self-report symptom inventory. Behavioral Science 1974; 19: 1–15.

16. Mollica RF, Wyshak G, de Marneffe D, Khuon F, Lavelle J. Indochinese versions of the Hopkins Symptoms Checklist-25: a screening instrument for the psychiatric care of refugee. Am J Psychiatry. 1987 Apr;144(4):497-500.

17. Zhang Z, Wang W, Shi Z, Wang L, Zhang J. Mental Health Problems among the Survivors in the Hard-Hit Areas of the Yushu Earthquake. PLoS ONE 2012;7(10) : e46449. doi:10.1371/journal.pone.0046449.

18. Niitsu T, Takaoka K, Uemura S, Kono A, Saito A, Kawakami N, et al. The psychological impact of a dual-disaster caused by earthquakes and radioactive contamination in Ichinoseki after the Great East Japan Earthquake. BMC Research Notes 2014;7:307.

19. Goodwin R, Takahashi M, Sun S, Ben-Ezra M. Psychological distress among tsunami refugees from the Great East Japan earthquake. British Journal of Psychiatry Open Sep 2015; 1 (1) 92-97.

20. Carter FA , Bell CJ , Ali AN , McKenzie J , Wilkinson TJ. The impact of major earthquakes on the psychological functioning of medical students: a Christchurch, New Zealand study. The New Zealand Medical Journal 2014; 127(1398):54-66.

21. Messiah A, Acuna JM, Castro G, Vega PR, Vaiva G, Shultz J, et al. Mental health impact of the 2010 Haiti earthquake on the Miami Haitian population: A random-sample survey. Disaster Health 2014;2(3-4).

22. Zhang LP, Zhao Q, Luo ZC, Lei TX, Wang Y, Wang PW. Prevalence and risk factors of posttraumatic stress disorder among survivors five years after the “Wenchuan” earthquake in China. Health and Quality of Life Outcomes 2015;13:75.

23. Qu Z, Tian D, Zhang Q, Wang X, He H, Zhang X, et al. The impact of the catastrophic earthquake in China's Sichuan province on the mental health of pregnant women. Journal of Affective Disorder 2012; 136(1-2):117-23.

24. Wang L, Li Z, Shi Z, Zhang J, Zhang K, Lui Z, et al. Testing The Dimensionality Of Posttraumatic Stress Responses In Young Chinese Adult Earthquake Survivors: Further Evidence For ‘‘Dysphoric Arousal’’ As A Unique Ptsd Construct. Depress Anxiety. 2011; 28(12):1097-104.

25. Zhang LP, Wang PX, Li YF, Hu QX. Assessment of the posttraumatic symptoms among survivors three years following Wenchuan Earthquake. Chinese Journal of Preventive Medicine 2012;46:708–12.

26. Phillips MR, Zhang JX, Shi QC, Song ZQ, Ding ZJ, Pang ST, et al. Prevalence, treatment, and associated disability of mental disorders in four provinces in china

during 2001–05: an epidemiological survey. Lancet. 2009; 373:2041–53.

27. Sugisawa H, Sugisaki H, Ohira S, Shinoda T, Shimizu Y, Kumagai T. Factors in Mental Health Problems among Japanese Dialysis Patients Living in Heavily Damaged Prefectures Two Years after the Great East Japan Earthquake. Advances in Psychiatry. Volume 2015 (2015), Article ID 265907, 8 pages, http://dx.doi.org/10.1155/2015/265907

28. Spittlehouse J, Joyce P, Vierck E, Schluter P, Pearson J. Ongoing adverse mental health impact of the earthquake sequence in Christchurch, New Zealand. Australian and New Zealand Journal of Psychiatry 2014; 48(8): 756-63.

29. Sakuma A, Takahashi Y, Ueda I, Sato H, Katsura M, Abe M et al. Post-traumatic stress disorder and depression prevalence and associated risk factors among local disaster relief and reconstruction workers fourteen months after the Great East Japan Earthquake: a cross-sectional study. BMC Psychiatry. 2015;15(58):1-13.

30. Armagan E, Engindeniz Z, Devay AO, Erdur B, Ozcakir A. Frequency of post-traumatic stress disorder among relief force workers after the tsunami in Asia: do rescuers become victims? Prehospital and Disaster Medicine. 2006; 21(3):168-72.

31. Fullerton C, Ursano RJ, Wang L. Acute Stress Disorder, Posttraumatic Stress Disorder, and Depression in Disaster or Rescue Workers. Am J Psychiatry. 2004;161(8):1370-6.

32. Iranmanesh S, Tirgari B, Bardsiri HS. Post-traumatic stress disorder among paramedic and hospital emergency personnel in south-east Iran. World J Emerg Med. 2013;4(1):26-31.

33. Shrestha R. Post-traumatic Stress Disorder among Medical Personnel after Nepal earthquake, 2015. J Nepal Health Res Counc 2015 May - Aug;13(30): 144-8.

34. Wang L, Zhang Y, Wang W, Shi Z, Shen J, Li M, et al. Symptoms of posttraumatic stress disorder among adult survivors three months after the Sichuan earthquake in China. J Trauma Stress. 2009 Oct;22(5):444-50.

35. Zhang Z, Shi Z, Wang L, Liu M. One year later: Mental health problems among survivors in hard-hit areas of the Wenchuan earthquake. Public Health 2011; 125: 293–300.

36. Basoglu M, Kilic C, Salcioglu E, Livanou M. Prevalence of posttraumatic stress disorder and comorbid depression in earthquake survivors in Turkey: An epidemiological study. Journal of Traumatic Stress 2004;17: 133–141.

37. Ni J, Reinhardt JD, Zhang X, Xiao M, Li L, Jin H, et al. Dysfunction and Post-Traumatic Stress Disorder in Fracture Victims 50 Months after the Sichuan Earthquake. PLoS ONE 2013; 8(10): e77535. doi:10.1371/journal.pone.0077535.

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