Introduction: Floods are the most common hazard to cause disasters and have led to extensive morbidity and mortality throughout the world. Nepal suffers from many kinds of natural disasters, of which the most common and serious one is flooding. Long and heavy rainfall in 2008 resulted in a devastating flood. It caused a substantial health impact on residents in and around the Sunsari District. Natural disasters, like flooding, have been reported to cause a wide range of psychosocial impacts, leading the victims to present psychiatric disorder.

Objectives: The aim of this study is to assess the psychosocial impact of flood among severely affected victims from flood in West Kusaha Sunsari district.

Methodology: A descriptive cross-sectional study was carried out among 127 households in 3 selected Village Development committee which is heavily flood affected. Participants were interviewed and information collected on the psychosocial impacts of the devastation after the flood using standard tools and questionnaire.

Results: In this study 98 respondents were male and 29 were female. More than one-third of respondents were between ages 41-50, mean age of the respondents was 46.58 ± SD 12.46 years. Finding shows that majority of respondents have GHQ Score > 3 which indicates psychological morbidity. More than half of respondents have mild to severe anxiety and more than half of the respondents have mild to severe depression. Regarding social support quite higher in age between 20-40 years, joint family members and people remain above poverty line.

Conclusion: There is some impact of flood among survivors as they had different level of depression, anxiety.

Key Words: Natural disaster, flooding, psychosocial impacts, anxiety, depression, social support

Introduction

Flood is an overflowing of water onto land that is normally dry due to heavy rains. Floods are the most common hazard to cause disasters and have led to extensive morbidity and mortality throughout the world.¹

The term psychosocial is understood as the dynamic relationship between psychological and social effects, each continuously interacting and influencing with the other. The social aspect is an inseparable environment that helps to shape the psychological world of an individual.²

The effects of flooding and disasters on people's health, relationships and welfare can be extensive and significant. Flooding can pose substantial social and mental health problems may continue over extended periods of time.³
Flooding is now the most frequent type of major disaster. Over the last 10 years, floods in Europe have killed more than 1,000 people and affected over 3.4 million others. In common with other types of major incidents or disasters, the effects on people’s health, relationships and welfare can be extensive. Flooding can pose substantial social and welfare problems that may continue over extended periods of time because of not only being flooded (the primary stressor), but also because of the secondary stressors (those stressors that are indirectly related to the initial extreme event, i.e., economic stress associated with re-building) that arise as people try to recover their lives, property and relationships. Flooding can challenge the psychosocial resilience of the hardiest of people who are affected.4

Most studies exploring the effects of flooding on common mental disorders came from high or middle-income countries, and results revealed significant increases in depression, anxiety and psychological distress among flooded adults; relatively few studies examined the effects of flooding on children, but those that did revealed increases in aggression, bedwetting and moderate to severe stress symptoms. Studies showing increases in PTSD following flooding came from Europe and North America, with limited evidence reported about suicide in relation to flooding.4

Thailand, the Philippines suffered the most from flooding. But the number of casualties is higher in the Philippines.5

The adverse human health consequences of flooding are complex and far-reaching: these include drowning, injuries, and an increased incidence of common mental disorders. Anxiety and depression may last for months and possibly even years after the flood event and so the true health burden is rarely appreciated. A comprehensive, risk-based emergency management program of preparedness, response, and recovery has the potential to reduce the adverse health effects of floods, but there is currently inadequate evidence of the effectiveness of public health interventions.6

Flooding can pose substantial social and welfare problems that may continue over extended periods of time. The adverse human health consequences of flooding are complex and far-reaching, and can increased incidence of common mental disorders. Anxiety and depression may last for months and
Conceptual Framework

Figure 1: Conceptual Framework

Figure 1 Shows the Conceptual Frame Work of the Study, which was developed on the basis of relationship between dependent and independent variables. This framework depicts that their psychosocial health depends on the socio-demographic characteristics of the respondents such as age, gender, ethnicity, religion, education, occupation, socioeconomic condition, etc. Similarly other variables like economic loss during flood, and range of help they have got after flood may also have effect on the psychosocial status among flood survivors. These were assessed by interview method using standardized tools.

Methodology

Descriptive cross-sectional study design was used. Study was done among the survivors of flood victims residing in a West Kusaha Village Development Committee. The area was selected as most of the flood red card survivors victims were residing there. Adult Red card holders were the population. Each household had taken as sampling unit. According to the prevalence rate of the similar study conducted in UK by Paranjothy et al on (2007) Prevalence of probable anxiety 48%, probable depression 43%, Sample size was calculated by using formula $n = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$ Sample size was 127. Systematic random sampling was used. Sampling interval was calculated by dividing total population (686) of West Kusaha red card holders by sample size (127). Sampling interval was 5.4. A random number selection was done from 1 to 8 and ‘4’ was the random number. So, starting from 4th house every 5th house was taken according to provided list. If the participant was absent in three consecutive visits, and then the immediate next house had been taken as a sample. Participants were selected based on eligibility criteria. Adult red card holders were included in the study.

A self-prepared semi-structured questionnaire has been used to collect information regarding socio demographic characteristics and information regarding flood. Following standardized tools were used to assess anxiety, depression and social support among flood survivors.

- **General health questionnaire (GHQ-12):** It is a standardized and widely used questionnaire developed in England as a screening instrument which helps to assess psychological distress among adults in general population. The 12-item General Health Questionnaire (GHQ-12), a brief self-report measure, has excellent psychometric properties as a screening instrument for psychiatric disorders in nonclinical settings (Goldberg & Williams, 1988) It comprises 12 questions related to mood and emotions states. Each item is rated on a four-point scale, gives a total score of 12 or 36 on the basis of the scoring method selected, and a common scoring method is Likert scoring (0-1-2-3). Cutoff score was used on the basis of mean score of GHQ$_{12}$. Higher score are an indication of more problems.

- Participant who scores 3 and more than 3 from GHQ$_{12}$ were further assessed with PHQ$_9$ (patient health questionnaire) depression questionnaire, GAD$_7$ (Generalized anxiety disorder) questionnaire to rule out level of depression and anxiety respectively.

- **Medical outcome study (MOS) Social Support Survey Instrument-** The level of social support among flood
• victims was measured through Medical outcome study (MOS) Social Support Survey Instrument. MOS social support survey is a brief, multidimensional, self-administered survey that was designed to be comprehensive of various dimensions of social support. The survey questionnaire consists of four separate social support subscales and an overall functional social support index. A higher score for an individual scale or for the overall support index indicates more support:

1. Emotional and informational support-1to 8 items
2. Tangible support-9-12 item
3. Affectionate support-13-15 item
4. Positive social interaction-16-18 item
5. Additional item-19 item

To obtain a score for each subscale, calculate the average of the scores for each item in the subscale. 13

• **Patient health questionnaire** - The PHQ-9 is the nine item depression scale of the Patient Health Questionnaire. They incorporate DSM-IV depression criteria with other leading major depressive symptoms into a brief self-report instrument that are commonly used for screening and diagnosis, as well as selecting and monitoring treatment. The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV. Interpretation of Total Score: 1-4 Minimal depression, 5-9 Mild depression, 10-14 Moderate depression, 15-19 moderately severe depression, 20-27 severe depression. PHQ-9 score ≥10 had a sensitivity of 88% and a specificity of 88% for major depression. 14

• **GAD-7 (Generalized anxiety disorder) questionnaire** - GAD-7 is a valid and efficient tool to screen for anxiety and to assess “its severity in clinical practice and research. There are seven short questions. The GAD-7 score is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of “not at all,” “several days,” “more than half the days,” and “nearly every day,” respectively, and adding together the scores for the seven questions. Scores of 5, 10, and 15 are taken as the cut off points for mild, moderate, and severe anxiety, respectively. 15

Pretesting was done among 10% of the sample size i.e. 12 subject who were Red card holders of Haripur V.D.C. Sunsari. A research instrument was developed by comprehensive and extensive literature search.

The standard tool used for measuring social support i.e. MOS social survey questionnaire, for psychological distress screening GHQ12 questionnaire, for measurement of anxiety GAD7 anxiety scale, and if GHQ12 score >3 PHQ9 tools for further measurement of depression was used. MOS social questionnaire and GHQ12 questionnaire has already been used locally by previous researcher.PHQ9 tools and GAD7 anxiety scale reliability was checked by using standard statistical method. Tools were translated to Nepali and again translated back to English. Interview has been taken to collect the data from structured questionnaires.

Validity of the tool was ascertained by consulting four experts from Department of Community Health Nursing BPKIHS, Department of Psychiatry Nursing BKIHS, expert for Nepali translation. Research tool was translated into Nepali and then checked and verified by subject experts.

Data collection was started after taking permission from Institutional Review Committee, BPKIHS. The research participants were explained about the objectives of the study and written consent was taken from each participant. Data has been collected by interview technique using standard tool.

First data was obtained regarding the participants demographic information. Then 12 item General health questionnaire was assessed by interview and MOS social support was assessed in each respondent. When participant obtained GHQ score >3 then
they were assessed for level of depression and anxiety in respondents using PHQ9 and GAD7 tools respectively.

**Result**

**Figure 2: Distribution of Respondents according to GHQ score**

Figure 2 shows that almost 94% of respondents had psychological distress as they had GHQ score > 3 whereas 6% had GHQ score <3.

**Figure 3: Depression Level among Flood Victims.**

Figure 3 shows that almost 42% of flood victims had mild depression followed by minimal depression 38.7%, 15.1% had moderate depression, 3.4% had moderately severe depression, and only 1.7% had severe depression symptoms in which score 1-4 indicates minimal depression, 5-9 indicates mild depression, 10-14 indicates moderate depression, 15-19 indicates moderately severe depression and score 20-27 indicates severe depression.

**Table 1: Social Supports among Respondents**

Table 1 shows social support score according to Medical Outcome Study (MOS) social support survey instrument. Total 19 items were included with the score ranging from 0 to 95 and a higher score indicates more support; about 28% of the respondents had score ranging from 69-82 in social support, where mean score was 67.3±SD 17.5.

**Table 2: Association of Anxiety, Depression and Social Support with Gender**

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| Characteristics | Category | f  | %  |
|-----------------|----------|----|----|
| Social support  | score    |    |    |
| 0-53            |          | 34 | 26.8|
| 54-68           |          | 30 | 23.6|
| 69-82           |          | 35 | 27.6|
| 83-95           |          | 28 | 22.0|

**Mean score 67.3±SD 17.5**

**Table 2: Association of Anxiety, Depression and Social Support with Gender**

| Characteristics | Gender category | f  | Mean ± SD   | p-value |
|-----------------|-----------------|----|-------------|---------|
| Depression**    | Male            | 93 | 5.87±5.02   | 0.196   |
|                 | Female          | 28 | 7.21±3.89   |         |
| Anxiety**       | Male            | 93 | 4.52±3.62   | 0.045*  |
|                 | Female          | 28 | 6.07±3.34   |         |
| Social support**| Male            | 98 | 67.61±18.34 | 0.728   |
|                 | Female          | 29 | 66.31±15.02 |         |

**Independent sample t-test**

**Significant association**
Table 2 shows association of Depression, Anxiety and Social support with Gender. In which total mean score of depression and anxiety is higher in female than male and GAD-7 score is significantly associated with gender (p = 0.045). There was not significant association of social support, depression with gender.

Table 3: Association of Anxiety and Depression with Perceived Social Support

| Characteristics | Category                        | f    | Mean ±SD  | p-value |
|-----------------|---------------------------------|------|-----------|---------|
| Anxiety*        | Minimal and mild anxiety        | 110  | 66.47±17.49 | 0.408   |
|                 | Moderate and severe anxiety     | 9    | 61.44±17.40 |         |
| Depression*     | Minimal and mild depression     | 95   | 68.24±17.16 | 0.007** |
|                 | Moderate, moderately severe and severe depression | 24  | 57.58±16.28 |         |

*Independent sample t-test
**Significant association

Table 3 shows that association of Anxiety and Depression with Social Support. In which, depression is significantly associated with perceived social support. People having minimal and mild anxiety or depression had higher mean score of social support in comparison to people having moderate and severe anxiety or depression

Discussion

According to the score of General health questionnaire (GHQ12), most of the respondents (93.7%) had a GHQ Score >3 which indicate the presence of psychological distress among respondents. In this study, mean score of GHQ12 is higher in female than male score < 3 is a cutoff to assess psychological distress. Depression score ≥ 10 as a cutoff for probable depression was seen among 20.2% of the flood victims whereas cutoff point for probable anxiety taken as score ≥ 10 was seen among 7.6% of flood victims. It is contrary to the findings of Paranjothy et al. in United Kingdom, study conducted on 3-6 months immediate after flood, where it was found that prevalence of all mental health symptoms was significantly higher among individuals who reported flood water in the home i.e. psychological distress 69%, probable anxiety 48%, and probable depression 43%.

The findings of the study showed that total mean score of GAD-7 is higher in female (6.07±3.34) as compared to male (4.52±3.62) which is similar to the finding of study by Krasucki C & etal. States that Women do have a higher prevalence of anxiety disorders than men but this difference diminishes with increasing age. Prevalence of anxiety and depression is higher in relation to study conducted in the UK in 2010 which 24.5% participants met criteria for symptoms associated for anxiety and 35.1% for depression.

According to the findings of this study, female were 1.7 times more likely to have anxiety disorder than male which is lesser than the study findings conducted in Jumla district Nepal, where the odds of reporting anxiety were 2.3 times greater among women compared with men. Similarly prevalence of moderate/severe anxiety was higher in female than male which is similar to the findings of the study conducted on 2003 in Americans showed the lifetime rates of anxiety disorders when controlling for racial group, age, education, and socioeconomic status. Logistic regressions revealed that even when controlling for demographic variables, women were significantly more likely to meet diagnostic criteria for all the anxiety disorders.

According to the findings of this study, prevalence of moderate/severe depression and anxiety is higher in >60 years old which is supported by the study conducted in the north Indian state of Bihar in where persons of both sexes aged over 60 years had higher scores for PTSD and depression compared to persons in other age groups.

Female were 1.8 times more likely to have depression than men and prevalence of moderate/severe anxiety is higher in female than male which is similar to the finding of the study conducted by conducted by Inter agency standing committee (IARC) reference group for mental health and psychosocial support in Emergency setting in Nepal 2015 where it was found that,
gender-based risk factors and social exclusion have been linked to women experiencing more psychological distress and mental health problems like PTSD and depression than men.\textsuperscript{21} Findings is also similar with a study conducted by WHO in India in which depressive disorders are more common in women in comparison with men.\textsuperscript{22}

Regarding social support the mean score of social support was almost similar in all occupation and caste. However mean score was higher in primary level of education (78.2\%) and period of residency < 20years (75.5\%). In this study there was significant association of social support with type of family (p<0.001) where mean score of joint family was higher (73.27±14.40) in joint family than single family (62.62±18.53).

Similarly In this study male and female mean score of social support is quite similar which findings is contradictory to study conducted by Inter agency standing committee (IARC) reference group for mental health and psychosocial support in Emergency setting in Nepal 2015 gender-based risk factors and social exclusion have been linked to women experiencing more psychological distress and mental health problems like PTSD and depression than men. Men endorse more access to social support than women. This has been seen to improve mental health outcomes for men compared to women.\textsuperscript{21}

This study shows that anxiety and depression is significantly associated with perceived social support. People who do not have anxiety and depression had higher mean score of social support in comparison to people having anxiety and depression. This findings is supported by the finding of the study conducted on 2002in Nepal in relation to coping, social support and psychological and somatic symptoms among torture survivors where there was relationship between coping and social support and psychological and somatic symptoms.\textsuperscript{45}Findings also similar with the study conducted on Malaysia in which overall, flood victims who perceived that the support they received will also influence their well-being.\textsuperscript{24}

\section*{Conclusion}

Psychosocial impact of flood among survivors is inevitable. It is clearly observed that the flood victim does experienced mild to severe level of depression and anxiety. Regarding social support is higher in age between 20–40 years, joint family members and people remain above poverty line.

\section*{Recommendations}

\begin{itemize}
  \item Similar study can be replicated in different setting with larger sample.
  \item An analytical study can be done between severely affected survivors and in the similar socioeconomic, ethnic group of non-flooded respondents.
  \item This type of study can be conducted immediate after disaster situation so it is easy to recall all events.
  \item A qualitative study will be conducted; it would better to assess cause of psychological impact in better ways.
  \item Psychosocial issues can be assessed in other member of the family.
\end{itemize}

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Ethical consideration

Ethical clearance was obtained from institutional ethical review committee, BPKIHS, College of Nursing, and District Development Committee Sunsari Nepal. Written permission for data collection was obtained. The objective of the study was explained and written informed consent had taken before introducing the questionnaire from all respondents. Confidentially was maintained throughout the period and no participants were harmed in the study. Health education was provided to the participants which have created awareness to the participants regarding mental health problems. Similarly those who had moderate and severe anxiety and depression were advised to consult at nearby health care facility.

References

1. Du W, FitzGerald GJ, Clark M, Hou XY. Health impacts of floods. Prehosp Disaster Med. 2010 May;25(3):265-72.
2. Pollock NB. Contextual adaptation. Human functioning as dynamic interaction: A social work perspective.
3. Murray V, Cadin L, Amlot R, Stanke C, Lock S, Rowlett H, Williams R. The effects of flooding on mental health. Health Protection Agency. 2011 Dec 1.
4. Stanke C, Murray V, Amlot R, Nurse J, Williams R. The effects of flooding on mental health: Outcomes and recommendations from a review of the literature. PLoS currents. 2012 May 30;4.
5. Palatino M. The Great Floods of 2011. Southeast Asia: 2012 January 5th.
6. Hajat S, Ebi KL, Kovats RS, Menne B, Edwards S, Haines A. The human health consequences of flooding in Europe: a review. In Extreme weather events and public health responses 2005 (pp. 185-196). Springer, Berlin, Heidelberg.
7. Nepal disaster knowledge network. Nepal hazard profile updated on: 2012 Nov 27. URL http://www.saarc-sadkn.org/countries/nepal/hazard_profile.aspx#toposhi River Flood (Nepal): Affected Areas in Sunsari and Saptari Districts. (Online). 2008 Aug 23. Retrieved from URL http://reliefweb.int/map/nepal/koshi-river-flood-nepal-affected-areas-sunsari-and-saptari-districts-23-aug-2008. Retrieved on 26 May 29, 2014.
8. Koshi River Flood (Nepal): Affected Areas in Sunsari and Saptari Districts. United Nations, Nepal Information Platform.(Online), 2008 Aug 22. http://reliefweb.int/map/nepal/koshi-river-flood-nepal-affected-areas-sunsari-and-saptari-districts.
9. Report-Il Natural Disasters and Displacement: Koshi River Flood in Eastern Nepal. Refugee Watch. 2010 December 36. http://www.mogr.ac.in/nv%20files/RW36/7.
10. Health the Netherland Vulnerabilities- Flood. (Online). https://www.climatechangepost.com/netherlands/health/
11. Flooding. (Online). 2015 August 12. http://eschooltoday.com/natural-disasters/floods/what-is-a-flood.html.
12. Hu Y, Stewart-Brown S, Twigg L, Weich S. Can the 12-item General Health Questionnaire be used to measure positive mental health?. Psychological medicine. 2007 Jul; 37(7):1005-13.
13. Shah T. Psychosocial factors determining quality of life among cancer patients in Nepal 2011 Jan 13.
14. Spitzer RL, Kroenke K, Williams JB. the Patient Health Questionnaire Primary Care Study Group: Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. Jama. 1999;282(18):1737-44.
15. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Archives of internal medicine. 2006 May 22;166(10):1092-7.
16. Paranjothy S, Gallacher J, Amlot R, Rubin GJ, Page L, Baxter T, Wight J, Kirrage D, McNaught R, Palmer SR. Psychosocial impact of the summer 2007 floods in England. BMC public health. 2011 Dec; 11(1):145.
17. Krasucki C, Howard R, Mann A. The relationship between anxiety disorders and age. International Journal of geriatric psychiatry. 2015 August 28; 13 (2): 79-99.
18. Mason V, Andrews H, Upton D. The psychological impact of exposure to floods. Psychology, health & medicine. 2010 Jan 1;15(1):61-73.
19. Gender and women’s mental health: WHO Report 2015. (Online). 2015 Sept 9.
20. Kohrt BA, Worthman CM. Gender and anxiety in Nepal: the role of social support, stressful life events, and structural violence. CNS neuroscience & therapeutics. 2009 Sep;15(3):237-48.
21. Inter-Agency Standing Committee. Nepal Earthquake 2015: Desk review of existing information with relevance to mental health and psychosocial support. IASC Reference Group for Mental Health and Psychosocial Support in Emergency Settings. 2015.
22. Telles S, Singh N, Joshi M. Risk of posttraumatic stress disorder and depression in survivors of the floods in Bihar, India. Indian Journal of Medical Sciences. 2009 Aug 1;63(8):330-4.
23. Emmelkamp J, Komproe IH, Van Ommeren M, Schagen S. The relation between coping, social support and psychological and somatic symptoms among torture survivors in Nepal. Psychological Medicine. 2002 Nov;32(8):1465-70.
24. Mustaffa CS, Marzuki NA, Ariffin MT, Salleh NA, Rahaman NH. Relationship between social support, impression management and well-being among flood victims in Malaysia. Procedia-Social and Behavioral Sciences. 2014 Nov 6;155:197-202.