

Post-traumatic stress disorder in the aftermath of wars, conflicts and terrorism: co-relation between countries gdp and prevalence of PTSD

Abstract

Background: An estimated 1.6trillion dollars per year is spent on defence, and as much as three times more people are killed by human made disasters, the reported prevalence of post-traumatic stress disorder among population exposed to human-made disasters varied across different countries. The global cost of mental illness is 2.5trillion dollars, accounting for 37% of health loss years.

Aim: Our aim was to investigate the prevalence of post-traumatic stress disorder across different region in population exposed to human-made disasters including war, conflicts and terrorist attacks. Another aim of our study was to investigate the correlation between prevalence of post-traumatic stress disorder and economic performance indicators of individual countries, and percentage of GDP spend on health care.

Method: The study was conducted in two stages. In stage 1 we conducted systematic literature search to establish prevalence of PTSD reported in context of human-made disasters from different countries. In stage we gathered economic performance reports and health care expenditure of respective countries. SPSS was used to identify any correlation between prevalence of PTSD, countries GDP, and percentage of GDP spend on health care expenditure.

Results: The review identifies large variation in the prevalence of post-traumatic disorder in population exposed to human-made disasters, with prevalence estimates from 0.6 to 73%. It has been found that countries with poor socioeconomic structure and lower spending on health care expenditures were seen with high prevalence of post-traumatic stress disorder.

Conclusion: Difference in prevalence of PTSD can be explained by gender, marital status, and educational background of the participants and time of the study after exposure to traumatic event. But countries socioeconomic status and per capita GPD health care expenditure were found to be significantly correlated with the difference in prevalence of PTSD in population exposed to human-made disasters.

Keywords: human-made disasters, conflicts, wars, mental illness, ptsd, cost of mental illness

Volume 5 Issue 2 - 2016

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Received: July 02, 2015 | **Published:** January 28, 2016

Introduction

CS: Cross Sectional Survey; LS: Longitudinal Survey; CC: Case Control; T: Time of Assessment; TA: Terrorists Attack; QPTS: Questionnaire for Post-Traumatic Stress; HADS: Hospital Anxiety & Depression Scale; HRQL-P: Health Quality of Life –Persian; SF-36: Short Form Health Survey; PTSD Scale: Post-Traumatic Stress Disorder Scale; RW-Rate: Return to Work Rate; THQ: Trauma History Questionnaire; DSM-IV ASD: DSM-IV Acute Stress Disorder; SF-8HS: Short Form Health Survey; PDEQ: Peritraumatic Dissociative Experience Questionnaire; ZSDS: Zung Self Rating Depression Scale; PCL-S 20: Post Traumatic Stress Disorder Check List, Stressor Specific Version; PSS-SR: Post-Traumatic Self Report Scale; PTSS: PTSD Total Severity Scale; HTQ: Harvard Trauma Questionnaire; GHQ-28: General Health Questionnaire -28; SCL-90-R: Symptom Check List -90 Revised; TE-CL: Traumatic Event Symptom Check List; MINI-INPI: MINI International Neuropsychiatric Review; PHQ: Patient Health Questionnaire; IES: Impact of Event Scale; EQLS: Eurohis Quality of Life Scale; CAPS: Clinician Administered PTSD Scale; PCL: PTSD Check list; GECL: Gaza Traumatic Event Check List; CRIES: Children Revised Impact of Event Scale; RCMAS-36: Revised Children Manifest

Anxiety Scale; SDQ: Strength & Difficulty Questionnaire; TMAS: Taylor Manifest Anxiety Scale; MOS-20: Medical Outcomes Study Short Form; COR-E: Conservation of Resources Evaluation; PSQI: Pittsburgh Sleep Quality Index; D-HSCL-25: Depression Sub-scale Hopkins Symptoms Check List 25; BDI: Brief Depression Inventory; BSI: Brief Symptoms Inventory; PWBS: Psychological Well Being Scale; MSAQL: Manchester Short Assessment of Quality of Life; PTSD-CL-Civ: PTSD Check list Civilian Version; LSC: Life Stressor Check List –Revised; AAQ: Acceptance and Action Questionnaire; MOSS-S: Medical Outcome Study –Social Support Scale; MCRI: Mood Coping Responses Inventory; MSC-PTSD: Mississippi Scale for Combat Related PTSD; PPS: Police Perception Survey; PSI: Post Traumatic Inventory; DES-11: Dissociative Experience Scale

Background

It has been estimated that human made disaster kills as much as three time more people, than those killed by natural disaster [IFRC World Disaster Report]. There are more than 61 countries in the world that are at war, either with other countries or with separatist, militia, guerrilla and anarchic groups. In Africa there are 24 countries and 83 separatist groups fighting, mainly in Algeria,

Libya, Nigeria, Somalia and Sudan. In Asia, there are more than 16 countries involved in fighting, which involve more than 79 militia and anarchic group, mainly in Afghanistan, Pakistan and Burma. In Middle East more than 8 countries and 78 separatist and other groups are involved in conflict, mainly in Iraq, Israel, Syria, Turkey and Yemen. According to one estimates, in the Eastern Mediterranean region of World Health Organization, more than 80% of the population is either in conflict situation or has had experienced one or more such situation in the last quarter of the 20th century.¹ Since 1980 there have been more than 39 major wars and since 1970 there have been more than 98,000 Terrorist Attacks in the World National Consortium for Study and Response to Terrorism. In the last 100 years we have lost more than 187million people due to war, conflicts and terrorism, which would have been equivalent to more than 10 % of World Population in 1913.²

An estimated 1.6trillion dollars per year is spent on defence, which is equivalent to 2.6 % of World GDP, an amount of 236\$ per person in the world. These conflicts, wars and act of terrorism cause significant damage to both physical and social environment of a community, are resulting in human losses, damage to properties, and disintegration of any society, with massive displacement of native population. The mental health consequences of these disasters are enormous requiring careful evaluation of community needs, identification of vulnerable groups, implementation of service provision programmes and work on prevention of secondary handicap and further morbidity. Currently the global cost of mental illness is 2.5trillion dollars, with a predicting increase to 6trillion dollars by 2030³. Mental Illness is the leading cause of disability adjusted life year DALY, accounting for 37% of healthy loss years.⁴

Massive collective distress distinguishes the victims of disaster from those suffering as a result of individual trauma, which may replicate some of the same stresses carried by disaster traumas.⁵ Mass traumatic events, particularly terrorist attacks are associated with greater mental health effects in the population.⁶

Globally an estimated 10% of population exposed to traumatic events in a conflict situation develop serious mental health problems notably depression, anxiety and PTSD, with another 10 % developing behavioural difficulties leaving them with reduced level of function (WHO 2002).

Prevalence of mental health problems among population exposed to human-made disaster is reported to be varied in different studies ranging from 5% to more than 50% in some epidemiological studies. An accurate estimate of true prevalence is important in planning, assessment, and intervention stages of a community's health response to such situations.

Aims and objectives

We conducted a mixed methods study including a systematic review of medical literature to investigate the prevalence of posttraumatic stress disorder attributed to human made disaster. We also reviewed economic performance indicator of countries reporting prevalence data in order to understand association between adverse economic performance and reported prevalence of mental health difficulties. We hypothesized that countries with higher prevalence of posttraumatic stress disorder were performing poorly in economic performance and that higher prevalence of illness was associated with additional economic adversity suffered by the population at large, possibly through an association with poor provision of appropriate healthcare input and intervention to deal with mental health consequences of human made disaster.

Methods

We conducted this study in two stages. In first stage we conducted systematic literature search to establish a clear picture of PTSD prevalence reported in the context of human made disasters from different countries. The second stage of the study gathered economic performance reports and health expenditure data from these countries. Statistical Package for Social Sciences (SPSS) was used to calculate correlations between prevalence of PTSD, Gross Domestic Product (GDP-per capita), and Health Expenditure figures calculated as proportion of GDP of each country.

Literature search

Four data bases, PubMed, MEDLINE, and EMBASE & Psych INFO were systematically searched for psychiatric morbidity, man-made disaster, terrorism, conflicts and Wars. In addition, references of available studies were examined to identify further studies.

PubMed [Medline] [Searched 19th January 2012] Years 1960-2012 ((“psychiatry”[MeSH Terms] OR “psychiatry”[All Fields] OR “psychiatric”[All Fields]) AND (“epidemiology”[Subheading] OR “epidemiology”[All Fields] OR “morbidity”[All Fields] OR “morbidity”[MeSH Terms])) AND (((“men”[MeSH Terms] OR “men”[All Fields] OR “male”[MeSH Terms] OR “male”[All Fields]) AND (“disasters”[MeSH Terms] OR “disasters”[All Fields] OR “disaster”[All Fields])) OR (“conflict (psychology)”[MeSH Terms] OR (“conflict”[All Fields] AND (“psychology”[All Fields] OR “conflict (psychology)”[All Fields] OR “conflicts”[All Fields]) OR (“war”[MeSH Terms] OR “war”[All Fields]) OR (“terrorism”[MeSH Terms] OR “terrorism”[All Fields]) EMBASE, Psych Info [Searched 14th January 2012] Years 1960 – 2012 Psychiatric morbidity AND man-made disaster OR Terrorism OR War OR Conflict

Box 1: Search Strategy for Identifying PTSD Prevalence Studies

(a) Study Selection

Identified papers were examined against the inclusion criteria for the studies. Selected papers were then examined in detail.

- Primary Research
- In a geographically defined population exposed to war, conflicts and terrorism.
- Case Control, Cross Sectional and longitudinal studies.
- Use validated instruments or DSM-IV or ICD-10 based criteria for diagnoses of psychiatric morbidity, mainly Post- traumatic Stress Disorder.
- Includes individual above 18 years.
- Paper published in Peer reviewed English Journals or Conference Presentation.
- Studies that includes prevalence data.

Box 2: Inclusion Criteria

- General Population or Population not exposed to conflicts, wars or terrorism.
- Studies of population exposed to natural disaster.
- Studies that only includes children and adolescent.

- d. Studies among the military personal, military veteran.
- e. Studies published in other languages

Box 3: Exclusion Criteria

(b) Data Extraction

Method, design of study, sample size, time of assessment since exposure to traumatic events, population characteristics mainly gender distribution; marital status and education were selected using the carefully designed data extraction sheet (Figure 1).

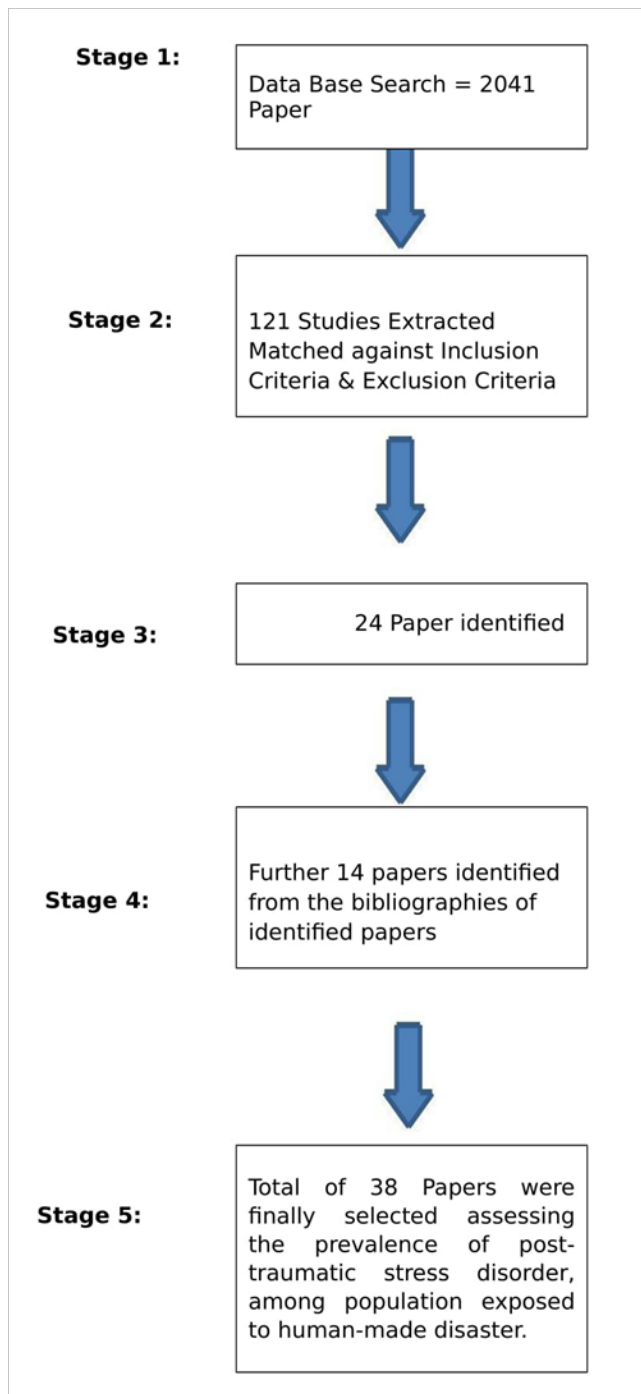


Figure 1 Search Flow Diagram.

Results

Literature search identified 2041 papers inclusive of duplicates. After exclusion through comparison of titles and abstracts against the inclusion criteria, 121 papers were selected for detailed examination. 24 papers were identified, and further 14 papers were identified from the bibliography of these studies, thus 38 papers were finally selected, which gave prevalence estimates for post-traumatic stress disorder amongst the populations exposed to wars, conflicts, or terrorism.

Studies included participants from more than 20 countries across Asia, Africa, Europe and America. The study sample sizes ranged from 32 to 28,962. Only 15 studies [38%] reported the prevalence rate by gender distribution. And only 5 studies (13%) reported the prevalence data by marital status and participant's educational background. Many studies didn't comment on selection criteria, refusal rate, interviewers background, number of traumas, previous psychiatric history or any other physical or mental health problem, socioeconomic status and family or close friends loses to these traumatic events.

- i. Table 1: Summary of Studies Assessing PTSD in population exposed to war, conflicts & terrorism.
- ii. Table 1: summarizes PTSD prevalence data from different countries. The table provides prevalence range where multiple studies are reported from individual countries.
- iii. Table 2 breaks down prevalence data on the basis of gender and Table 3 provides further overview of prevalence of PTSD subdividing study populations on the basis of marital status, and educational background.
- iv. Table 2: Studies explaining the variation in prevalence of PTSD by gender.
- v. Table 3: Prevalence of PTSD & participants' marital status and education background.
- vi. Table 4: Prevalence of PTSD and Countries GDP.

We collected countries' GDP data and health expenditure data as a proportion of GDP from United States of America Government website that was freely accessible as a useful source of information.

We calculated Correlations between prevalence of PTSD, GDP (per capita income) and countries health expenditure (as % of GDP). We used Pearson Correlations Test using SPSS in order to test the study hypothesis.

The test provided confirmation of study hypothesis. GDP (per capita income) and Healthcare Expenditure (as % of GDP) were negatively correlated with prevalence of PTSD. We used statistical analysis conducting statistical testing using prevalence figures reported from different countries. Where more than one study reported prevalence figures from a country we used the lower figure for our hypothesis testing. Pearson correlation coefficient was $-.569$ ($P < 0.01$) for GDP-per capita income and PTSD prevalence. Pearson correlation coefficient was $-.496$ ($P < 0.05$) for Healthcare Expenditure and PTSD prevalence.

Results

The review found a large amount of variation in the prevalence of post-traumatic disorder in population exposed to human made disasters that includes wars, conflicts and terrorism (Table 1). The prevalence estimates have been from 0.6 to 73 %. Although no statistical analysis was done, it was noted that most of the studies with smaller sample

size yields high prevalence rate.⁷⁻¹⁰ The research period to estimate the prevalence is again debatable in these studies, as some of the studies¹¹⁻¹³ reported their initial time of assessment from as early as few days to few weeks for probably diagnoses of post-traumatic stress disorder. On the other hand, some of the studies carried their initial assessment almost a decade after the population exposure to massive and collective traumatic events.¹⁴⁻¹⁷ Some variation in the prevalence

rate can be explained as studies were carried out in areas where the population remain exposed to these traumatic events and continue to live in these areas of conflict.¹⁸⁻²³ Having experienced a single traumatic event and remain living in conflict zone with continuous exposure to multiple traumatic events, fear of life with minimal social support may be seen as another factor for some of the variation in the prevalence.

Table 1 Summary of Studies Assessing PTSD in population exposed to war, conflicts & terrorism

S. No	Study Author & Location	Study Design & Time of Assessment	Sample Size/ Trauma Group	Outcome Measures	Prevalence of PTSD
1	Maya Tuchner et al. Israel	C.S 2 years after the T.A	35 T.A	PTSD scale SF-36 R-W Rate	39%
2	Louise Jehel et al. France	L.S T1= 6 Months T2= 32 Months	32 T.A	QPTSIES	T1=38.5% T2=25%
3	Goran Arbanas et al. Croatia	L.S T1= after the war T2= after 10 years	T1= 272 T2= 85 War	Clinical Diagnostic Criteria	T2= 73%
4	Laura DiGrande et al. USA	C.S 2-3 years after the T.A	3271 T.A	PCL-S 20	15%
5	Noam Shussman et al. Israel	C.C 2001-2004 (On going conflict)	46 T.As	PTSD Scale PSS-SR PTSS	52.20%
5	Laila Farhood et al. Lebanon	C.S Lived in area of conflict for 2 years	257 War	HTQ GHQ-28	29.30%
6	Miro Klaric et al. Bosnia & HZ	C.C After the end of war in 2000	367 War	HTQ SCD-90-R	28.30%
7	Nexhmedine Morina et al. Kosovo	C.S 8 years after the war	163 War	TE-CL, PHQ MINI-INPI, IES GHQ-28, EQLS	29.40%
8	Judith Cukor et al. USA	C.S 10-34 months after the T.A	2960 T.A	CAPS PCL	8%
9	Jenanne Mager Stellman et al. USA	C.S 10-61 months after the T.A	10.132 T.A	PCL PHQ CAGE	11.90%
10	A.A Thabet et al. Gaza	C.S On-going Conflict	200 War	GECL, CRIES-13 RCMAS-36 ,SDQ GTC, PCL .T.MAS	60%
11	Carol S North et al. USA	L.S T1= 6 months post disaster. T2= after 7 years	113 T.A	DIS-DS DSM-IV	T1=41% T2=26%
12	Katie J Campion et al. Israel	C.S On-going Conflict	1001 War	CORE-E PSQI PTSD-SC	5.50%
13	Khalid A Mufti et al. Afghanistan	C.S On-going Conflict	1301 War	SS-I MINI-INPI	53%
14	Nexhmedine Morina et al. Kosovo	C.S T1 = 8-9 years after war	81 War	MINI-INPI,BDI , PTSD-S, BSI , PWBS, MSAQL	69.10%

Table Continued...

S. No	Study Author & Location	Study Design & Time of Assessment	Sample Size/ Trauma Group	Outcome Measures	Prevalence of PTSD
15	Ann-Charlotte Hermansson et al. Iran, Iraq, Lebanon, Somalia, Colombia, El Salvador	C.S TI = 8 years after exposure to war	44 War	HSCL-2,PTSD-S WBS ,ADL SCHEME, Bathel Index	50%
16	Carmela Vazquez et al. Spain	C.S TI = 25 says after the T.A	503 T.A	IR-DSM-IV , PTS-DSM-IV PTSD-CL-Civ	13.30%
17	Todd B Kashdan et al. Kosovo	C. S TI = 7 years after the war	174 War	MINI-INPI ,BSI DSM-IV & ICD-A.A.Q	26.40%
18	Bayard Roberts et al. Sudan	C.S On-going Conflict	1242 War	HTQ HSCL-25	36%
19	Phuong N .Pharm et al. Rwanda	C.S TI = 8 year after genocide	2091 War	PCL-C CAPS	24.80%
20	Megan A Perrin et al. USA	C.S TI = 2-3 years after the T.A	28,962 TA	PCL-C	14.40%
21	Pierre Verger et al. France	C.S TI = 2 years after TA	196 TA	Computer Assisted Interview	31.30%
22	Stefan Preibe et al. Balkan Region [BH, Croatia, Kosovo, Macedonia, Serbia]	C. STI = 5-15 years after the war ,& still living in area of conflict	3313 War	Self-Administered Interview	BH: 35.4% Croatia: 18% Kosovo:18.20% Macedonia:10.60% Serbia:18.80%
23	Carol S North et al. USA	C.S TI = 6 months after TA	182 T.A	DI-DS	34.30%
24	Barbara Lopes Cardozo et al. Afghanistan	C.C On-going Conflict	799 War	SF-36 ,HSCL-25 HTQ Open Ended Qs	42.10%
25	Laila F Farhood et al. Lebanon	C.S TI = One year after T.A	33 T.A	CAPS-I BDI	39.40%
26	Vivian Khamis Palestine	C.S On-going Conflict	120 War	DSM-III-R	50%
27	Yori Gidron et al. Israel	C.S TI = Few days after the T.A	149 T.A	PTSD-like Symptoms based Qs.	10.10%
28	Jennifer Ahern et al. Kosovo	C.S TI = 2 years after the war	306 War	MOSS-S HTQ	14.10%
29	Harvey-Lintz et al. USA	C.S After 1997 LA Civil Unrest /Riots	141 Civil Unrest	MCRI MSC-PTSD PPS	17%
30	Lucien Abenheim et al. France	C. S TI = months after 1987 T.A	254 T.A	Self-administered Qs	18.10%
31	Eve Bernstein Carlson et al. Cambodia	C.S TI = Settled Refugees in USA 1983-1985	50 War /Armed Conflict	PSI PTSD-CL DES HSCL-25 SR-PTSD & MDD Qs	40%
32	Jessica Cardenas et al.USA	C.S TI = 1-2 years after TA	305 T.A	Based on DSM-IV Criteria	5.90%

Table Continued...

S. No	Study Author & Location	Study Design & Time of Assessment	Sample Size/ Trauma Group	Outcome Measures	Prevalence of PTSD
33	Patrick A .Palmieri et al. Israel	C.S T1=Soon after escalation of rocket attacks	1200 War	COR-E PTSD-S	7.20%
34	Willem F.Scholte et al. Afghanistan	C.S T1= on going conflict	1011 War /T.A	HTQ HSCL-25	20.40%
35	Joop T.VM de jong et al. Algeria ,Cambodia, Ethiopia, Palestine	C.S.TI= Ongoing Conflict	Algeria :653 Cambodia :610 Ethiopia :1200 Palestine:585 War/ Armed Conflict	Using the Composite International Diagnostic Review [CIDI] Version 2.1	Algeria :37% Cambodia :28.4% Ethiopia :15.8% Palestine:17.8%
36	Galea S et al. USA	L.S T1=1 month T2=4 month T3=6 month	T1=1008 T2= 2001 T3=2752 T.A	SCID-DSM III R	T1= 7.5% T2= 0.6 %
37	Galea S et al. USA	C.S T1= 5- 8 weeks after TA	988 TA	DSM-IV based PTSD SCALE	8.80%
38	Barbara Lopes Cardozo et al. Kosovo	C.S T1= 12 months After War	1358 War	GHQ-28 HTQ MOS-20	17%

Table 2 Studies explaining the variation in prevalence of PTSD by gender

Study Author / Location	Male[%]: Female[%]	Male	Female	Total Prevalence & Statistical Analysis
Louise Jehel et al. France	47 % : 53 %	25%	75%	38% (df [1]P value 0.003)
Goran Arbanas Croatia	12% : 88%	36%	20%	73% (NA)
Laura Di Grande et al. USA	58.8% : 41.2%	9.90%	22.40%	15% (OR [2.63])
Laila Farhood et al. Lebanon	46% : 54%	20.95%	36.60%	29.30% (PValue < 0.0067)
Nexhmedine Morina et al. Kosovo	39.3% : 607%	28.10%	30.30%	29.40% (X2 090 , df =1)
Jenanne Mager Stellman et al. USA	87% : 13%	10.90%	12.10%	11.90% (N.S)
Carmela Vazquez et al. Spain	33% : 67%	11.30%	14.40%	13.30% (N.S) 24.85
Phuong N .Pharm et al. Rwanda	48.5%: 51.5%	19.60%	29.70%	(OR F:M ; 1.73[95% CI ;1.41-2.12]) 31.30%
Pierre Verger et al. France	46.4% : 54%	23.10%	38.10%	(OR M:F :2.54 [95% CI; 1.22-5.57]) 34%
Carol S North et al. USA	51.6% : 48.4%	23%	45%	(X2=9.44; PValue; 0.002)
Barbara Lopes Cardozo et al. Kosovo	37.7% : 62.3%	12%	19.67%	17% (PValue < 0.01)

Table Continued...

Study Author / Location	Male[%]: Female[%]	Male	Female	Total Prevalence & Statistical Analysis
Barbara Lopes Cardozo et al. Afghanistan	37% : 63%	32.14%	48.30%	42.10% (PValue < 0.001)
Lucien Abenheim et al. France	51% : 49 %	16.90%	19.3%	18.10% (N.S)
Jessica Cardenas et al.USA	25% : 74%	1.30%	4.60%	5.90% (PValue < 0.01)
Patrick A. Palmieri et al. Isarael	48.3% : 51.8%	4.30%	9.90%	7.20% (Fisher exact test P Value < 0.001).

Table 3 Prevalence of PTSD & participants' marital status and education background

Study Author & Location	Marital Status (PTSD %)	Education (PTSD %)
Laura DiGrande et al. USA	Married= 11.8% Divorced =25.4% Widow= 21.4%	H.S= 60% College =11.5% Postgraduate=8%
Jenanne Mager Stelman et al. USA	Single=11.6% Married =10.2% Separated=14.6% Widow=13% P Value < 0.001	H.S= 17.2% > H.S =12.2% College=9.6% Graduate College=8.8% >G. College =10.7% P Value < 0.001
Barbara Lopes Cardozo et al. Kosovo	Married =16.49% Single=15.14% Divorced=10.48% Widow=30.96%	< Pr.Education= 21.29% Pr.Education=15.99% Secondary School =15.8% University = 11.01%
Barbara Lopes Cardozo et al. Afghanistan	Married =42.43% Widow =41.47% Single=43.19%	No Education= 75.6% Pr.Education=18% H.S=6.5%
Pierre Verger et al. France	Married or in relationship=25.4% Living Alone =44.8% OR :2.29 [95% CI 1.09-4.72]	Low Education : 30.8% High Education : 31.8%

Table 4 Prevalence o PTSD and Countries GDP

Countries	Prevalence Range (%)	GDP (per capita Income)**	Heath Care Expenditure (% of GDP)***
Afghanistan	20% to 53%	1000\$	7.4
Algeria	37%	7200\$	5.8
Bosnia	28% to 35%	8200\$	10.8
Herzegovina Cambodia	40%	2300\$	5.9
Croatia	18.2%-73 %	18,300\$	7.8
E Salvador	50%	7600\$	6.4
Ethiopia	11.50%	1100\$	4.3
France	18% to 25%	35000\$	11.7
Gaza	185 to 50 %	2900\$	NA
Israel	5.5 % to 52 %	31,000	7.6
Kosovo	14% to 69%	6400\$	NA
Lebanon	29% to 39 %	15,600\$	8.1
Macedonia	10.60%	10,400\$	6.9
Rwanda	25%	1300\$	9
Spain	13.30%	30,600\$	9.7
Serbia	18.80%	10,700\$	9.9
Somalia	50%	600\$	5.9
Sudan	36%	3000\$	7.3
United States of America	0.6 % to 34 %	48,000\$	16.2

Source: CIA World Fact-book. * World Bank Data

Some studies^{2,3,5,8,10,12,14,21,24-28} commented on prevalence of PTSD in population exposed to human-made disasters into male and female groups (Table 2). Some of the studies found significant statistical variation in prevalence of PTSD in male and female, with female more likely to suffer from PTSD after exposure to traumatic events.

Few studies^{2,6,21,24,27} reported the prevalence of PTSD according to participant's marital status and education background (Table 3). It has been noted that being married or in relationship and have a higher education were protective factors against PTSD.

We also try to understand the variation in prevalence of PTSD in different regions and countries by their socioeconomic structure and health care expenditure (Table 4). Countries with poor socioeconomic structure lower GDP and lower spending on health care expenditure was seen with high prevalence of post-traumatic stress disorder.²⁹⁻³²

Large degree of variation in prevalence of post-traumatic stress disorder was found, so funnel plot to exclude publication bias was not considered. In some of the studies, time since the traumatic event was not documented.³³⁻³⁶ There may be some selection bias because papers not likely to generate significant clinical interest, paper with smaller studies, with un-remarkable results or published in languages other than English, may not have been identified in the searches or published. There were few studies from Afghanistan, none from Iraq & Pakistan, Yemen, some parts of Russia, countries going through significant civil unrest, and have been victim of significant numbers of terrorist attacks on general population.³⁷⁻³⁹ Another limitation of the review would be that most of the studies didn't comment on participants' previous history of mental health illness or whether any efforts were made to ensure that assessment of incidence were carried out among population group with no previous exposure to traumatic events.^{40,41}

Discussion

This review will contribute in explaining some of the variation in prevalence data of serious mental health problem among population exposed to human-made disasters. Some of the variation can be explained by difference in prevalence by gender, marital status and education of the participants, socio-economic status which was noted to have large regional variation. Other explanation could be access to better therapeutic services and early intervention in some part of the world and less awareness of mental health illness in other parts of the World. Another important factor would be exposure to multiple traumatic events both at individual and community level. One substantial factor would be population migration due to conflicts, wars and terrorist attacks, which also cause significant socio-economic disruption to the society. It is also likely that population with better coping strategies to collective traumas may remain in the area of conflict or on the other hand those with significantly reduced level of functioning, or poor economic status never able to move out of the conflict zone, which may skewed the prevalence data in either direction.

Acknowledgements

None.

Conflicts of interest

Author declares there are no conflicts of interest.

Funding

None.

References

1. World Health Organization. Resolution on health action in crises and disaster. Geneva. 2005.
2. Eric Hoobsbwn. The Guardian News Paper. 2002.
3. Bloom DE, Cafiero ET, Jané-Llopis E, et al. The Global Economic Burden of Non-communicable Diseases. *World Economic Forum*, Geneva. 2011.
4. World Health Organization. Global status report on non-communicable diseases 2010. Geneva. 2011.
5. Kinston W, Rosser R. Disaster Effects on Mental and Physical State. *J Psychosom Res*. 1974;18(6):437-456.
6. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak, part II Summary and implication of the disaster mental health research. *Psychiatry*. 2002;65(3):240-60.
7. Thabet AA, Abu Tawahina A, El Sarraj E, et al. Exposure to War Trauma and PTSD among Parents and Children in the Gaza Strip. *Eur Child Adolesc Psychiatry*. 2008;17(4):191-199.
8. Hermansson AC, Timpka T, Thyberg M. The Mental Health of War Wounded Refugees; An 8 Year Follow-up. *J Nerv Ment Dis*. 2002;190(6):374-380.
9. Harvey-Lintz, Terri, Tidwell, et al. Effects of the 1992 Los Angeles Civil Unrest; Post Traumatic Stress Disorder Symptomology Among Law Enforcement Officers; *Social Science Journal*. 1997;34(2).
10. Klaric M, Klarić B, Stevanović A, et al. Psychological Consequences of War Trauma and Post-war Social Stressors in Women in Bosnia and Herzegovina. *Croat Med J*. 2007;48(2):167-176.
11. Perrin MA, DiGrande L, Wheeler K, et al. Differences in PTSD prevalence and associated risk factors among World Trade Center disaster rescue and recovery workers. *Am J Psychiatry*. 2007;164(9):1385-1394.
12. Laure DiGrande, Yuval Neria, Robert Brackbill M, et al. Long Term Posttraumatic Stress Symptoms Among 3271 Civilian Survivors of the September 11, 2001, Terrorist Attacks on the World Trade Center. *American Journal of Epidemiology*. 2010.
13. National Consortium for Study of Terrorism and Response to Terrorism.
14. Lopes Cardozo B, Vergara A, Agani F, et al. Mental Health, Social Functioning, and Attitudes of Kosovar Albanians Following the War in Kosovo. *JAMA*. 2000;284(5): 569-577.
15. Arbanas G. Patient with Combat-related And War related Posttraumatic Stress Disorder 10 years after Diagnosis. *Croat Med J*. 2010;51(3):209-214.
16. Ahern J, Galea S, Fernandez WG, et al. Gender, Social Support, Posttraumatic Stress in Postwar Kosovo. *J Nerv Ment Dis*. 2004;192(11):762-770.
17. Mufti KA, Naeem F, Ayub M, et al. Psychiatric Problems in an Afghan Village. *J Ayub Med Coll Abbottabad*. 2005;17(3):19-20.
18. Roberts B, Damundu EY, Lomoro O, et al. Post-Conflict Mental Health Needs; A cross Sectional survey of Trauma, depression, and associated factors in Juba, Southern Sudan. *BMC Psychiatry*. 2009; 9: 7.
19. Carlson EB, Rosser-Hogan R. Trauma Experiences, Post-Traumatic stress, Dissociation, and Depression in Cambodian Refugees. *Am J Psychiatry*. 1991;148(11):1548-1551.
20. Galea S, Resnick H, Ahern J, et al. Posttraumatic stress disorder in Manhattan, New York City, after the September 11th terrorist attacks. *J Urban Health*. 2002;79(3):340-353.
21. DiGrande L, Neria Y, Brackbill RM, et al. Long Term Posttraumatic Stress Symptoms Among 3271 Civilian Survivors of the September 11, 2001, Terrorist Attacks on the World Trade Center. *Am J Epidemiol*. 2010;173(3):271-281.

22. Farhood LF, Noureddine SN. PTSD, Depression and Health Status in Lebanese Civilian Exposed to a Church Explosion. *Int J Psychiatry Med.* 2003;33(1):39–53.
23. Morina N, Ford JD, Risch AK, et al. Somatic Distress among Kosovar Civilian War Survivors: Relationship to Trauma Exposure and the Mediating Role of Experiential Avoidance. *Soc Psychiatry Epidemiol.* 2010; 45(12):1167–1177.
24. Cardozo BL, Bilukha OO, Crawford CA, et al. Mental Health & Social Functioning and Disability in Post War Afghanistan. *JAMA.* 2004;292(5):57–84.
25. Jenanne Mager Stellman, Rebecca P Smith, Craig L Katz, , et al. Enduring Mental Health Morbidity and Social Function Impairment in World Trade Center Rescue, Recovery, And Clean-up Workers. *The Psychological Dimension of and Environmental Health Disaster; Environmental Health Perspectives, Environmental Medicine.* 2008;116(9).
26. de Jong JT, Komproe IH, Van Ommeren M. Common Mental Disorders in post conflict settings. *Lancet.* 2003;361(9375):2128–2130.
27. Chipman KJ, Palmieri PA, Canetti D, et al. Predictors of Posttraumatic Stress related impairment in victims of terrorism and on-going conflict in Israel. *Anxiety Stress Coping.* 2011;24(3): 255–271.
28. Tuchner M, Meiner Z, Parush S, et al. Health Related Quality of Life Two Years After Injury Due to Terrorism. *Isr J Psychiatry Relat Sci.* 2010;47(4):269–275.
29. Shussman N, Mintz A, Zamir G, et al. Posttraumatic Stress Disorder in Hospitalized Terrorist Bombing Attack Victims. *J Trauma.* 2011; 70(6):1546–1550.
30. Farhood L, Dimassi H, Lehtinen T. Exposure to War-Related Traumatic Events, Prevalence of PTSD and General Psychiatric Morbidity in a Civilian Population From Southern Lebanon. *J Transcult Nurs.* 2006;17(4):333–340.
31. Kashdan TB, Morina N, Priebe S. Post-Traumatic stress Disorder, Social Anxiety Disorder, and Depression in Survivors of Kosovo War: Experiential Avoidance as a contributor to distress and quality of life. *J Anxiety Disord.* 2009;23(2):185–196.
32. Pham PN, Weinstein HM, Longman T. Trauma and PTSD Symptoms in Rwanda Implications for Attitudes Toward Justice and Reconciliation. *JAMA.* 2004;292(5): 602–612.
33. Verger P, Dab W, Lamping DL, et al. The Psychological Impact of Terrorism; An Epidemiologic Study of Posttraumatic Stress Disorder and Associated Factors in Victims of the 1995-1996 Bombings in France. *Am J Psychiatry.* 2004;161(8):1384–1389.
34. North CS, Nixon SJ, Shariat S, et al. Psychiatric Disorders Among Survivors of the Oklahoma City Bombing. *JAMA.* 1999;282(8):755–762.
35. Vivian Khamis. Post-Traumatic Stress Disorder Among the Injured of the Intifada. *Journal of Traumatic Stress Volume.* 1993;6(4).
36. Gidron Y, Kaplan Y, Velt A, et al. Prevalence and Moderators of Terror-Related Post-Traumatic Stress Disorder Symptoms in Israeli Citizens. *Isr Med Assoc J.* 2004;6(7):387–391.
37. Abenheim L, Dab W, Salmi LR. Study of Civilian Victims of Terrorist Attacks [France 1982-1987]. *J Clin Epidemiol.* 1992;45(2):103–109.
38. Cardenas J, Williams K, Wilson JP, et al. PTSD, Major Depressive Symptoms, and Substance Abuse Following September 11, 2001, in a Midwestern University Population. *Int J Emerg Ment Health.* 2003;5(1):15–28.
39. Palmieri PA, Canetti-Nisim D, Galea S, et al. The Psychological Impact of the Israel-Hezbollah War on Jews and Arabs in Israel: The Impact of Risk and Resilience Factors. *Soc Sci Med PMC.* 2009;67(8):1208–1216.
40. Scholte WF, Olf M, Ventevogel P, et al. Mental Health Symptoms Following War and Repression in Eastern Afghanistan. *JAMA.* 2004;292(5):585–593.
41. Galea S, Vlahov D, Resnick H, et al. Trends of probable post-traumatic stress disorder in New York City after the September 11 terrorist attacks. *Am J Epidemiol.* 2003;158(6):514–524.