

# The global burden of perinatal common mental health disorders and substance use among migrant women: a systematic review and meta-analysis

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## Summary

**Background** There are one billion migrants globally, of whom 82 million are forced migrants. Pregnant migrants face pre-migration stressors such as conflict, transit stressors including poverty, and post-migration stressors including navigating the immigration system; these stressors can make them vulnerable to mental illness. We aimed to assess the global prevalence of and risk factors for perinatal mental health disorders or substance use among women who are migrants.

**Methods** In this systematic review and meta-analysis, we searched OVID MEDLINE, Embase, PsycINFO, CENTRAL, Global Health, Scopus, and Web of Science for studies published from database inception until July 8, 2022. Cohort, cross-sectional, and interventional studies with prevalence data for any mental illness in pregnancy or the postnatal period (ie, up to a year after delivery) or substance use in pregnancy were included. The primary outcome was the prevalence of perinatal common mental health disorders among women who are migrants, globally. Data for study quality and risk factors were also extracted. A random-effects meta-analysis was used to calculate pooled prevalence estimates, when appropriate. Sensitivity analyses were conducted according to study quality, sample representativeness, and method of outcome assessment. Risk factor data were synthesised narratively. This study is registered with PROSPERO, CRD42021226291.

**Findings** 18 650 studies were retrieved, of which 135 studies comprising data from 621 995 participants met the inclusion criteria. 123 (91%) of 135 studies were conducted in high-income host countries. Five (4%) of 135 studies were interventional, 40 (30%) were cohort, and 90 (66%) were cross-sectional. The most common regions of origin of participants were South America, the Middle East, and north Africa. Only 26 studies presented disaggregated data for forced migrants or economic migrants. The pooled prevalence of perinatal depressive disorders was 24.2% (range 0.5–95.5%;  $I^2$  98.8%;  $\tau^2$  0.01) among all women who are migrants, 32.5% (1.5–81.6; 98.7%; 0.01) among forced migrants, and 13.7% (4.7–35.1; 91.5%; 0.01) among economic migrants ( $p < 0.001$ ). The pooled prevalence of perinatal anxiety disorders was 19.6% (range 1.2–53.1;  $I^2$  96.8%;  $\tau^2$  0.01) among all migrants. The pooled prevalence of perinatal post-traumatic stress disorder (PTSD) among all migrant women was 8.9% (range 3.2–33.3;  $I^2$  97.4%;  $\tau^2$  0.18). The pooled prevalence of perinatal PTSD among forced migrants was 17.1% (range 6.5–44.3;  $I^2$  96.6%;  $\tau^2$  0.32). Key risk factors for perinatal depression were being a recently arrived immigrant (ie, approximately within the past year), having poor social support, and having a poor relationship with one's partner.

**Interpretation** One in four women who are migrants and who are pregnant or post partum experience perinatal depression, one in five perinatal anxiety, and one in 11 perinatal PTSD. The burden of perinatal mental illness appears higher among women who are forced migrants compared with women who are economic migrants. To our knowledge, we have provided the first pooled estimate of perinatal depression and PTSD among women who are forced migrants. Interpreting the prevalence estimate should be observed with caution due to the very wide range found within the included studies. Additionally, 66% of studies were cross-sectional representing low quality evidence. These findings highlight the need for community-based routine perinatal mental health screening for migrant communities, and access to interventions that are culturally sensitive, particularly for forced migrants who might experience a higher burden of disease than economic migrants.

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## Introduction

Approximately 4% of the world's population are international migrants.<sup>1</sup> Most are economic migrants

who migrate within or to higher-income regions, but approximately 89 million migrants, internationally, are forced migrants, including refugees, asylum seekers,

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### Research in context

#### Evidence before this study

There are approximately 281 million migrants worldwide and 89 million forced migrants. Women who are migrants and who are pregnant or post partum could be more vulnerable to mental illness because of pre-migration, transit, and post-migration stressors. However, there are few data on the prevalence and risk of common mental health disorders and substance-use disorders among the perinatal migrant population. In planning this review, a literature search including the key terms “migrant”, “perinatal”, “mental illness”, and “systematic review/meta-analysis” was conducted for papers published from database inception until July 5, 2022. It retrieved two relevant systematic reviews, both conducted in 2015, which estimated the global prevalence of perinatal depressive disorders among women who are migrants to be between 19% and 31%. In the general population of perinatal women, the prevalence is estimated to be 12–17% for depression. However, there was a lack of pooled prevalence data on other common mental health disorders, such as anxiety and post-traumatic stress disorder (PTSD), and substance-use disorders. This systematic review aims to update the global prevalence estimate of perinatal depressive disorders and provide the first global estimates for other perinatal common mental health disorders and substance use in pregnancy.

#### Added value of this study

This systematic review and meta-analysis presents some of the first pooled prevalence estimates for perinatal mental health disorders among women who are migrants, including anxiety, PTSD, and substance use in pregnancy. This paper is also one of

the first reviews to compare forced versus economic migrants, as most existing reviews focus on one population or consider them as a single group. The findings suggest women who are forced migrants have a higher prevalence of perinatal depressive disorders compared with women who are economic migrants, and that forced migrants experience a high burden of PTSD. Key risk factors for perinatal depression were being a recently (ie, approximately within the past year) arrived immigrant, having poor social support, and having a poor relationship with one’s partner, all of which represent important areas for further research and clinical and policy reform.

#### Implications of all the available evidence

Similarly to previous studies, there is a high burden of mental health disorders among women who are migrants and who are pregnant or post partum. Additionally, there is a lack of data for other mental illnesses including perinatal anxiety, PTSD, and psychosis, and from low-income and middle-income countries. Further work is needed because we included a high number of cross-sectional studies and few eligible studies for some mental health disorders, which makes the underlying data somewhat unreliable. The findings stress the need for comprehensive and culturally sensitive mental health screening and care services for women who are migrants and who are pregnant or post partum, particularly for forced migrants. More than 90% of the included studies were conducted in high-income host countries, highlighting an urgent need for research among perinatal migrant populations in low-income and middle-income countries.

and internally displaced people.<sup>1,2</sup> Women constitute approximately half of the international migrant population.<sup>1</sup> Women who arrive as migrants and who are pregnant or post partum can face stressors that increase their risk of poor physical and mental health, for example difficulties adjusting to a new culture, poor social support in their host country, or poor access to health care.<sup>3</sup> Women who are forced migrants and who are pregnant or post partum could be at a higher risk of poor mental and physical health owing to additional pre-migration stressors such as the experience of war, transition stressors including dangerous migration trajectories and homelessness, and post-migration stressors such as experiencing discrimination or poor access to legal entitlements.<sup>3,4</sup> Additional hardship can also stem from sociocultural barriers in obstetric care, gender-based violence, and poverty.<sup>4–7</sup>

The perinatal period is commonly defined as including pregnancy and up to 1 year after birth. Mental health disorders are the most common illnesses of the perinatal period and can have negative consequences for women, including a higher risk of suicide, developing substance disorders, and difficulty breastfeeding and bonding with

their child.<sup>8–11</sup> All women who have mental illness or substance-use disorders in the perinatal period, and especially migrant women, are likely to experience substantial effects on their quality of life, including their ability to work, socialise, and adapt to a new culture.<sup>12</sup> These consequences can lead to poorer immediate outcomes for the infant including low birthweight, restricted growth, diarrhoeal disease, and long-term consequences such as increased risk of cardiovascular disease and mental illness in adulthood.<sup>13–17</sup> The prevalence of perinatal depression is estimated to be 12–17%<sup>18–20</sup> and the prevalence of perinatal anxiety is estimated to be 15%<sup>21</sup> globally among the general population.

Two systematic reviews published in 2017 sought to assess the global prevalence of perinatal mental illness among women who are migrants and who are pregnant or post partum.<sup>5,22</sup> Owing to a lack of data at that time, both could only assess the pooled prevalence of perinatal depressive disorders and were unable to provide separate estimates for forced migrants. Anderson and colleagues<sup>22</sup> estimated the prevalence and risk of common mental health disorders among women who are migrants

globally. All eligible studies were conducted in high-income host countries, and only two included women who were forced migrants. Owing to high heterogeneity between studies, a meta-analysis was not conducted. The median prevalence of antenatal depression was 28% and postnatal depression was 19%. Notably, being a forced migrant increased the risk of postnatal depression. Fellmeth and colleagues<sup>5</sup> estimated the prevalence and risk of common mental health disorders among women who are migrants from lower-income and middle-income countries (LMICs). 40 studies were included, of which 37 were conducted in high-income countries; two studies included women who were forced migrants. The pooled prevalence of perinatal depression was 31%.

There is a lack of robust updated estimates of the prevalence of perinatal common mental health disorders and substance use in pregnancy among women who are migrants globally, and specifically for women from a forced migrant background. The aims of this systematic review and meta-analysis were to provide a prevalence estimate of perinatal common mental health disorders and substance use in pregnancy among all women who are migrants (ie, economic and forced migrants); identify risk factors for these disorders; and assess the methodological quality of studies.

## Methods

### Search strategy and selection criteria

In this systematic review and meta-analysis, a migrant is defined as someone who was born outside their host country.<sup>23</sup> Host country refers to the country in which a migrant has relocated to. A forced migrant is defined as a person who is a refugee or asylum seeker. An economic migrant is defined as someone who has left their home primarily in search of economic opportunities. Study inclusion and exclusion criteria were defined a priori (appendix p 2). Cohort, cross-sectional, and interventional studies including prevalence and risk factor data for any mental disorder in the pregnancy or postnatal period (up to 1 year post-delivery) were included. Studies including women who were clinically diagnosed with a mental illness or who had tested positive on a validated screening tool (ie, a mental illness screening tool that had undergone formal testing for its applicability, validity, and acceptability in that population) during the perinatal period were included. Studies including diagnoses based on medication prescriptions or self-reported diagnoses (aside from self-reported substance use in pregnancy) were excluded. Studies including only risk factor data and those comprising people who were internally displaced were excluded. Qualitative studies and those using unvalidated screening scales were excluded. We included studies if they used an established screening tool and made some justification for the cutoff applied for their specific population; for example, they had based the cutoff score on a local validation study for their population of interest. The primary outcome was to provide a prevalence estimate

of perinatal depression, psychosis, anxiety, post-traumatic stress disorder (PTSD), and substance use in pregnancy among all women who are migrants (ie, both economic and forced migrants). Secondary outcomes were risk factors for these disorders and to assess the quality and nature of eligible studies. Substance use was defined as the use of illicit drugs during pregnancy (eg, cannabis, cocaine, and heroin, but excluding tobacco, which was seen to be a complex topic needing to be explored separately). Alcohol consumption was defined as the intake of any alcohol during pregnancy. OVID MEDLINE, Embase, PsycINFO, CENTRAL, Global Health, Scopus, and Web of Science were searched. The literature search was conducted on July 9, 2022, and included studies published from inception until July 8, 2022, with no language or date restrictions. The root search terms were “migrant”, “mental illness or substance disorder”, and “pregnancy” (appendix p 3). Two authors (KS and GF or SE) independently screened abstracts and full-text articles. Reference lists of previous relevant reviews were hand-searched.<sup>5,22</sup> References were collated using EndNote and transferred to Covidence for screening.

### Deviations from the protocol

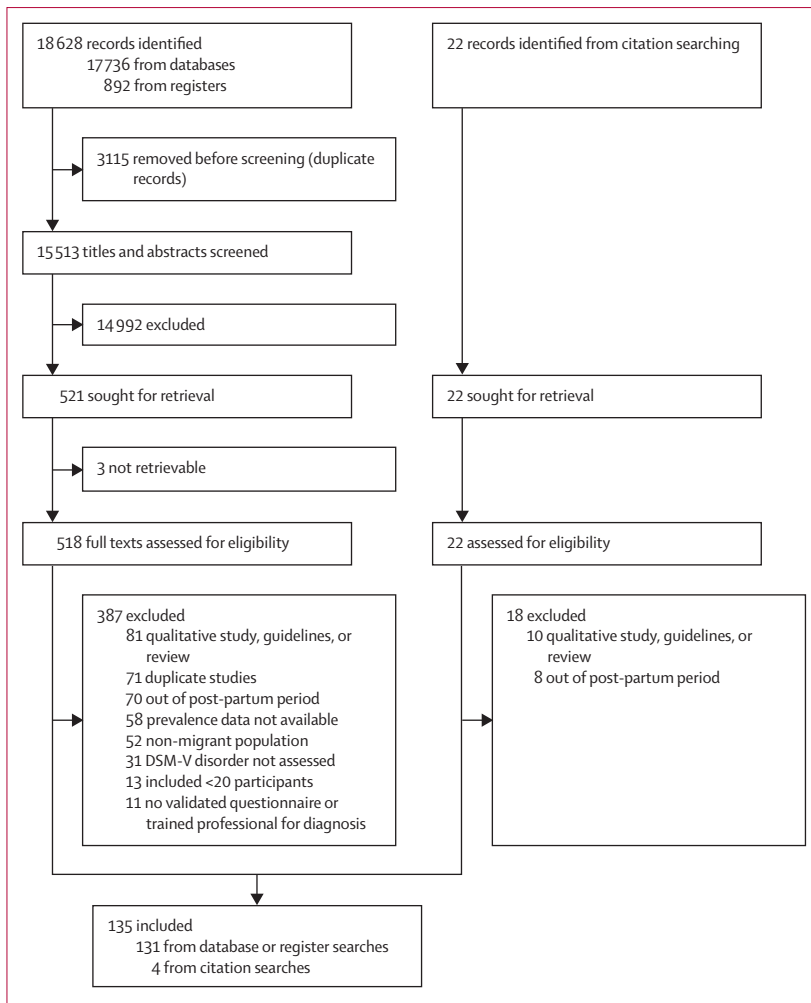
At inception the primary outcome was the prevalence of depression, anxiety, PTSD, psychosis, or self-harm or suicidal ideation among women who are migrants and who are pregnant or post partum, globally. Following a preliminary search, many studies also explored substance use in pregnancy but to our knowledge no global prevalence estimate among women who are migrants and who are pregnant or post partum existed. Thus, the search strategy was expanded to include substance use in pregnancy.

### Data extraction

Data extraction was conducted independently by two authors (KS and GF or SE). Data for study design, participant characteristics, and outcomes were extracted as raw numbers. Risk factors for substance use or alcohol consumption in pregnancy or any perinatal mental disorder were noted as free text. Any risk factor found to have a strong statistical association (assessed based on a p value of <0.05) with the outcome was noted. Baseline data from interventional studies were extracted and analysed as cross-sectional data. Extracted data were compared for consensus, and disagreements resolved by discussion with the other authors. All studies were in English except for three studies (in French or Spanish). These were extracted by a fluent speaker (GF) and double-extracted by KS using Google Translate. If studies presented combined prevalence data for more than one disorder (eg, prevalence of common mental health disorders), authors were contacted to ask for disaggregated data (eg, on depression only).

The quality and risk of bias of included studies were assessed independently by two authors (KS and GF or

See Online for appendix



**Figure 1: Study profile**

DSM-V=Diagnostic and Statistical Manual of Mental Disorders, 5th edition.

SE). We modified the Critical Appraisal Skills Programme Checklist and the Joanna-Briggs Institute Checklist for Prevalence Studies to meet the requirements of this study.<sup>24,25</sup> Interventional studies were quality-assessed as cross-sectional studies. Studies were graded as low, medium, or high quality (appendix pp 4–10). If a study did not provide enough information, the authors were contacted for additional information; abstracts were excluded from quality assessment. Low quality studies and abstracts were not excluded from the review, but their limitations were discussed. Results were reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (appendix pp 11–13) and the Meta-analyses of Observational Studies in Epidemiology (appendix pp 14–16) guidelines.

#### Data analysis

Data were summarised narratively and in tabular form, and a meta-analysis for any outcome with at least three studies was conducted with Stata version 16. For

meta-analyses, random-effects models were used owing to the expected high amounts of heterogeneity and the observational nature of prevalence studies and subsequent meta-analyses. The pooled prevalence estimate is presented alongside the range of prevalence values from included studies to better reflect the heterogeneity observed. Subgroup analyses according to prespecified variables were conducted: perinatal period (ie, antenatal and postnatal), host country World Bank income classification (ie, high and low or middle income), and migration status (ie, forced and economic). Heterogeneity was assessed using the  $I^2$  statistic and as high heterogeneity as assessed by  $I^2$  is common in prevalence meta-analyses, between-study variance was also assessed by the  $\tau^2$  statistic. Research suggests that  $\tau^2$  is a more appropriate measure of heterogeneity for these analyses than  $I^2$ .<sup>26–29</sup> To further explore contextual and methodological differences between studies, sensitivity analysis was conducted to examine the effect of study quality, assessment instrument, and sampling method on prevalence estimates. The analysis was then repeated including only high quality, population-based studies. Sensitivity analysis was conducted on studies assessing perinatal depression only. We note that classifying participants as solely forced or economic migrants is challenging. Drivers and circumstances are complex and often multifactorial. To address this difficulty, we chose to only conduct subgroup analysis according to forced or economic migrant status if participants' migration status was explicitly explained in the study method—for example the participants included had clearly migrated for economic reasons or held refugee or asylum-seeking status. There is evidence that international cutoff scores are not optimal for in-country assessments of mental illness,<sup>30,31</sup> so we used locally validated cutoffs when available. Risk factor data were summarised in tabular form. This study is registered with PROSPERO, CRD42021226291.

#### Role of the funding source

The funders had no role in study design, data collection, data analysis, data interpretation, writing of the report, or the decision to submit for publication.

#### Results

The search retrieved 18 650 references, of which 540 were potentially relevant (figure 1).<sup>32</sup> Initial exclusions were duplicates, then based on title and abstract screening, and then on full-text screening. 135 studies, comprising data from 621 995 participants, were included (appendix pp 17–28).<sup>33–49</sup> We contacted 74 authors for additional data, 45 replied, and 32 provided data. Five (4%) of 135 studies were interventional, 40 (30%) were cohort studies, and 90 (66%) were cross-sectional studies. The most common regions of origin of women were South America, the Middle East, and north Africa. 123 (91%) of 135 studies were conducted in high-income host countries, 11 (8%)

in middle-income countries, and one (1%) in a low-income country. Of the included studies, 21 (16%) of 135 were population-based (all conducted in high-income countries), 67 (50%) were conducted in multiple hospitals or clinics, and 47 (35%) in a single hospital or clinic. Sample sizes ranged from 22 to 327 279 individuals. Most studies included a mix of forced and economic migrant populations. There were 22 studies with disaggregated data for women who are forced migrants (of which nine were conducted in LMICs), and 17 which included data for economic migrants (of which two were conducted in LMICs; appendix pp 17–28). 78 (58%) of 135 reported prevalence data only, whereas the remainder also presented risk factor data. Studies investigated perinatal depression (n=111), perinatal anxiety disorders (n=13), PTSD (n=10), self-harm or suicidal ideation or attempt (n=6), psychosis (n=2), bipolar disorder (n=1), and alcohol consumption or substance use during pregnancy (n=27).

111 studies (97 177 participants) assessed the prevalence of perinatal depressive disorders. Ten studies (3592 participants) were conducted in LMIC host countries. 12 different screening instruments were used; 11 used clinical interviews. The pooled prevalence of perinatal depression was 24.2% among all migrants (range 0.5–95.5;  $I^2$  98.8%;  $\tau^2$  0.01). The pooled prevalence of antenatal depression was 24.8% (range 4.4–64.2;  $I^2$  96.9%;  $\tau^2$  0.01; appendix p 29) compared with 22.9% (0.5–95.5; 99.4%; 0.01) for postnatal depression (p=0.39; table). The pooled prevalence of any perinatal depressive disorder among all migrants in high-income host countries was 23.5% (range 0.5–95.5;  $I^2$  98.7%;  $\tau^2$  0.01) compared with 31.2% (2.1–49.6, 99.2%; 0.01) in LMIC host countries (p=0.19; table).

21 studies (8160 participants) included disaggregated data for forced migrants, and ten for economic migrants. The pooled prevalence of perinatal depressive disorders was 32.5% (range 1.5–81.6;  $I^2$  98.7%;  $\tau^2$  0.01) among forced migrants, and 13.7% (4.7–35.1; 91.5%; 0.01) among economic migrants (p<0.001). Among studies presenting mixed prevalence figures for forced and economic migrants, the pooled prevalence was 22.7% (range 0.5–95.5;  $I^2$  98.8%;  $\tau^2$  0.01; 87 studies, 89 017 participants; figure 2).<sup>21,50–159</sup>

We did not find evidence for a significant difference in the prevalence of perinatal depression according to the method of outcome assessment (ie, screening tool or diagnostic interview, p=0.31) or study design (ie, cross-sectional, cohort, or interventional study, p=0.61; appendix p 31). A very similar measure was provided by cross-sectional (25.0%) and cohort studies (24.4%). There was some evidence of a difference according to study quality (p=0.06; appendix p 31). There was strong evidence for a difference in prevalence according to the screening instrument used (p<0.01), with the highest prevalence found with the Postpartum Depression Screening Scale and the lowest with the Beck Depression

	n	Pooled prevalence (range)	$I^2$	$\tau^2$	p value
Perinatal period*	..	..	..	0.01	0.39
Antenatal	37	24.8% (4.4–64.2)	96.9%	..	..
Postnatal	81	22.9% (0.5–95.5)	99.4%	..	..
Host country income classification	..	..	..	0.01	0.19
High income	101	23.5% (0.5–95.5)	98.7%	..	..
Low or middle income	10	31.2% (2.1–49.6)	99.2%	..	..

\*Some studies presented disaggregated data for the antenatal and postnatal period.

**Table: Subgroup analysis of the prevalence of perinatal depression**

Inventory Second Edition (appendix p 31). There was also some evidence for a difference according to sampling method (p<0.05) with the highest prevalence being studies associated with groups of hospitals or clinics, and the lowest with population-based studies (appendix p 31). Higher quality, population-based studies (seven studies, 58 732 women who are migrants) tended to present lower prevalence estimates (18.0%; range 12.0–25.6;  $I^2$  99.5%;  $\tau^2$  0.01; appendix p 31) compared with lower quality, single hospital, or clinic-based studies.

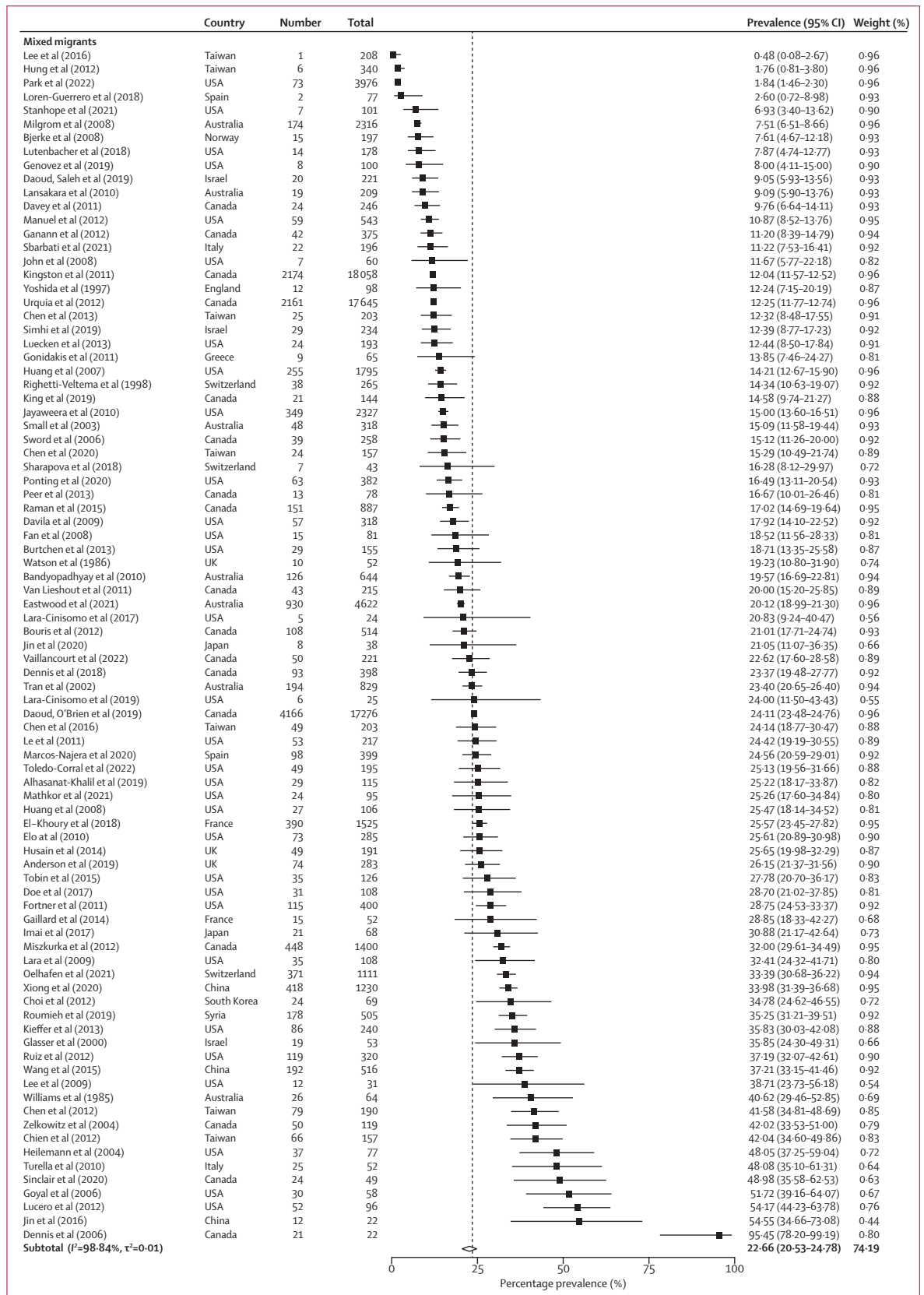
13 studies (all conducted in high-income host countries) assessed the prevalence of any perinatal anxiety disorder (n=5789) among women who are migrants. The pooled prevalence of any perinatal anxiety disorder was 19.6% (range 1.2–53.1;  $I^2$  96.8%;  $\tau^2$  0.01; figure 3).<sup>50–53,97,100,105,106,110,124,134,136,156,160</sup> Most studies included mixed forced and economic migrants. Only one study included disaggregated data for forced migrants, with a prevalence of 11.5%.<sup>50</sup> The pooled prevalence without this study is presented in the appendix (p 33).

Nine studies (n=2140; eight conducted in high-income host countries) assessed the prevalence of perinatal PTSD.<sup>50–54,58,161–163</sup> Four presented data for women who are forced migrants.<sup>50,54,58,162</sup> The pooled prevalence of perinatal PTSD was 8.9% (range 3.2–33.3;  $I^2$  97.4%;  $\tau^2$  0.18; appendix p 34). The pooled prevalence of perinatal PTSD among forced migrants was 17.1% (range 6.5–44.3;  $I^2$  96.6%;  $\tau^2$  0.32; appendix p 35). The remaining studies included mixed forced and economic migrants, and no disaggregated data were available for economic migrants.

27 studies (n=212 278) investigated alcohol consumption or substance use in pregnancy (appendix p 36). Only two studies were conducted in an LMIC<sup>55,56</sup> and only two included data for women who are forced migrants,<sup>56,164</sup> negating any subgroup analysis by country income classification or by migration status. The prevalence of alcohol use in pregnancy was 8.0% (range 0.0–29.8;  $I^2$  99.6%;  $\tau^2$  0.01), and the prevalence of substance use in pregnancy was 2.1% (0.6–5.5; 92.8%; 0.01). The pooled prevalence of combined alcohol use or substance use during pregnancy was 5.1% (range 0.0–29.8;  $I^2$  99.4%;  $\tau^2$  0.01).

Six studies (n=328 660; two conducted in an LMIC host country) investigated the prevalence of perinatal





(Figure 2 continues on next page)

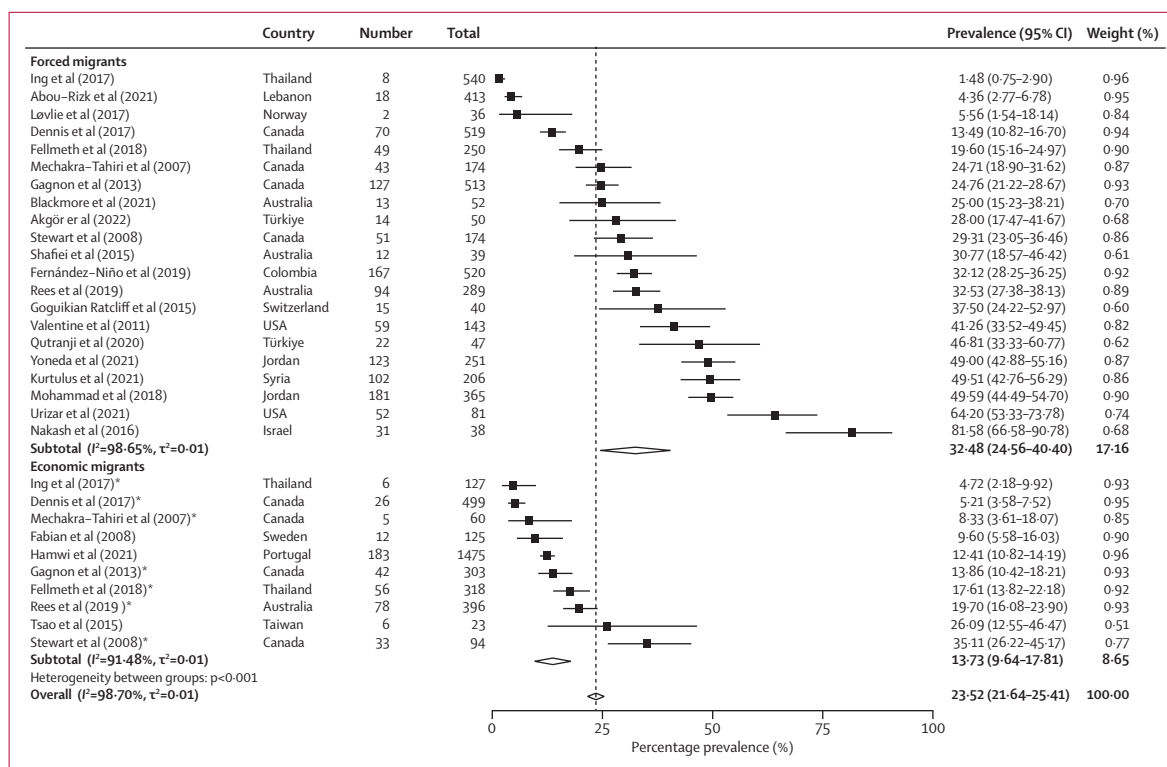


Figure 2: Forest plot of the prevalence of any perinatal depressive disorder among women who are migrants globally by migration status  
 \*Studies including cohorts of both forced migrants and economic migrants, which were disaggregated and analysed separately for this analysis.

self-harm or suicidal ideation or attempt.<sup>55,165-169</sup> Three studies included disaggregated data for women who are forced migrants.<sup>55,166,169</sup> The pooled prevalence of perinatal suicidal ideation or attempt, or self-harm among all migrants was 5.4% (range 0.1-14.4;  $I^2$  94.8%;  $\tau^2$  0.001; appendix p 37). Among forced migrants, the pooled prevalence was 6.0% (range 2.1-14.4;  $I^2$  86.1%;  $\tau^2$  0.01; appendix p 38).

Two studies investigated the prevalence of perinatal psychosis and schizophrenia, thus quantitative synthesis was not possible.<sup>170,171</sup> One study reported a prevalence of post-partum psychosis among a national cohort of women who are immigrants living in Canada of 0.2% (295 of 123 231).<sup>170</sup> A Danish study assessing the prevalence of first perinatal psychotic disorder care episodes using a national psychiatric care dataset involving secondary care episodes only reported a prevalence of 0.1% (33 of 29 051) among all migrants, and 0.1% (nine of 7804) among refugees.<sup>171</sup> One study reported a prevalence of postnatal bipolar disorder among a nationally representative cohort of women who are immigrants living in Canada of 2.2% (2680 of 123 231).<sup>170</sup>

Risk factors for perinatal depression, PTSD, anxiety, psychoses, and suicidal ideation or attempt were identified, but no risk factors for any other disorders were reported (appendix p 39). Risk factors commonly associated with perinatal depression included poor social

support, low income, and poor relationship with one's partner. Key risk factors for perinatal anxiety included poor social support and fear of deportation; for PTSD key risk factors included insecure immigration status and poor social support; for psychosis refugee status was the key risk factor; and for suicidal ideation or suicidal attempt refugee status, unplanned pregnancy, and history of trauma exposure were key risk factors.

### Discussion

In this review we assessed the global burden of mental health disorders and alcohol and substance use in women who are migrants who are pregnant or post partum and updated the global pooled prevalence estimates for perinatal depression among these women. To our knowledge, we have provided the first disaggregated pooled estimate of perinatal depression and PTSD among women who are forced migrants. Our findings suggest that among women who are migrants who are pregnant or post partum, one in four experience perinatal depression, one in five perinatal anxiety, and one in eleven perinatal PTSD. 135 studies comprising data from 621 995 participants were included. Women who are forced migrants can experience an especially high prevalence of perinatal depression, affecting approximately one in three, and PTSD, affecting approximately one in five. Key risk factors for perinatal mental illness were poor social support, being a recently

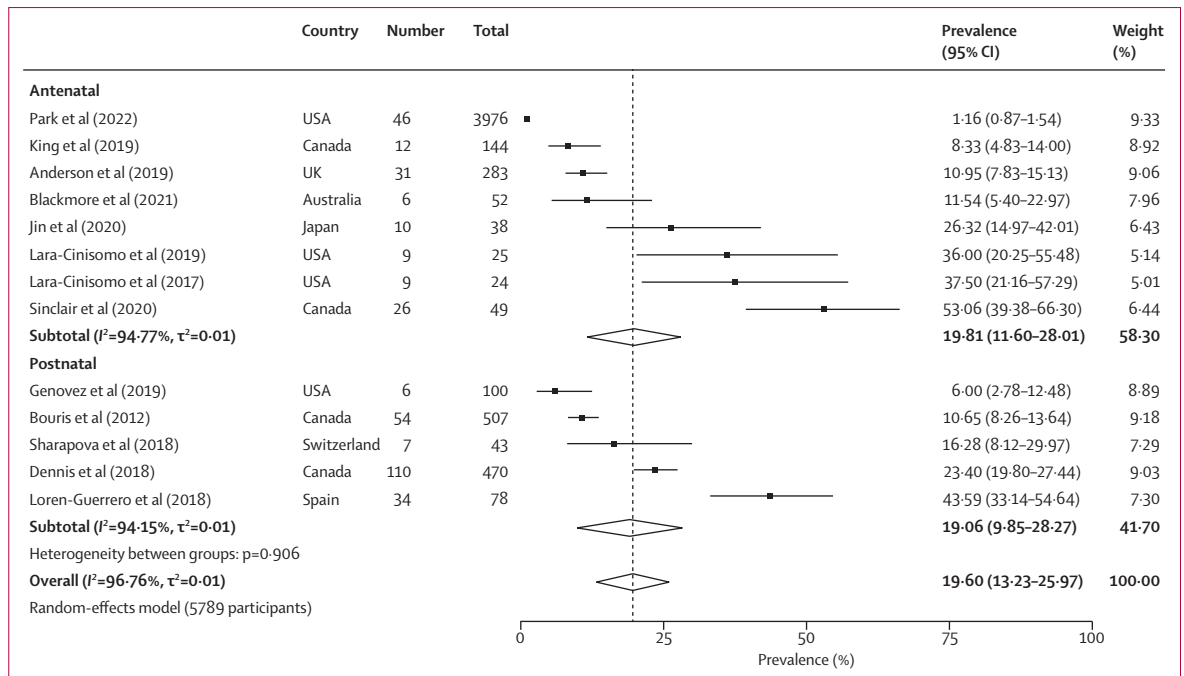


Figure 3: Forest plot of the prevalence of perinatal anxiety disorders among women who are migrants globally by perinatal period

(ie, approximately within the past month) arrived migrant, being from a minority ethnic group in the host country, and trauma exposure. Included studies were mostly cross-sectional representing low quality evidence, and many were hospital-based or community-based highlighting the need for further work to confirm our findings.

In this review, the pooled prevalence of perinatal depression among migrants was 24.2% (range 0.5–95.5). This result is broadly similar to findings from previous reviews<sup>3,22</sup> and is higher than the prevalence of 12–17% among non-migrant perinatal women.<sup>18,20</sup> Our findings also suggest strong evidence for a higher prevalence of perinatal depressive disorders among forced migrants, affecting 32.5% (range 1.5–81.6), compared with economic migrants, affecting 13.7% (4.7–35.1). 19.6% (range 1.2–53.1) of women who are migrants are likely to experience perinatal anxiety; this finding is high compared with non-migrant perinatal women, 15% of whom experience anxiety.<sup>21</sup> Due to a scarcity of disaggregated data we were unable to present anxiety prevalence for forced or economic migrants. 8.9% (range 3.2–33.3) of women who are migrants are likely to experience perinatal PTSD, rising to 17.1% (6.5–44.3) among women who are forced migrants; this finding compares with 3% among women who are not migrants.<sup>172</sup> These findings suggest all women who are migrants are at higher risk of common perinatal mental illnesses when compared with non-migrants, but forced migrants seem to be at particularly high risk. Forced migrants are likely to have multiple risk factors including social isolation, trauma exposure, and life stressors and might have a

greater exposure to these factors compared with economic migrants.

The prevalence of any alcohol use in pregnancy among migrants was 8.0% (range 0.0–29.8); this finding correlates closely with prevalence estimates of 10% of any alcohol use in pregnancy among women who are not migrants and who are pregnant, which suggests that women who are migrants have a similar risk to the general population.<sup>173</sup> Note that studies investigating any alcohol use during pregnancy (eg, just one sip) were eligible for inclusion, and not all used validated screening scales; thus, these figures might not represent a high volume of intake during pregnancy. The prevalence of substance use in pregnancy was 2.1% (range 0.6–5.5); this finding is low compared with estimates of 5–15% among women who are not migrants and who are pregnant.<sup>11,174</sup> This result could be due to cultural differences in origin versus host countries or to under-reporting. The prevalence of perinatal suicidal ideation, suicide attempts, or self-harm among all migrants was 5.4% (range 0.1–14.4). Among women who are forced migrants it was 6.0% (range 2.1–14.4). Death from suicide comprises 2–20% of all maternal deaths in the non-migrant population.<sup>10,175,176</sup> The prevalence of perinatal self-harm in the non-migrant population is approximately 1%.<sup>177</sup> Although we were unable to disaggregate data for self-harm and suicidal ideation or attempts, our findings suggest self-harm could be more prevalent among women who are migrants who are pregnant or post partum compared with the non-migrant perinatal population, perhaps because of a greater burden of affective disorders and migration stressors.



Women who are forced migrants could possibly have an even higher prevalence of self-harm and suicidal ideation, but our pooled prevalence included just three studies so the findings should be interpreted with caution.

The general risk factors for perinatal depression correlated with those found in non-migrant pregnant populations,<sup>178</sup> and migration-specific risk factors were similar to those identified in previous reviews.<sup>5,22</sup> The most common general risk factors for perinatal depression were lack of social support, poor relationship with one's partner, and current life stressors, all of which could be exacerbated by migration. Migration-specific factors included recent arrival (ie, approximately within the past month), being from an ethnic minority group in the host country, and trauma exposure. The only migration-specific risk factor for perinatal anxiety was fear of deportation. For PTSD, migration-specific risk factors were insecure immigration status and a history of trauma exposure. Being a refugee was a risk factor for suicidal ideation or attempt when compared with the general perinatal population. Lack of social support was a common risk factor for most disorders; evidence suggests social support is key to safeguarding mental health, and that loss of social networks among migrant communities can increase the risk of mental illness.<sup>179</sup> These risk factors also highlight the need to address the wider socioeconomic determinants of mental illness including language skills courses, peer-support groups, and access to social care.<sup>180</sup> This review found that women who are forced migrants could be at a higher risk of mental illness owing to precarious immigration status, increased exposure to trauma, and poor access to health care. Thus, host countries should ensure fair and efficient asylum processes, culturally sensitive perinatal mental health screening, and policies to ensure free access to comprehensive host country health and social care services.

Compared with previous reviews, this review identified a larger number of studies comprising a more diverse range of women who are migrants. It was able to provide prevalence estimates for additional mental health disorders among the general and forced migrant perinatal population and used locally validated screening tool scale cutoffs when available. However, there are several limitations. In prevalence meta-analyses with many observational studies  $I^2$  values are usually very high due to a large number of participants.<sup>27</sup> Data suggest the  $\tau^2$  statistic might be more appropriate in assessing clinically relevant heterogeneity in prevalence meta-analyses since it measures between-study variance.<sup>26–29</sup> In this review,  $\tau^2$  values were very low in pooled estimates. However, differences in prevalence estimates were sometimes large between studies; for example, antenatal depression estimates among forced migrants ranged from 1% to 80% and perinatal anxiety among all migrants ranged from 1% to 53%. This finding could be due to several factors including

differing sociodemographic profiles, health-care systems, or methodological differences, and highlights the need for caution in interpreting our pooled estimates. 56% of studies were of medium quality, 66% were cross-sectional, and just 16% were population-based. Sensitivity analysis indicated that high quality population-based studies had a lower prevalence of perinatal depression compared with lower quality hospital-based or regional-based studies. Additionally, there is likely to be a degree of reporting and publication bias in this field, as negative results are less likely to be published. We have not produced funnel plots as data suggest they are inaccurate for prevalence meta-analyses.<sup>181</sup> Thus, the included evidence is typically of low quality, and more work is needed to confirm these initial findings. Clinical interviews are the gold standard for diagnosing mental health disorders. In practice, however, screening tools are often used, which tend to produce higher prevalence estimates than clinical interviews. However, in sensitivity analysis we did not find evidence of a significant difference in prevalence estimates according to whether clinical interview or screening tools were used in this study, or according to the study design (ie, cross-sectional, cohort, or interventional studies). However, due to a limited number of studies we were unable to stratify by study design for other outcomes. Additionally, most studies assessed for mental illness or substance use at one point in time. Given that all studies were conducted post-migration and that most assessed point prevalence, our estimates represent the current burden of mental health disorders post-migration, and do not represent lifetime burden. Many studies included heterogeneous groups of forced and economic migrants, making comparisons between these two groups challenging. Only 16% of studies included disaggregated data for forced migrants, predominantly conducted in high-income host countries despite LMICs hosting approximately 90% of the world's forced migrants.<sup>2</sup> The estimated pooled prevalence of perinatal PTSD among women who are forced migrants included just four studies, so this finding should be interpreted with caution. 123 (91%) of all 135 studies were conducted in high-income countries, with only ten being from a middle-income host country, and two from a low-income host country. Notably, only one study was conducted in South or central America, and none were conducted in sub-Saharan Africa despite very high numbers of migrants in these regions.<sup>2,57</sup> Mental health disorders and substance use in pregnancy might differ depending on whether women settle in high-income, middle-income, or low-income settings, and pooling across such settings without stratification could mask differences. The review has also highlighted the need for further research exploring a broader range of mental health disorders among perinatal women who are migrants, including more severe mental illnesses such as schizophrenia.

This review has highlighted the substantial burden of perinatal mental illness among women who are migrants, especially those who are forced migrants. Although no direct statistical comparisons were made, these findings suggest that women who are migrants experience a higher burden of perinatal mental health disorders than the general perinatal population since all perinatal women who are migrants are exposed to a high number of general and migration-specific risk factors for perinatal mental illness. The suggestion that forced migrants have a higher burden of perinatal depressive disorders and PTSD than economic migrants is important; further investigation is warranted to determine if these findings hold true for all common mental health disorders. The findings highlight that mental health should be routinely and regularly discussed in maternity care settings serving women who are migrants. In England, for example, screening for symptoms of depression and anxiety is recommended for all maternity contacts by the National Institute for Health and Care Excellence guidance.<sup>182</sup> The results also highlight that access to trauma-informed and culture-informed mental health care services are especially important for women who are migrants. The review stresses the urgent need for action to address the wider social determinants of mental illness among pregnant women who are migrants including poor social support, harmful immigration policies, and poverty, as well as the wider systemic issues associated with forced migration including action to address the climate emergency and conflict prevention.<sup>3,183</sup> Finally, the findings highlight the need for more research to be conducted in LMICs, which host the majority of the world's forced migrant population.<sup>184</sup>

#### Contributors

KS, GF, PB, DCF, and OMRC contributed to the conception of the Review. KS, GF, DCF, CC, PB, and OMRC contributed to the methods. KS, GF, and SE contributed to the data curation and verification. KS, CC, and OMRC contributed to the statistical analysis. DCF and OMRC provided supervision. KS and GF contributed to the draft writing. All authors contributed to the data interpretation and review and editing. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

#### Declaration of interests

We declare no competing interests.

#### Data sharing

Template data collection forms, data extracted from the included studies, quality assessment scales, data used for analyses, and the analytic code are available from the corresponding author on request.

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