

The epidemiology of mental disorders in conflict settings: new estimates from the World Health Organization

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Abstract

Background. Existing WHO estimates of the prevalence of mental disorders in emergency settings are more than a decade old and no longer reflect modern methods to gather existing data and derive estimates. We sought to update WHO estimates for the prevalence of mental disorders in conflict-affected low-income and middle-income settings and calculate the burden per 1,000 population.

Method. We applied the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) and used Bayesian meta-regression techniques that adjust for predictors of mental disorder to calculate new prevalence estimates in settings that had experienced conflict less than 10 years previously. We limited our analyses to depression, anxiety disorder (including post-traumatic stress disorder [PTSD]), bipolar disorder, and schizophrenia.

Findings. We estimate that approximately 1 in 5 people (22.1% [95% UI 18.8-25.7]) in post-conflict settings has a mental disorder at any point in time. The mean point prevalence of mild mental disorder (mild forms of depression and anxiety, including mild PTSD) was 13.0% (95% UI 10.3-16.2). Mean prevalence rates for moderate mental disorder (moderate forms of depression and anxiety, including moderate PTSD) was 4.0% (95% UI 2.9-5.5). Mean point prevalence rates for severe disorders (schizophrenia, bipolar disorder, severe depression, or severe anxiety including severe PTSD) was 5.1% (95% UI 4.0-6.5). Age-standardised rates of years lived with disability (YLDs) in conflict-affected populations were 24.8 YLDs per 1,000 population (95% UI 16.4–36.0) for depression and 23.2 YLDs per 1,000 population (95% UI 17.0-29.9) for anxiety, which is more than 5-fold higher than the 2016 global burden of disease estimates for both disorders.

Interpretation. The burden of mental disorders is extremely high in conflict-affected populations. Given the vast numbers of people in need and the humanitarian imperative to reduce suffering, there is an urgent need to implement scalable mental health interventions to address this burden.

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Introduction

At the time of writing there are major co-occurring crises in Bangladesh, Democratic Republic of Congo, Iraq, Myanmar, Somalia, South Sudan, Syria, and Yemen. United Nations estimates suggest that more than 128 million people worldwide are directly affected by conflict, the highest number of people affected since World War Two.¹ This dramatic increase in people affected by conflict coincides with a growing interest in mental health, as exemplified by the adoption of the Mental Health Action Plan 2013-2020 by 194 World Health Organisation (WHO) Member States.² Interest is especially high in the mental health of people affected by humanitarian emergencies.³

In 2005 WHO estimated the rates of mental disorders among people affected by humanitarian emergencies. These estimates⁴ have been repeated in policy documents,^{3,5,6} news media,⁷ and appeals and funding proposals for help for people living through the world's worst crises. WHO emphasised that these estimates represented averages across emergency settings and that observed rates would vary by affected population and assessment method.⁴ However, WHO's 2005 estimates were not based on applicable systematic reviews of evidence.

Epidemiological studies in conflict settings typically present varying results, making their interpretation difficult,⁸ and their statistical heterogeneity is extremely high.^{9,10} We sought to update WHO estimates of rates of mental disorders in conflict-affected populations by updating systematic literature reviews for post-traumatic stress disorder (PTSD) and depression, searching for a wider range of disorders, and applying Bayesian meta-regression techniques while adjusting for predictors of mental health disorders in conflict settings. Furthermore, we estimate disease burden in terms of years lived with disability (YLDs) per 1000 people affected by conflict.

Methods

We followed the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) statement¹¹ and utilised methodologies developed for the Global Burden of Disease (GBD) studies.¹²

Systematic review

We based our dataset on a previous systematic review.¹⁰ We updated this review by searching Medline (PubMed), PsycINFO, and Embase, to identify studies published from January 1, 2000, to August 9, 2017, to identify sources for the prevalence of PTSD, depression and anxiety disorders using the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD) criteria, and variables known to be associated with prevalence (such as exposure to trauma) to guide a predictor analysis. The search string used for PubMed was (((((((("Warfare"[Mesh]) OR "Warfare and Armed Conflicts"[Mesh]) OR "Torture"[Mesh]) OR "Ethnic Violence"[Mesh]) OR "Exposure to Violence"[Mesh]) OR "Mass Casualty Incidents"[Mesh]) OR "Civil Disorders"[Mesh])) AND (((("Anxiety Disorders"[Mesh]) OR "Mood Disorders"[Mesh]) OR "Trauma and Stressor Related Disorders"[Mesh]) OR "Stress, Psychological"[Mesh]) OR "Neurotic Disorders"[Mesh]) AND (((("Epidemiology"[Mesh] OR "epidemiology" [Subheading]) OR "Prevalence"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]))), which we adapted for the other online databases. We also searched the grey literature using Google scholar, datasets from literature reviews of the prevalence of major depression and anxiety,^{13,14} and reference lists from studies identified. We sought data on

the prevalence of schizophrenia and bipolar disorder in conflict-affected populations from existing systematic reviews.^{15,16} The search flow diagram can be found in the appendix.

We included study samples that were representative of the general conflict-affected population, defined as being within a described geographical location and having been in a state of conflict within 10 years preceding data collection, as documented by the Uppsala Conflict Data Program database.¹⁷ We only included studies of participants residing in their country of origin, or displaced or resettled in a neighbouring low-income or middle-income country (ie, not resettled in a high-income country) that reported point or past-year prevalence estimates from either cross-sectional or longitudinal population-based surveys. Survey instruments had to map to DSM or ICD diagnostic criteria. More detailed information on inclusion and exclusion criteria can be found in the appendix.

Statistical methods

We used a Bayesian model and the Adaptive Metropolis Markov-chain Monte Carlo method to draw samples from the posterior distribution of all model parameters simultaneously, with the modelling software package DisMod-MR.^{12,18} To explain between-study variability in prevalence we included covariates that had previously been shown to have significant associations with mental disorder prevalence¹⁰. We reported point estimates based on the means of functions of these parameter draws, and uncertainty intervals (UI) corresponding to the 2.5-th to 97.5-th percentile values. Details on covariate selection can be found in the appendix.

To adjust for comorbidities and severity splits in depression, anxiety, and PTSD, we applied the rate of 41.6% (95% UI 39.8–43.4) of individuals with major depressive disorder (MDD) who also had comorbid anxiety, as previously identified from the literature.¹⁹ Distributions of depression and anxiety severity were taken from GBD 2016,¹² which considers several health states within a particular disease reflective of different levels of functional impairment (ie, asymptomatic, mild, moderate, or severe major depression). Asymptomatic PTSD in GBD does not infer a subthreshold diagnosis, but indicates PTSD with disability weight equal to zero once disability attributable to comorbid disorders is portioned out.²⁰ In the absence of severity splits for PTSD, we relied on severity distributions for anxiety disorders. We excluded asymptomatic cases from our results to reflect only those cases which are likely to require access to treatment. More detail on GBD severity splits and disability weights can be found in the appendix.

Full details of GBD burden estimation methodology have been published elsewhere.²¹ YLDs were derived by multiplying the number of prevalent cases associated with each disorder by their associated GBD disability weight. In place of GBD prevalence estimates, we used prevalence estimates of conflict-affected population mental disorder (derived as described above) as a primary input for YLD estimation. PTSD was not assessed as a separate disorder in GBD2016 so we did not calculate burden of disease estimates for PTSD. We used Monte Carlo simulation–modelling techniques to present uncertainty ranges around estimates reflecting the main sources of sampling uncertainty in the calculations using Ersatz software version 1.2.²² More detailed information on GBD burden of disease estimation can be found elsewhere.¹² In our analyses we considered all prevalent cases of schizophrenia and bipolar disorder as severe.

Role of the funding source

WHO provided funding for this research. Core funding for the Queensland Centre of Mental Health Research is provided by the Queensland Department of Health, Australia. The Institute for Health Metrics and Evaluation receives funding from the Bill and Melinda Gates Foundation.

Results

The updated systematic review identified a total of 128 studies providing 96 prevalence estimates for PTSD, 70 for depression, and 38 for any anxiety disorder (table 1). 40 countries were represented in the dataset in total; 35 with data for depression and PTSD, and 26 countries had data for anxiety (figures 1, 2, and 3).

Age-standardised prevalence rates for depression, PTSD, and anxiety disorders were elevated in conflict-affected populations as compared with global mean prevalence rates (10.8% [95% UI 8.1–14.2] for depression, 15.3% [95% UI 9.9–23.5] for PTSD, and 21.7% [95% UI 16.7–28.3] for anxiety disorders; table 2). The mild forms of all three disorders were the most prevalent. Adjusting for comorbidity between depression and anxiety led to a mean, combined prevalence of mild, moderate, or severe depression, PTSD, and other anxiety disorders of 21.2% [95% UI 17.7–24.7] in conflict-affected populations (table 3). By aggregating the prevalence of mental disorders in conflict-affected populations by severity we estimate that about 9% of the conflict-affected population will have moderate to severe mental disorders (schizophrenia, bipolar disorder, or moderate to severe anxiety [including moderate or severe PTSD] or moderate or severe depression; table 4). We did not detect significant differences in prevalence for PTSD over time during the 10-year period after conflict. Prevalence rates of depression decreased significantly 3–4 years after conflict, but then increased again. Anxiety disorder prevalence was significantly lower in years 1–4 of the post-conflict period compared with the conflict period, but there was no significant difference in prevalence for years 5–10 as compared with the conflict period, which indicates that symptoms persisted long after the conflict had ended.

We only identified two studies that provided epidemiological estimates for psychosis in conflict-affected populations. A cross-sectional study of an internally displaced population in South Darfur reported a prevalence of schizophrenia of 4.1%,²³ and a general population survey in Timor Leste reported a schizophrenia point prevalence of 0.34%.²⁵ We did not identify any studies that reported epidemiological estimates for bipolar disorder in conflict-affected populations. This small number of studies precluded pooling of estimates, so for schizophrenia and bipolar disorder we applied the global mean prevalence estimates from GBD2016 (0.3% [95% UI 0.2–0.3]²⁴ and 0.6% [95% UI 0.5–0.7], respectively).

In conflict settings trends of depression and anxiety prevalence increased with age. Mean prevalence of PTSD declined in the older age groups, although there are large ranges of uncertainty surrounding these estimates (figure 4). Our data suggest prevalence of depression, PTSD, or any anxiety disorder is higher in women, although this finding was only statistically significant for depression (table S6).

Examination of covariate coefficients in our modelling showed that symptom scales significantly overestimate prevalence by about 1.5 to 2-times in conflict-affected populations as compared with diagnostic tools in all three disorder models (table S6).

Heterogeneity in our datasets was large. The median value of the negative binomial model overdispersion parameter calculated by DisMod-MR was 1.2 for anxiety, 0.95 for PTSD, and 0.96 for depression (where zero is completely uninformative, and infinity is a Poisson distribution).

Age-specific YLD rates in conflict-affected populations showed elevated and statistically significant differences across most age groups as compared with estimated global YLD rates in GBD 2016 (figure 5). We estimated age-standardised YLD rates for depression in conflict-affected populations at a rate of 24.8 YLDs per 1,000 population (95% UI 16.4–36.0), by contrast with the GBD 2016 global age-standardised YLD rate of 4.6 per 1,000 population (95% UI 3.2–6.2). Age-standardised estimates of YLD rates for any anxiety disorder in conflict-affected populations were 23.2 YLDs per 1,000 population (95% UI 17.0–29.9), as compared with the GBD 2016 estimates of 3.5 per 1,000 population (95% UI 2.5–4.8).

Discussion

Conflict and displacement now affect more lives than at any time since World War Two. Yet previous estimates of the effect of humanitarian crises on mental health and the burden of mental disorders were inadequate and

long out of date. We sought to update WHO's 2005 estimates focusing on depression, anxiety disorder (including PTSD), bipolar disorder, and schizophrenia in settings that had experienced conflict in the preceding 10 years. For data transparency we followed GATHER, a checklist of 18 best practices that sets the standard for disclosing how health estimates are developed. We used Bayesian meta-regression techniques that adjust for predictors of mental disorder to calculate new point prevalence estimates, updating our previous study¹⁰ to include more recent data and including data on schizophrenia, bipolar, and anxiety disorders from an additional 45 studies. We sought to estimate prevalence rates for a broad range of mental disorders to inform high-level decision makers on the overall burden of disease and the need for population-level planning to address this burden. Our approach is in line with current WHO and Inter-Agency Standing Committee (IASC) policies and tools that take a broad multi-disorder perspective.^{1-3,26-28}

We focused on conflict and thus did not include natural disasters and public health emergencies, such as Ebola. We made this decision to limit heterogeneity, because available conflict studies already cover highly diverse exposures to adversity. It is unclear to what extent natural disasters have similar or different mental health consequences though conflict likely has more severe consequences^{29,30}. A focus on conflict is appropriate as the vast majority of humanitarian aid goes to people affected by conflict (REF UN=1)

We estimated that approximately 1 in 5 people in post-conflict settings has depression, anxiety disorder (including PTSD), bipolar disorder, or schizophrenia. This is in stark contrast to data from GBD2016, which suggest a mean global prevalence of 1 in 14. Our empirically derived estimates show higher prevalence of severe mental disorders compared with the previous WHO estimates (5.1% point prevalence in current estimate compared with 3-4% 12-month prevalence in previous estimates) and higher prevalence rate of mild to moderate mental disorders (approximately 17% point-prevalence in the revised estimates, compared with 15-20% 12-month prevalence in previous estimates). Our estimates of YLD rates per 1,000 people for depression and PTSD were more than 5-fold higher than the existing global mean burden of disease estimates. Charlson et al's previous study reported an age-standardised pooled prevalence of 7.6% for depression and 12.9% for PTSD.¹⁰

Our observation that prevalence of anxiety disorder decreased in the first four years after the conflict period but then increased again for the next five years is consistent with findings from longitudinal research among World War Two survivors in Europe and Japan, showing that anxiety disorder associated with conflict increased over time.^{10,31} One hypothesis to explain the time trend we observed in depression—where prevalence rates are high in the first months after conflict, decrease significantly around 3-4 years post-conflict, but then increase again—is that depression rates fall as people start to rebuild their lives and then rise again when their hopes are thwarted, illusions shattered, and they feel that humanitarian aid is decreasing. Despite these findings, our study was not designed to examine time trends and further research, preferably longitudinal cohort studies, are needed to unpack the natural history of mental disorders in populations affected by conflict.

A useful finding from our study for field researchers who use self-report or symptom-based measures to ascertain mental disorder prevalence estimates is that these instruments were shown to significantly overestimate the prevalence of depression, PTSD, and anxiety by 1.5 to 2 times. Most of these instruments do not assess clinical significance or function, and hence tend to overestimate rates of disorder as compared with diagnostic instruments.

Our study methodology has several strengths. By contrast with previously published reviews we applied more stringent inclusion and exclusion criteria to our literature search, optimised search strategies, and used updated statistical methods^{9,32}. We sought to address heterogeneity in epidemiological studies by use of Bayesian approaches to allow for a more consistent set of estimates. We made separate estimates for mild, moderate and severe mental disorders. While the clinical significance of mild mental disorders in emergencies may be contested (REF RODIN=8), the clinical needs of those with severe mental disorders are too often

neglected³³. The biggest limitation in this study was the raw data. Even with relatively strict inclusion criteria there was considerable heterogeneity in the mental disorder datasets and their reported estimates, which created large uncertainty around the predicted estimates. This heterogeneity stemmed partly from differences across study designs—an issue inherent to psychiatric epidemiology, particularly research following major emergencies⁸— and partly from the myriad of factors that influence the experience and expression of mental distress in these settings. Many studies failed to report a robust process of translation, cultural adaptation or validity testing of their instruments. A strength of the DisMod-MR approach is how it deals with heterogeneity through adjustments to the data, which allowed us to create a robust epidemiological profile of mental disorders in conflict-affected populations. The data sources are from an era when PTSD was considered an anxiety disorder. Accordingly, our estimates of anxiety disorders include PTSD.

We only identified two studies on schizophrenia and found no studies on bipolar disorder in conflict-affected populations: too few to pool estimates using meta-regression methods, especially given that one of the studies estimated a 10-fold prevalence rate of schizophrenia²³. Therefore, we conservatively defaulted to global mean prevalence estimates as derived by GDB 2016. The estimates for psychosis we report here may thus be underestimates, and do not take into account the studies we had to exclude from our systematic search that suggest an increase in psychoses in populations affected by conflict.³⁴ Because of the paucity of data we had to use several assumptions and proxy inputs—such as a comorbidity adjustment informed by a single study from a conflict-affected population and the proxy use of GBD2016 disability weights—which should be considered when interpreting our findings, until more and better-quality epidemiological data become available. Another limitation is the anxiety severity splits we had to apply to PTSD (table 2), and asymptomatic PTSD is unknown in the world of clinical care. Also, the study did not include comorbid disorders, such as alcohol use disorders and epilepsy, which are frequently addressed within mental health programs²⁷.

Nonetheless, our study identified the sustained presence of high rates of mental disorders in conflict-affected countries, making a compelling case for global development, health, and mental health communities to prioritise development of mental health services in post-conflict settings.

Evidence for building systems for mental health-care after conflict shows that emergencies—which can generate political interest and funding for mental health—can be a catalyst for the meaningful development of mental health systems.³ A review of lessons learned from such work in 10 countries showed that focusing on system-wide reform to address both new-onset and pre-existing mental disorders is crucial.³ Guidance for management of disorders that should be scaled up in conflict-affected countries already exists. WHO and UNHCR have designed the *mhGAP Humanitarian Intervention Guide*, which addresses the assessment and management of moderate and severe mental disorders in non-specialised health care settings, such as general hospital and primary health care clinics.²⁷ Moreover, a variety of packages designed to address multiple mental disorders, such as Problem Management Plus, Common Elements Treatment Approach (CETA), and Self-Help Plus (SH+), have been used with promising results among conflict-affected Pakistanis, Burmese refugees, and South Sudanese refugees.³⁵⁻³⁷ It should be noted that there is wide consensus that mental health and psychosocial supports for affected populations should go beyond medical and psychological treatments for mental disorders, and that such supports should include psychosocial intervention that strengthens community self-help and support²⁶ and advocacy for security and for adequate humanitarian aid, including livelihood supports.

Our findings highlight the need to prioritise conflict-affected countries for implementation of the WHO Mental Health Action Plan.² This will require a focus on investment in leadership and governance for mental health, and the development of integrated, responsive mental health and social care services in community-based settings. Strategies for promotion and prevention in mental health, and building and strengthening of information systems, evidence, and research for mental health in conflict-affected countries, are also needed. These services could be initiated with short-term emergency funds that are often available during crises.

Demonstration projects can provide proof of concept and attract the further support and funds necessary for system development to reduce the burden of mental disorders among people affected by war and other conflict.³

Our study shows that the impact of conflict on people's mental health is higher than previous estimates suggest. Mental health care must be prioritised in countries affected by conflict, not least for the well-established links between mental health, individual functioning, and country development.

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Table 1: Summary of included data

	Depression	Anxiety	PTSD	Depression, Anxiety or PTSD
Total number of studies in updated systematic review	70	38	96	128
Number of studies in our original systematic review ¹⁰	28	-	61	83
Number of studies from supplemental systematic review	42*	38*	35	45
Total number of prevalence estimates	141	80	202	423
Total number of countries represented	35	26	35	40

* Includes studies included in our previous systematic review,³⁹ with 10 additional studies on depression and 17 additional studies in anxiety.

Table 2: Age-standardised point prevalence (%) with 95% uncertainty, unadjusted for comorbidity

Health state	Depression	Any anxiety disorder (including PTSD)	Post-traumatic stress disorder
Severe disorder	1.1 (0.3-2.2)	2.8 (1.8-4.0)	2.0 (1.1-3.2)
Moderate disorder	1.8 (1.2-2.6)	4.1 (2.9-5.6)	2.9 (1.7-4.4)
Mild disorder	6.4 (4.4-8.6)	8.5 (6.2-11.1)	6.1 (3.5-9.1)
Asymptomatic disorder	1.4 (0.9-2.0)	6.2 (4.6-7.9)	4.4 (2.7-6.5)
Total	10.8 (8.1-14.2)	21.7 (16.7-28.3)	15.3 (9.9-23.5)

All severity splits taken from GBD2016. Asymptomatic PTSD indicates PTSD with disability weight equal to zero once disability attributable to comorbid disorders is portioned out.

Table 3: Comorbidity adjusted age-standardised point prevalence (%) with 95% uncertainty

Health state	Depression (without comorbid anxiety)	Any anxiety disorder (including PTSD) (without comorbid depression)	Comorbid anxiety (including PTSD) with depression*	Total
Severe disorder	0.6 (0.2-1.3)	3.3 (2.1-4.7)	0.4 (0.1-1.0)	4.3 (3.1-5.6)
Moderate disorder	1.1 (0.7-1.5)	2.2 (1.3-3.3)	0.8 (0.5-1.1)	4.0 (2.9-5.5)
Mild disorder	3.7 (2.6-5.1)	6.8 (4.4-9.6)	2.6 (1.9-3.6)	13.0 (10.3-16.2)
Total	5.3 (4.0-6.9)	12.1 (9.4-15.4)	3.8 (2.8-4.9)	21.2 (17.7-24.7)

Totals may not equal sum of parts due to rounding. *Applying a rate of 41.6% (95% UI 39.8-43.4) of depression cases with comorbid anxiety. GBD severity splits applied. Asymptomatic cases are excluded.

Table 4: Point prevalence estimates for mental disorders in conflict-affected populations

	Post-conflict prevalence (within 10 years of conflict), (% , 95% UI)
Severe disorder (severe anxiety [including severe PTSD], severe depression, schizophrenia and bipolar disorder)	5.1% (4.0-6.5)
Moderate disorder (moderate anxiety [including PTSD], moderate depression)	4.0% (2.9-5.5)
Mild disorder (mild anxiety [including PTSD], mild depression)	13.0% (10.3-16.2)
Total	22.1% (18.8-25.7)

Estimates are adjusted for comorbidity. Asymptomatic cases are excluded.