



## Regional update

## Sex differentials in the risk factors of post traumatic stress disorder among tsunami survivors in Tamil Nadu, India

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## ARTICLE INFO

## Article history:

Received 5 June 2015

Received in revised form 21 May 2016

Accepted 7 July 2016

Available online xxx

## Keywords:

PTSD

Risk factors

Men and women survivors

IES-R

## ABSTRACT

This study assessed if pre disaster, with-in disaster and post disaster factors predicted Post Traumatic Stress Disorder (PTSD) differently, among men and women survivors of the 2004 Southeast Asian tsunami in Kanyakumari district, Tamil Nadu, India. PTSD was identified using a validated tool, Impact of Events Scale-Revised (IES-R) among the participants in a cross-sectional community based survey (n = 485). Case control analysis of 299 subjects was done to determine the predictors of PTSD. The odds of having PTSD were 6.35 times higher in women than men. Higher odds for PTSD was seen among women who were married, aged over 40, belonged to low socioeconomic status and resided in heavily damaged areas. Protective odds for PTSD was found among women who had received more than three times of counseling services whereas men were not at risk if they were free from fear of recurrence of tsunami, when adjusted for other variables. Women were vulnerable to PTSD because of their socially constructed roles. It is important to consider gender based vulnerabilities while designing interventions to combat mental health problems among disaster affected communities.

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## Background

Disasters and their aftermath are sources of enormous psychological stress to the afflicted, irrespective of sex. Men and women respond differently to stress and the sex differences related to posttraumatic stress disorder appear to be mediated by different risk factors (Christiansen and Elklit, 2008). Numerous explanations have been put forth to explain the higher susceptibility of women to PTSD. These include sex-specific psychological and biological reactions to trauma along with the gender-specific exposure to traumatic experiences (Olf et al., 2007). It is also known that culture, and the ways in which it shapes women's and men's lives, play a role in explaining these variations (Norris et al., 2001). The social and cultural factors have varying influences on men and women which in turn shapes the diverse coping strategies during disasters. (McLean and Anderson, 2009). Furthermore, the capacity to cope with disasters also depends on the extent of exposure and the socioeconomic status of the community (Paul and Routray, 2010). The problem is that a majority of disasters occur in

developing countries where the resources are limited. In addition, the strategies employed in combating disasters are often gender neutral and this, in turn, makes the situation worse. In this context, it is imperative to understand the variations in risk factors and coping mechanisms in relation to sex. It is also essential to recognize the sex differentials and gender<sup>1</sup> based factors affecting mental health while establishing emergency relief services and devising strategies to cope with disasters.

The tsunami in December 2004 caused major loss of human lives, destruction of economic and social infrastructure and psychological distress among the survivors. There are only a few studies which have explored the sex-specific variations in the risk factors for posttraumatic stress disorder in tsunami survivors. In addition, such studies are rarely done in developing countries. We hypothesized that there are sex-specific variations in pre disaster, within disaster and post disaster factors that affect PTSD. We conducted a study among the tsunami survivors in Kanyakumari district of Tamil Nadu, India to examine the influence of sex and

Abbreviations: PTSD, post-traumatic stress disorder; IES-R, impact of events scale-revised.

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<sup>1</sup> "Gender" refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women. It is different from "sex" which refers to the biological and physiological characteristics that define men and women (World Health Organization's website <http://www.who.int/gender/whatisgender/en/>).

gender on the risk factors that affect PTSD.

## 2. Methods

### 2.1. Study setting

The study was conducted in two urban and two rural villages of Kanyakumari district, one of the worst affected districts in Tamil Nadu in terms of population affected and lives lost. When the deadly tsunami waves struck, the inhabitants of the urban area suffered extensive damages and loss due to their proximity to the sea, whereas the residents of the rural area experienced less damage and death toll.

### 2.2. Study design and sampling

A cross-sectional community-based survey was carried out from June 2005 to October 2005, six months following the tsunami. The number of PTSD cases required for this study was calculated as 153, after assuming alpha error at 0.05, power at 80% and odds ratio (OR) at 2. Based on the prevalence estimates of PTSD (35%) from other studies, the number of subjects to be screened was estimated to be 437, for identifying 153 cases in this population. Information was collected from 485 subjects; 158 cases and 141 controls were included in case control analysis.

### 2.3. Data collection and analysis

PTSD was identified using algorithms based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 2000). The cases in the study population were defined as the survivors of the tsunami who had PTSD as evidenced by a total score of 48 or more on the administration of a validated instrument, Impact of Events scale-Revised (IES-R) (Weiss and Marmar, 1997). A cutoff score of 33 can be taken to identify persons with high levels of posttraumatic stress (Creamer et al., 2003). In this study, subjects with a score equal to or above to 48 (70th percentile) were included as cases. All those with a total score equal to or below 33 (30th percentile) were taken as the controls. However, the IES-R does not render a clinical diagnosis of PTSD, but only indicates probable PTSD. The validated

tool was administered to a random sample of 485 subjects above the age of 18, living along the seashore of the urban and rural villages in Kanyakumari. Information was also collected on the sociodemographic variables and the pre disaster, within disaster and post-disaster factors. Further details have been already published elsewhere (Pyari et al., 2012).

Case-control analysis of data among 158 cases and 141 controls within this sample was done to identify the association between the risk factors and PTSD. Further analysis of data was done separately among men and women within the cases and controls. Qualitative in-depth interviews using a semi structured interview schedule were also conducted among a sub sample of the PTSD cases chosen by purposive sampling. This information was collected in order to get a better understanding of the gender specific issues which contributed to the risk factors for PTSD. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) Windows version 16 whereas the themes observed from the in-depth interviews were analyzed manually.

### 2.4. Ethical considerations

Informed written consent was obtained from the participants prior to the interviews and administration of the questionnaires. Counseling was given to the participants during the interview, whenever it was required. The data was coded and the personal identifiers of the participants were kept confidential. Ethical clearance for this study was obtained from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala, India.

## 3. Results

Out of the 299 respondents included in the case control analysis, 40.5% were men and 59.5% were women. There were more women (78.5%) among the cases, whereas men (61.7%) were more in number among controls. Women had 6.35 times higher risk of PTSD as compared to men, when adjusted for other variables. Table 1 shows the distribution of risk factors among men and women in the study population. The association of risk factors and PTSD among men and women is depicted in Tables 2 and 3.

**Table 1**  
Distribution of risk factors among men and women.

Risk Factors	Men			Women		
	Cases (N = 34)	Controls (N = 87)	Total (N = 121)	Cases (N = 124)	Controls (N = 54)	Total (N = 178)
Pre disaster factors						
Married	31(31.6)	67(68.4)	98(37.9)	116(72.5)	44(27.5)	160(62.1)*
Age ≥ 40yrs	19(32.2)	40(67.8)	59(47.2)	53(80.3)	13(19.7)	66(52.8)*
Low SLI	12(38.7)	19(61.3)	31(42.5)	38(90.5)	4(9.5)	42(57.5)*
Urban	32(34.8)	60(65.2)	92(37.6)*	113(73.9)	40(26.1)	153(62.4)*
Factors within the disaster						
Injury to family members	30(40)	45 (60)	75(35.9)*	101(75.4)	33(24.6)	134(64.1)*
Escape with assistance <sup>†</sup>	8(42.1)	11(57.9)	19(19.8)	55(71.4)	22(28.6)	77(80.2)
Death of relatives	20(54.1)	17(45.9)	37(31.6)*	66(82.5)	14(17.5)	80(68.4)*
Fully damaged house	21(31.8)	45(68.2)	66(35.3)	89(73.6)	32(26.4)	121(64.7)
Post disaster factors						
Satisfaction of services received	8(17)	39(83)	47(40.9)*	43(63.2)	25(36.8)	68(59.1)
Counseling more than three times	24(26.4)	67(73.6)	91(43.5)	74(62.7)	44(37.3)	118(56.5)*
Absence of fear of recurrence of tsunamis	8(13.1)	53(86.9)	61(46.6)*	39(55.7)	31(44.3)	70(53.4)*

Figures in parentheses are percentages.

\* p < 0.05.

<sup>†</sup> 13 subjects did not experience the trauma, only witnessed the event.

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