Mental health of migrants with pre-migration exposure to armed conflict: a systematic review and meta-analysis

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Summary

Background Exposure to armed conflict has been associated with negative mental health consequences. We aimed to estimate the prevalence of generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder among migrants exposed to armed conflict.

Methods In this systematic review and meta-analysis, we searched online databases (Cochrane Library, Embase, LILACS, PsycInfo [via Ovid], PubMed, and Web of Science Core Collection) for relevant observational studies published between Jan 1, 1994, and June 28, 2021. We included studies that used standardised psychiatric interviews to assess generalised anxiety disorder, major depressive disorder, or post-traumatic stress disorder among migrants (refugees or internally displaced persons; aged ≥18 years) with pre-migration exposure to armed conflict. We excluded studies in which exposure to armed conflict could not be ascertained, studies that included a clinical population or people with chronic diseases that can trigger the onset of mental disease, and studies published before 1994. We used a random effects model to estimate each mental health disorder's pooled prevalence and random effects meta-regression to assess sources of heterogeneity. Two independent reviewers assessed the risk of bias for each study using the Joanna Briggs Institute Checklist for Prevalence Studies. The protocol was registered with PROSPERO, CRD42020209251.

Findings Of the 13 935 studies identified, 34 met our inclusion criteria; these studies accounted for 15 549 migrants. We estimated a prevalence of current post-traumatic stress disorder of 31% (95% CI 23–40); prevalence of current major depressive disorder of 25% (17–34); and prevalence of generalised anxiety disorder of 14% (5–35). Younger age was associated with a higher prevalence of current post-traumatic stress disorder (odds ratio 0·95 [95% CI 0·90–0·99]), lifetime post-traumatic stress disorder (0·88 [0·83–0·92]), and current generalised anxiety disorder (0·87 [0·78–0·97]). A longer time since displacement was associated with a lower lifetime prevalence of post-traumatic stress disorder (0·88 [0·81–0·95]) and major depressive disorder (0·81 [0·77–0·86]). Migrating to a middle-income (8·09 [3·06–21·40]) or low-income (39·29 [11·96–129·70]) country was associated with increased prevalence of generalised anxiety disorder.

Interpretation Migrants who are exposed to armed conflict are at high risk of mental health disorders. The mental health-care needs of migrants should be assessed soon after resettlement, and adequate care should be provided, with particular attention paid to young adults.

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See **Comment** page e398

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Introduction

War, armed conflict, political instability, and other types of organised violence contribute to a high proportion of the global burden of disease, not only in terms of deaths and injuries, but also long-term consequences.[1] At the end of 2019, organised violence resulted in 76 480 fatalities[2] and a record-high 79·5 million forcibly displaced persons,[3] of whom 45·7 million are internally displaced people, 26·0 million are refugees, and 4·2 million are asylum seekers.[3] Besides experiencing sustained violence, people living in conflict territories also experience poverty, poor access to health care,[4] and food insecurity.[5] In addition to pre-migration stressors in countries of origin, migration and post-migration conditions in host countries pose substantial burdens for migrants exposed to armed conflict, which might lead to mental health disorders.

Previous systematic reviews and meta-analyses have assessed the prevalence of mental health outcomes among migrants.[6–8] Although migrant mental health has been studied widely, heterogeneity between studies and varying methods for psychiatric diagnosis have made it difficult to ascertain the prevalence of migrant mental health disorders from exposure to armed conflict. Some studies[6,9] have defined their population by migration status rather than pre-migration exposure to armed

Research in context

Evidence before this study

People forced to migrate from armed conflict in their countries of origin have a substantial burden of mental health disorders. However, questions persist about the burden of mental health disorders in conflict-affected populations because previous meta-analyses focused on the migration process and were limited to asylum seekers and refugees. To estimate the prevalence of common mental disorders (major depressive disorder, post-traumatic stress disorder, and generalised anxiety disorder) for all migrants exposed to armed conflict, we searched Cochrane Library, Embase, LILACS, PsycInfo (via Ovid), PubMed, and Web of Science Core Collection for studies published between Jan 1, 1994, and June 28, 2021. To identify sources of prevalence of generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder in adult (≥18 years) migrants from conflict-affected regions who were diagnosed by standardised psychiatric interview, we used the following search terms on PubMed (then adapted them for other databases): (("human migration"[MeSH] OR "transients and migrants"[MeSH] OR "refugees"[MeSH] OR "emigration and immigration"[MeSH] OR "emigrants and immigrants"[MeSH] OR "undocumented immigrants"[MeSH] OR migrant*[tiab] OR immigrant*[tiab] OR immigration*[tiab] OR emigrant*[tiab] OR emigration*[tiab] OR internal displace*[tiab] OR internally displaced person*[tiab] OR displaced people[tiab] OR displaced population*[tiab] OR refugee*[tiab] OR asylum seeker*[tiab]) AND (("mood disorders"[Mesh] OR "depressive disorder"[Mesh] OR "anxiety"[MeSH] OR "anxiety disorders"[MeSH] OR "stress disorders, post-traumatic"[MeSH]) OR (mood[tiab] AND disorder*[tiab] OR affective[tiab] AND disorder*[tiab] OR anxiety[tiab] OR depression[tiab] OR depressive[tiab] OR post-traumatic stress disorder*[tiab] OR posttraumatic stress disorder*[tiab] OR PTSD[tiab]))). We did not apply language restrictions. We also did a grey literature search using datasets from existing literature reviews and reference lists from the studies we identified.

Added value of this study

To our knowledge, this meta-analysis is the first to include all types of migrants—many previously unstudied, such as internally displaced persons—who have been exposed to armed conflict. To avoid overlapping with previous reviews, we studied pre-migration exposure to armed conflict instead of migratory status, which provides a more comprehensive analysis of common mental disorders for all migrants. We also updated estimates of prevalence for current generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder; and lifetime major depressive disorder and post-traumatic stress disorder. We addressed diagnosis heterogeneity by only including studies that used psychiatric interviews. We found that the most prevalent diagnosis was post-traumatic stress disorder, followed by major depressive disorder and current generalised anxiety disorder. Further, we found that age at migration, income classification of the country of origin and host country, intensity of the conflict, and time since displacement were associated with an increased prevalence of mental health disorders.

Implications of all the available evidence

Migrants who are exposed to armed conflict are at high risk of mental disorders. The mental health-care needs of migrants should be assessed soon after resettlement, and adequate support should be provided, with particular attention paid to young adults. Psychosocial interventions can have a beneficial effect on post-traumatic stress disorder, depression, and anxiety in asylum seekers and refugees, but limited support exists for pharmacological treatment. Comprehensive interventions that also address social and material challenges can improve the mental health of migrants.

conflict, leaving out some migrants, such as internally displaced people and undocumented migrants. Other systematic reviews[10,11] focused on migrants from specific regions, which does not allow for comparison between conflict type. In addition to pre-migration stressors in countries of origin, displacement-related stressors and post-migration conditions in host countries contribute to the increased risk of mental health disorders in migrants exposed to armed conflict.[12–14]

We aimed to update previous findings, identify the prevalence of common mental health disorders among migrants exposed to armed conflict, and assess prevalence factors. Specifically, we aimed to review the prevalence of generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder among migrants with pre-migration exposure to armed conflict. We also aimed to explore whether prevalence differs by age, conflict intensity, country of origin, host country, sex, and migratory status.

Methods

Search strategy and selection criteria

We did this systematic review and meta-analysis according to PRISMA guidelines[15] and the Meta-analyses Of Observational Studies in Epidemiology checklist. We searched six databases (Cochrane Library, Embase, PsycInfo [via Ovid], PubMed, Web of Science Core Collection, and LILACS) for observational studies reporting the prevalence of generalised anxiety disorder, major depressive disorder, or post-traumatic stress disorder published between Jan 1, 1994, and June 28, 2021. The search was done by BM. A first database search was done on July 9, 2019. We updated the search on June 28, 2021. We also examined studies suggested by experts, the reference lists of retrieved studies, and systematic reviews on the same topic. We used a combination of search terms relating to migration (eg, asylum seeker and migrant) and mental health disorders (eg, anxiety and post-traumatic stress disorder). The complete list of

search terms is given in the appendix (pp 1–4). We did not apply language restrictions.

We included articles reporting cohort, case-control, and cross-sectional studies on adult migrants (aged ≥18 years) from armed-conflict settings that investigated and measured the prevalence of generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder. We focused on adults to reduce the heterogeneity of the age of the study population and facilitate the comparability of mental health assessments. We only included articles reporting diagnoses made with structured, standardised psychiatric interviews, such as the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders (DSM; SCID),[16] WHO Composite International Diagnostic Interview (CIDI),[17] Mini International Neuropsychiatric Interview (MINI),[18] Diagnostic Interview Schedule,[19] Clinician-Administered Post-Traumatic Stress Disorder Scale (CAPS),[20] and Structured Interview for Post-Traumatic Stress Disorder (SI-PTSD)[21] that followed the DSM-IV, DSM-5, or the 10th Revision of the International Classification of Diseases (ICD-10) diagnostic criteria.

We excluded studies in which exposure to armed conflict could not be ascertained, as well as studies done among migrants recruited from inpatient or outpatient mental health clinics or treated for psychiatric disorders, as they were deemed not representative of the broader migrant population. Because of the association between somatic comorbidities and mental health disorders,[22] we excluded studies of migrants with other diseases that are associated with the onset of secondary mental health disorders, such as cancer, cardiovascular disease, HIV, lupus, and Parkinson's disease. We also excluded articles published before 1994 to allow for comparison of diagnostic criteria between DSM and the ICD.

Two independent reviewers (CM-V and either ZMR-D, DG, WCG-J, or ML) screened article titles and abstracts against eligibility criteria; they discussed disagreements, and any unresolved disagreements were clarified with a third independent reviewer (DB-G). The independent screening of titles and abstracts and full texts both yielded a Cohen's κ of 0·67. The first author (CM-V) assessed the selected articles' full texts to verify that they met all inclusion criteria, and extracted the data. In instances when articles using the same sample met inclusion criteria, we chose the article that addressed the most outcomes with the biggest sample or the most recent one. We contacted three authors to clarify questions or obtain full texts, but only one author responded.

Data analysis

We extracted data from the included studies. These data included the prevalence of each mental disorder with numerator and denominator, age at interview and at migration, type of diagnostic interview, sample size, proportion of men and women, origin and host countries (for internally displaced people, the same country was used as both origin and host; changes in income classification that occurred between time since displacement and time at interview were taken into consideration), time since migration, and tools used for assessing traumatic or torture events. We extracted data from the publications where available. We confirmed the presence of armed conflict reported in the studies using to the Uppsala Conflict Data Program/Peace Research Institute Oslo (UCDP/PRIO) dataset.[23,24] We calculated the mean rate of deaths by conflict and terrorism per 10 000 inhabitants between the beginning of the conflict or the beginning of data availability (1990), whichever occurred later, and the time of displacement as a proxy for the intensity of the conflict using Global Burden of Diseases, Injuries and Risk Factors Study (GBD) data.[25] When the year of displacement was not reported, we calculated it using the date of data collection minus the mean time since displacement, or from migrant mean age at the time of data collection minus mean age at displacement. We excluded from this analysis studies with multiple countries of origin in which we could not confirm the armed conflict to which participants were exposed. We used the World Bank database to classify countries of origin according to income at the time of displacement and according to income of the host country at the time of data collection. We classified migratory status into two categories: refugees and internally displaced people. Refugees were defined as individuals who migrated to a third country and internally displaced people were classified as those who migrated within the borders of their countries of origin. All migrants were included in the meta-regression.

We estimated the pooled prevalence of current generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder; lifetime major depressive disorder and post-traumatic stress disorder; and 95% CIs and prediction intervals (PIs) using random effects models and present prevalence estimates in forest plots. Each outcome was modelled separately. We did not include lifetime generalised anxiety disorder in our analysis because only two studies reported this outcome. We did a subgroup analysis of the prevalence of current post-traumatic stress disorder by sex. Heterogeneity between studies was assessed using τ^2. We explored sources of heterogeneity in prevalence estimates using univariable random effects meta-regression for each of the five outcomes. In prespecified meta-regression analysis we included income classification of country of origin, host country, age at time of migration, time since displacement, and annual conflict-related and terrorism-related deaths per 10 000 population for countries using GBD estimates for each of the five outcomes. In post-hoc meta-regression analysis, we explored the effect of sampling method, diagnostic interview, and migratory status on the prevalence of mental disorders. For the meta-regression, we used logit-transformed proportions,

See Online for appendix

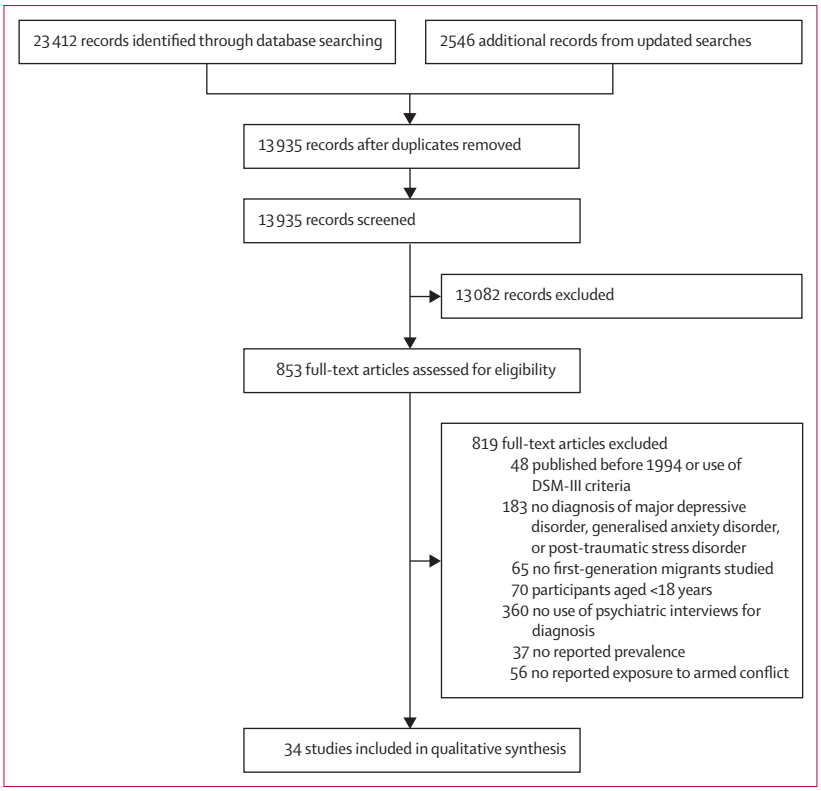

Figure 1: **PRISMA diagram of study selection**
DSM=Diagnostic and Statistical Manual of Mental Disorders.

and coefficients were then exponentiated to obtain odds ratios (ORs). We used R (version 4.0.5) and the metafor package for statistical analysis. We used the influence function in metafor to compute outliers and influential case diagnostics, including externally standardised residuals and the leave-one-out estimates of the heterogeneity.

This study protocol was registered with PROSPERO, CRD42020209251. We deviated from the protocol with respect to software used for statistical analysis. We used R instead of Stata because of rich meta-analytic techniques implemented in R packages. Furthermore, we did not do prespecified subgroup analysis by sex of the prevalence of lifetime post-traumatic stress disorder, current and lifetime major depressive disorder, and current generalised anxiety disorder because most studies did not have this kind of disaggregated data.

Risk-of-bias assessment

Two independent reviewers assessed the risk of bias for each study using the Joanna Briggs Institute Checklist for Prevalence Studies.[26] For each study, we assessed each question independently without calculating a score or classifying it by low, middle, or high risk. Disagreements between reviewers were discussed and resolved with input from a third independent reviewer. We did a regression for the prevalence of each outcome against the sample size to assess publication bias, and against the response rate to assess response bias.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Our search identified 13 935 studies, after removal of duplicates (figure 1). We assessed 853 full-text articles for eligibility. 48 studies were excluded because they were published before 1994 or did not use the DSM-IV or a later version for diagnosis; 220 studies did not assess the target outcomes or did not reported prevalence; in 135 studies, participants were not first-generation migrants or were younger than 18 years; 56 studies did not explicitly reported exposure of their subjects to armed conflict; and 360 did not use psychiatric interviews for diagnosis (figure 1). We included 34 independent studies[27–60] in the analysis (figure 1; table 1). The 34 included studies were either longitudinal (n=3) or cross-sectional (n=31). Sample sizes ranged from 31 migrants to 1876 migrants. In total, studies included 15 549 migrants: 10 584 (68%) refugees and 4401 internally displaced people. 252 were classified by the authors as return migrants, 167 as war survivors, and 145 as Holocaust survivors. As we could not classify them into either internally displaced person or refugee, we did not include them in the post-hoc meta-regression analysis by migratory status. All migrants were aged 18 years and older. All world geographical regions were represented in countries of origin. Most of these countries are classified by the World Bank[61] as low-income (n=12), lower-middle-income (n=7), and upper-middle-income (n=9). By contrast, most migrants were hosted in high-income economies in Europe (n=19), North America (n=2), and Australia (n=2). Internally displaced people were included in studies in Colombia,[28,33] Croatia,[42] Nigeria,[51] Sri Lanka,[52] Syria,[27,56] Sudan,[49] and Turkey.[37] The mean age of migrants was 37·2 years (SD 9·3) and the mean time of residence in the host country was 7·1 years (SD=6·9; n=16 studies). Of 15 549 participants, 8420 (54·2%) were women and 7129 (45·8%) were men. One study[50] did not report the proportion of men and women in its sample. The most studied psychiatric disorder was post-traumatic stress disorder (n=30) diagnosed using MINI (n=10), SCID (n=6), CIDI (n=5), CAPS (n=8), and SI-PTSD (n=1). Major depressive disorder (n=20) was assessed using MINI (n=11), SCID (n=5), and CIDI (n=4). Generalised anxiety disorder (n=12) was assessed using MINI (n=9) and CIDI (n=3; table 1). Few studies reported sex-specific estimates: four for current major depressive disorder, none for lifetime major depressive disorder, three for current generalised anxiety disorder, one for lifetime post-traumatic stress disorder, and eight for current post-traumatic stress disorder.

	Type of study, sampling method, and dates of data collection	Country of origin	Host country	Migratory status	Sample size			Age at interview, years	Tool for assessment of psychiatric disorders	Criteria	Mental health disorder assessed
					Total	Men	Women				
Al Ibraheem et al (2017)[27]	Cross-sectional; non-random; February–May, 2016	Syria	Syria and Netherlands	Refugees and IDPs	306 (195 [64%] IDPs, 111 [36%] refugees)	206 (67%)	100 (33%)	35·5 (11·0)	CAPS	DSM-IV	Current PTSD
Alejo et al (2007)[28]	Cross-sectional; random; April–June, 2001; July–December, 2003; February–May, 2004	Colombia	Colombia	IDPs	851	317 (37%)	534 (63%)	37·4 (14·0)	SCID	DSM-IV	Current PTSD
Bapolisi et al (2020)[29]	Cross-sectional; random; April–May, 2017	DR Congo, Burundi, Somalia, Rwanda, Ethiopia, Eritrea, and Sudan	Uganda	Refugees	387	168 (43%)	219 (57%)	33·1 (12·2)	MINI	DSM-5	Current PTSD, current MDD, and current GAD
Beiser et al (2015)[30]	Cross-sectional; random; 2001–04	Sri Lanka	Canada	Refugees	1601	869 (54%)	732 (46%)	43·8	CIDI	ICD-10	Lifetime PTSD
Bhui et al (2006)[31]	Cross-sectional; random	Somalia	UK	Refugees	143	71 (50%)	72 (50%)	44·3	MINI	ICD-10	Current PTSD, current and recurrent MDD, and current GAD
Bogic et al (2012)[32]*	Cross-sectional; non-random; January, 2005–November, 2006	Bosnia and Herzegovina, Kosovo, Serbia, Croatia, and North Macedonia	Germany, Italy, and UK	Refugees	854	416 (49%)	438 (51%)	41·6 (10·8)	MINI	DSM-IV	Current PTSD, current and recurrent MDD, and current GAD
Botelho de Oliveira et al (2011)[33]	Cross-sectional; non-random	Colombia	Colombia	IDPs	95	28 (29%)	67 (71%)	19·7	SCID	DSM-IV	Current PTSD
Caroppo et al (2020)[34]	Cross-sectional; non-random	Somalia, Nigeria, Syria, Libya, Eritrea, Iraq, Sudan, Afghanistan, Mali, Burkina Faso, Chad, Iran, Pakistan, and occupied Palestinian territory	Italy	Refugees	180	94 (52%)	86 (48%)	25·5 (5·6)	SCID	DSM-IV-TR	Current PTSD and current MDD
Civan Kahve et al (2021)[35]	Cross-sectional; non-random; March–May, 2017	Iraq	Turkey	Refugees	101	49 (48%)	52 (52%)	36 (range 18 to 68)	CAPS	DSM-IV	Current and lifetime PTSD
Fenta et al (2004)[36]	Cross-sectional; random; May, 1999–May, 2000	Ethiopia	Canada	Refugees	342	203 (59%)	139 (41%)	35·3 (7·2)	CIDI	DSM-IV and ICD-10	Current MDD
Gülşen et al (2010)[37]	Cross-sectional; non-random	Turkey	Turkey, Germany, France, Netherlands, Sweden, and UK	Refugees and IDPs	1127 (558 [50%] IDPs, 569 [50%] refugees)	NA	1127 (100%)	37·7 (11·3)	SI-PTSD	DSM-IV	Current PTSD
Hengst et al (2018)[38]	Cross-sectional; random; 1999–2001	Iraq	Netherlands	Refugees	294	190 (65%)	104 (35%)	35·4 (12·8)	CIDI	DSM-IV-TR	Lifetime PTSD, lifetime MDD, and lifetime GAD
Kaur et al (2020)[39]	Cross-sectional; random; July–August, 2019	Myanmar	Malaysia	Refugees	220	116 (53%)	104 (47%)	33·5	MINI	DSM-5 and ICD-10	Current PTSD, current MDD, and current GAD

(Table 1 continues on next page)

	Type of study, sampling method, and dates of data collection	Country of origin	Host country	Migratory status	Sample size			Age at interview, years	Tool for assessment of psychiatric disorders	Criteria	Mental health disorder assessed
					Total	Men	Women				
(Continued from previous page)											
Kazour et al (2017)[40]	Cross-sectional; non-random	Syria	Lebanon	Refugees	452	200 (44%)	252 (56%)	35·0 (12·4)	MINI	DSM-IV and ICD-10	Current and lifetime PTSD
Kira et al (2017)[41]	Cross-sectional; non-random; June–October, 2016	Syria	Egypt	Refugees	196	134 (68%)	62 (32%)	35·9 (11·1)	CAPS	DSM-IV-TR	Current PTSD
Letica-Crepulja et al (2011)[42]	Cross-sectional; non-random; March, 2002–July, 2002	Former Yugoslavia	Croatia	NA	167	74 (44%)	93 (56%)	33·2 (12·4)	SCID and CAPS	DSM-IV	Current and lifetime PTSD and current and lifetime MDD
Llosa et al (2014)[43]	Cross-sectional; random; July–November, 2010	Occupied Palestinian territory and Syria	Lebanon	Refugees	748	367 (49%)	381 (51%)	39 (15·8)	MINI	DSM-IV-TR	Current PTSD, current and recurrent MDD, and current GAD
Madianos et al (2012)[44]†	Cross-sectional; random; February–September, 2007	Palestine	West Bank	Refugees	916	455 (50%)	461 (50%)	39·7 (17·0)	SCID	DSM-IV	1-month and lifetime PTSD and 1-month and lifetime MDD
Momartin et al (2004)[45]‡	Cross-sectional; non-random	Bosnia	Australia	Refugees	126	49 (39%)	77 (61%)	47	SCID and CAPS	DSM-IV	Current PTSD and current MDD
Naja et al (2016)[46]	Cross-sectional; random; July–October, 2014	Syria	Lebanon	Refugees	309	120 (39%)	189 (61%)	32·3	MINI	DSM-IV-TR	Current, lifetime, and pre-war MDD
Nosè et al (2020)[47]§	Cross-sectional; 2016	Pakistan, Africa, and other countries	Italy	Refugees	252	252 (100%)	NA	28·7 (7·3)	MINI and CAPS	DSM-IV	Current PTSD, current MDD, and current GAD
Roth et al (2006)[48]	Longitudinal; random; August, 1999–February, 2001	Kosovo	Sweden	Refugees	56	27 (48%)	29 (52%)	20·7	SCID	DSM-IV	Current PTSD
Salah et al (2013)[49]¶	Cross-sectional; non-random; October–December, 2008	Sudan	Sudan	IDPs	1876	831 (44%)	1045 (56%)	35·5 (14·8)	MINI	DSM-IV	Current PTSD, current MDD, and current GAD
Sharon et al (2009)[50]	Cross-sectional; random; May, 2003–April, 2004	Holocaust survivors	Israel	NA	145	..	..	74·6 (6·9)	CIDI	DSM-IV	Lifetime PTSD and lifetime GAD
Sheikh et al (2015)[51]	Cross-sectional; random; March, 2013	Nigeria	Nigeria	IDPs	258	124 (48%)	134 (52%)	38·7 (15·2)	CIDI	DSM-IV	Current MDD
Siriwardhana et al (2015)[52]	Longitudinal; random; 2012	Sri Lanka	Sri Lanka	NA	576 (324 [56%] IDPs, 252 [44%] refugees)	197 (35%)	379 (65%)	39·4 (0·8)	CIDI	DSM-IV	Current PTSD
Söndergaard et al (2001)[53]	Longitudinal; random	Iraq	Sweden	Refugees	86	54 (63%)	32 (37%)	35 (range 18 to 48)	SCID and CAPS	DSM-IV	Current PTSD

(Table 1 continues on next page)

	Type of study, sampling method, and dates of data collection	Country of origin	Host country	Migratory status	Sample size			Age at interview, years	Tool for assessment of psychiatric disorders	Criteria	Mental health disorder assessed
					Total	Men	Women				
(Continued from previous page)											
Steel et al (2005)[54]‖	Cross-sectional; random; June, 1999–May, 2000	Vietnam and Australia	Australia	Refugees	1161	577 (50%)	584 (50%)	Range 18 to ≥65	CIDI	DSM-IV	12-month PTSD, 12-month MDD, and 12-month GAD
Sundvall et al (2020)[55]	Cross-sectional; non-random; 2012–13	Iraq	Sweden	Refugees	31	17 (55%)	14 (45%)	47·5	MINI	DSM-IV	Current PTSD and current MDD
Tekeli-Yesil et al (2018)[56]	Cross-sectional; non-random; May 6–17, 2017	Syria	Syria and Turkey	Refugees and IDPs	529 (244 [46%] IDPs, 285 [54%] refugees)	210 (40%)	319 (60%)	35·0 (10·7)	MINI	DSM-IV	Current PTSD, current and recurrent MDD, and current GAD
Tekin et al (2016)[57]	Cross-sectional; random; February–April, 2015	Iraq	Turkey	Refugees	238	105 (44%)	133 (56%)	32·7 (11·9)	SCID	DSM-IV	Current and lifetime PTSD and current and lifetime MDD
Turner et al (2003)[58]	Cross-sectional; non-random; November, 1999–January, 2000	Kosovo	UK	Refugees	831	391 (47%)	440 (53%)	37·1 (14·7)	CAPS	DSM-IV	Current PTSD
von Lersner et al (2008)[59]**	Cross-sectional; non-random; June, 2005–March, 2007	Former Yugoslavia	Germany	Refugees	47	25 (53%)	22 (47%)	48·7 (17·2)	MINI	DSM-IV	Current MDD and current GAD
Widmann et al (2014)[60]	Cross-sectional; non-random	Somalia	Kenya	Refugees	48	48 (100%)	0	34·5 (13·3)	MINI	DSM-IV	Current PTSD

Data are n (%) or mean (SD), unless otherwise indicated. CAPS=Clinician-Administered PTSD Scale. CIDI=WHO Composite International Diagnostic Interview. DSM=Diagnostic and Statistical Manual of Mental Disorders. DSM-IV-TR=DSM-IV-Text Revision. GAD=generalised anxiety disorder. ICD=International Classification of Diseases. IDP=internally displaced person. MDD=major depressive disorder. MINI=Mini International Neuropsychiatric Interview. NA=not applicable. PTSD=post-traumatic stress disorder. SCID=Structured Clinical Interview for DSM. SI-PTSD=Structured Interview for PTSD. *Same sample as in Jankovic et al (2012) and Sabes-Figuera et al (2012). †Same sample as in Madianos et al (2011). ‡Same sample as in Momartin et al (2003). §Same sample as in Nosè et al (2018). ¶Same sample as in Sanhori et al (2020). ‖Same sample as in Silove et al (2007). **Same sample as in von Lersner et al (2008) and von Lersner et al (2008).

Table 1: **Included studies in the systematic review**

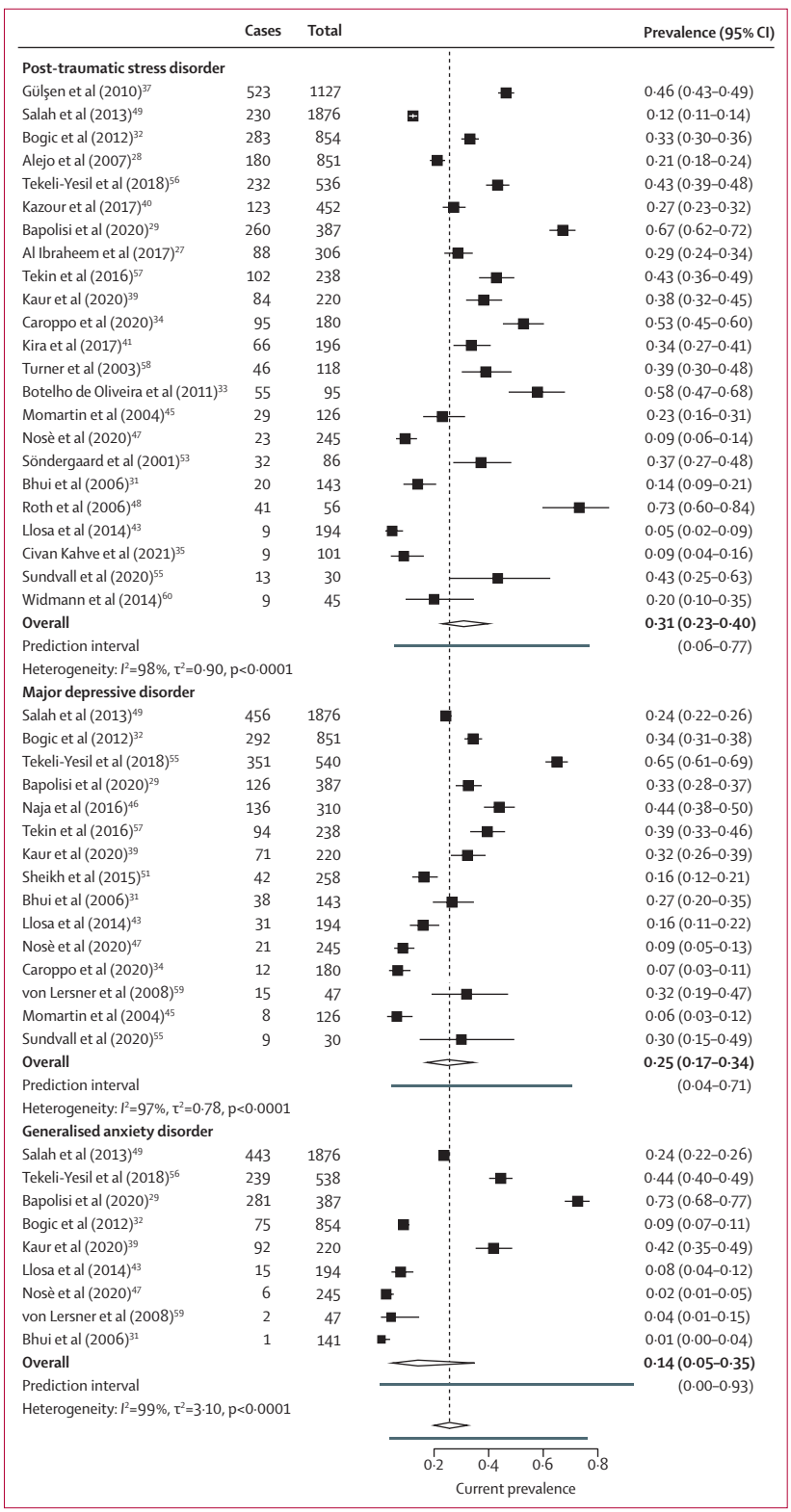

Figure 2: **Forest plot of current diagnoses**

Because armed conflicts differ in duration, intensity, and type, we reviewed tools commonly used to assess migrant exposure to traumatic events. 20 studies assessed migrant exposure to various traumatic event types (appendix pp 5–8). Most scales used were self-reported questionnaires that identify type and number of lifetime traumatic events, such as the Harvard Trauma Questionnaire, which was most common (appendix pp 5–8). All studies reported translating tools into the migrant's preferred language. Seven studies reported an estimated mean number of events suffered by their study participants, which accounted for a pooled mean of 7·9 (SD 2·8). Examples of the most frequent traumatic events migrants reported include bombarding or shelling; experiencing combat situations, torture, detention, and imprisonment; being under siege; lacking food, water, and shelter; losing a family member by violent death, suffering severe injuries, as well as physical and sexual abuse and life-threatening diseases; and witnessing violence toward others (appendix pp 5–8).

We excluded four studies from the meta-analysis: two studies[50,52] were excluded on the basis of the influence analysis (appendix pp 9–13) and one study[42] because it reported a lower prevalence of lifetime post-traumatic stress disorder than of current post-traumatic stress disorder. An additional study[54] was not included in the meta-analysis because it reported neither current nor lifetime prevalence but 12-month prevalence estimates of post-traumatic stress disorder, major depressive disorder, and generalised anxiety disorder.

Post-traumatic stress disorder was the most prevalent disorder, with a current prevalence of 31% (95% CI 23–40; PI 6–77) and a lifetime prevalence of 32% (95% CI 21–45; PI 5–80; figures 2, 3). The current prevalence of major depressive disorder was 25% (95% CI 17–34; PI 4–71) and lifetime prevalence was 28% (95% CI 18–40; PI 5–74; figures 2, 3). We found a current generalised anxiety disorder prevalence of 14% (95% CI 5–35, PI 0–93; figures 2, 3). The prevalence of current post-traumatic stress disorder was 42% (95% CI 22–65) in women and 28% (95% CI 14–49) in men (appendix p 14). We found high heterogeneity between studies for all diagnoses (figures 2, 3). The independent titles-and-abstracts screening and full-text-screening both yielded a Cohen's kappa of 0·67.

In the meta-regression, we found that coming from a middle-income country was associated with an increased prevalence of lifetime post-traumatic stress disorder (OR 2·95 [95% CI 1·29–6·70]) and lifetime major depressive disorder (4·37 [1·88–10·17]) when compared with migrants from low-income countries (table 2). Similarly, staying in a low-income (39·29 [11·96–129·70]) or middle-income country (8·09 [CI 3·06–21·40]) was associated with an increased prevalence of current generalised anxiety disorder when compared with migrants residing in high-income countries (table 2). Furthermore, a younger age was associated with a higher

prevalence of current (0·95 [0·90–0·99]) and lifetime (0·88 [0·83–0·92]) post-traumatic stress disorder and current generalised anxiety disorder (0·87 [0·78–0·97]), whereas a shorter time since displacement was associated with higher prevalence of lifetime post-traumatic stress disorder (0·88 [0·81–0·95]) and major depressive disorder (0·81 [0·77–0·86]; table 2). We observed a direct association between annual deaths from conflict and terrorism per 10 000 inhabitants in the country of origin and the prevalence of current major depressive disorder (1·03 [1·01–1·05; table 2).

We did not find an association between the sampling method or the migratory status and any of the five outcomes (appendix p 15). The use of the SCID was associated with an increased prevalence of current post-traumatic stress disorder, but interview type was not associated with other outcomes (appendix p 15).

Because one inclusion criterion was diagnosis via validated psychiatric interview tools by psychologists, psychiatrists, or other trained interviewers, all studies performed well regarding questions about assessment of post-traumatic stress disorder, major depression disorder, and generalised anxiety disorder. We identified sample size, non-randomised sample selection, and response-rate management and reporting as the main weaknesses across studies in the risk-of-bias analysis (appendix p 16).

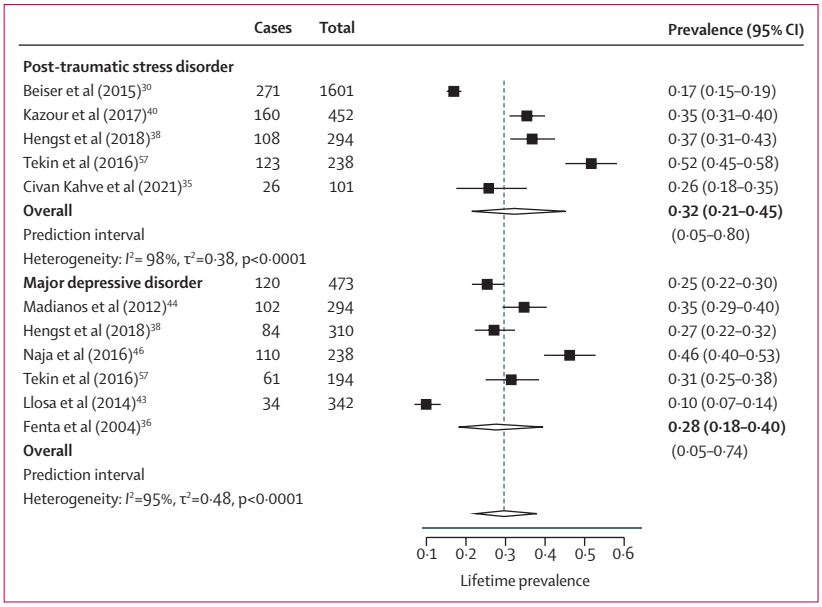

Figure 3: **Forest plot of lifetime diagnoses**

Discussion

Migrants with previous exposure to violence had a high prevalence of mental disorders, particularly post-traumatic stress disorder and major depressive disorder, followed by current generalised anxiety disorder. Although not consistently across all studied disorders, we found that pre-migration factors such as the intensity of the conflict in the country of origin, post-migration factors such as a low income level of the host country, and characteristics of the migrant population, particularly a younger mean age of the study population, were associated with an increased prevalence of mental health disorders.

We found our studies' pooled estimates to be similar to the estimates reported in a previous systematic review[6] that examined the mental health of refugees and asylum seekers. Blackmore and colleagues[6] reported a prevalence of current post-traumatic stress disorder of 31% (95% CI 24–39), a prevalence of current depression of 32% (23–40), and a prevalence of any anxiety disorder of 11% (7–15). The prevalence of current post-traumatic stress disorder found in our study was also similar to the estimated pooled prevalence of probable post-traumatic stress disorder of 30% in conflict-affected areas in sub-Saharan Africa, reported by Ng and colleagues.[62] However, our estimates are not directly comparable to the estimates of Ng and colleagues, who also included studies using screening measures for post-traumatic stress disorder that usually yield much higher prevalence rates than those of studies using diagnostic interviews.

Our study supports previous finding that migrants who are exposed to armed conflict are disproportionally affected by common mental health disorders.[6,63] The GBD and WHO Mental Health Survey estimated a prevalence of 3% for current major depressive disorder, 5% for current anxiety disorders, and 4% for lifetime post-traumatic stress disorder in adults, compared with our much higher prevalence estimates ranging from 14% for current generalised anxiety disorder to 32% for lifetime post-traumatic stress disorder.[25,64]

Our study extends previous systematic reviews to include data on over 4000 internally displaced people. Generalised anxiety disorder, major depressive disorder, and post-traumatic stress disorder prevalence in internally displaced people were similar to the prevalence in refugees who left their country of origin. This finding suggests that internally displaced people also carry a substantial and disproportional burden of mental disorders. Additionally, poor post-migration living conditions and constrained health systems in conflict-affected countries might contribute further to the vulnerability of internally displaced people.

Consistent with the epidemiological literature on sex differences in the prevalence of post-traumatic stress disorder and Blackmore and colleagues'[6] meta-analysis, we found a higher prevalence of current post-traumatic stress disorder in women than in men.[6,65] Sex differences in trauma exposure or response to traumatic events might explain sex differences in prevalence.[63,65] Although men are more likely to be exposed to combat-related traumatic events, women are at higher risk of experiencing gender-based and sexual violence.[65]

	Current PTSD	Lifetime PTSD	Current MDD	Lifetime MDD	Current GAD
Income classification of country of origin	n=21	n=5	n=12	n=6	n=9
Low	1	1	1	1	1
Middle	1·47 (0·61–3·56)	2·95 (1·29–6·70); p≤0·001	1·10 (0·45–2·67)	4·37 (1·88–10·17); p≤0·0001	NA
Income classification of host country	n=22	n=5	n=15	n=6	n=9
Low	2·03 (0·79–5·26)	..	1·85 (0·34–9·95)	..	39·29 (11·96–129·70); p≤0·0001
Middle	0·70 (0·38–1·29)	1·74 (0·56–5·42)	1·83 (0·81–4·14)	0·76 (0·27–2·16)	8·09 (3·06–21·40); p≤0·0001
High	1	1	1	1	1
Age, years	n=23; 0·95 (0·90–0·99); p≤0·01	n=5; 0·88 (0·83–0·92); p≤0·0001	n=15; 1·01 (0·95–1·07)	n=6; 0·99 (0·89–1·09)	n=9; 0·87 (0·78–0·97); p≤0·01
Time since displacement, years	n=18; 1·01 (0·95–1·07)	n=5; 0·88 (0·81–0·95); p≤0·001	n=14; 0·95 (0·90–1·01)	n=5; 0·81 (0·77–0·86); p≤0·0001	n=8; 0·98 (0·83–1·15)
Annual conflict-related and terrorism-related deaths per 10 000 inhabitants	n=20; 1·004 (0·978–1·024)	n=5; 1·006 (0·957–1·057)	n=11; 1·032 (1·013–1·051); p≤0·0001	n=6; 0·996 (0·956–1·038)	n=6; 1·049 (0·997–1·104)

Data are odds ratio (95% CI), unless otherwise indicated. GAD=generalised anxiety disorder. MDD=major depressive disorder. PTSD=post-traumatic stress disorder. n refers to the number of studies included in each analysis.

Table 2: **Output of univariable meta-regression**

Protecting female refugees and internally displaced people against sexual and gender-based violence in the post-migration phase should be a priority.

Our meta-regression partly supports the finding that a higher level of exposure to armed conflict is associated with a higher prevalence of common mental health disorders among displaced people.[13] We found that a higher number of deaths due to conflict and terrorism was associated with a higher prevalence of current major depressive disorder. Contrary to expectations, increased numbers of deaths due to conflict and terrorism did not explain heterogeneity in prevalence estimates of current and lifetime post-traumatic stress disorder.

Although pre-migration exposure to trauma is an important risk factor for developing mental health disorders, post-migration factors play a crucial role in the adaptation and recovery from pre-migration trauma.[12–14] Socioeconomic hardship, unemployment, unstable housing conditions, language barriers, discrimination, social isolation, and uncertainty about their migratory status are frequent stressors faced by migrants during resettlement.[12] Failure to address these post-migration stressors might undermine the recovery process from traumatic experiences and might limit the effectiveness of mental health care in refugee settings.[14]

A substantial body of literature has investigated the effectiveness of psychological and pharmacological interventions on mental health outcomes in refugees, asylum seekers, and displaced people.[66] Although meta-analyses showed that psychosocial interventions can have a clinical benefit on post-traumatic stress disorder, depression, and anxiety in asylum seekers and refugees,[67,68] there is weak evidence to support pharmacological treatment and results from different studies are not consistent.[69,70] Task shifting of psychological interventions to primary health-care providers or laypersons is a feasible and effective approach for the delivery of mental health interventions in low-resources settings.[13,66,71] Data from a randomised trial[71] support early and proactive management of psychosocial distress to prevent the onset of mental health disorders in migrants exposed to armed conflict. Miller and Rasmussen's[13] ecological model of refugee distress highlights the importance of post-migration stressors in refugee populations and supports the implementation of comprehensive interventions that address the social and material conditions of daily lives of refugees in post-migration settings.

Our study has several limitations. The main limitation is the inherent difficulty of working with hard-to-reach populations. The lack of national registers and migrants' hesitancy to participate in research makes obtaining a complete picture of migrants' mental health challenging. In the risk-of-bias assessment, we identified non-randomised sampling and non-reporting of both response rates and demographic characteristics of non-responders as the main weaknesses of the reviewed studies. Additionally, although we searched broadly aiming to include all types of displaced people, we did not identify eligible studies on the prevalence of mental health disorders in undocumented migrants. Because their migration journeys and leaving conditions might be worse when compared with those of regularised migrants who have more and better access to health care and social services, this lack of representation could underestimate the prevalence of mental disorders.[72] Another limitation in our study is that we could not do the pre-specified analyses of the prevalence

of lifetime post-traumatic stress disorder, current and lifetime major depressive disorder, and current generalised anxiety disorder by sex because most studies did not have sex-disaggregated estimates. We could not explore prevalence estimates by ethnicity due to insufficient disaggregated data in primary studies. Further studies should present estimates disaggregated by sex, age, and ethnicity. Estimates of the prevalence of current post-traumatic stress disorder in men and women should be interpreted with caution because of the small number of studies included in this subgroup analysis. The independent screening of titles, abstracts, and full texts to assess the eligibility of studies for inclusion in the systematic review yielded a moderate inter-rater reliability. However, disagreements on included and excluded studies were discussed between the reviewers to reach a consensus. We observed a small difference between the pooled estimates of the prevalence of current and lifetime post-traumatic stress disorder and major depressive disorder. We believe that lifetime prevalence estimates could be underestimated because of recall bias. Furthermore, we did not include data on comorbidity. Anxiety and mood disorders are highly comorbid; some studies show that comorbidity could be even higher for migrants compared with the general population. For instance, rates of comorbid anxiety, depression, and post-traumatic stress disorder are high among refugees[73] and migrants who survived torture.[74] Because we did not estimate comorbid mood and anxiety disorders, our study cannot shed light on the burden of mental health disorders among migrants who potentially need more complex treatment. Lastly, we observed a high degree of heterogeneity in the prevalence estimates of all studied mental disorders. Possible sources of heterogeneity include differences in the exposure to conflict, differences in the age and sex distribution of the study populations, living conditions in countries of origin and host countries, as well as methodological differences related to sampling, diagnostic interviews, and small sample sizes. Although we made efforts to examine sources of heterogeneity using meta-regression, substantial heterogeneity remained unexplained.

Migrants affected by armed conflict are highly susceptible to mental health disorders, with a substantial burden of mental health disorders, and are in great need of mental health care. Particular attention should be given to migrants who are young adults recently arrived from conflict-affected areas. Comprehensive interventions addressing living conditions of displaced persons could influence recovery from pre-migration trauma.

Contributors

CM-V, TM, NT-O, and OHF conceived the study and wrote the first draft of the study protocol. DB-G, ZMR-D, MG, DS, DG, ML, WCG-J, APDM, and CB participated in screening titles and abstracts, the full-text assessment, and the risk-of-bias assessment. BM did the literature search. CM-V and ADH did the statistical analysis. CM-V, ADH, OHF, and NT-O provided substantial feedback and contributed to the last version of the manuscript. All authors commented on earlier drafts of the paper and approved the final version of the paper for submission. CM-V and ADH accessed and verified the data and all authors had access to the data.

Declaration of interests

We declare no competing interests.

Data sharing

Extraction data sheets can be made available upon request to the corresponding author.

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