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Landscaping the evidence of intimate partner violence and postpartum depression: A systematic review

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ABSTRACT

Objective: To assess the evidence of the association between exposure to IPV and postpartum depression. IPV during pregnancy can have immediate and long-term physical and mental health consequences for the family. Therefore, it has been hypothesized that intimate partner violence may affect the risk of developing postpartum depression.

Methods: A systematic review was conducted according to the PRISMA guidelines. Pubmed, Embase, Global Health Library, Scopus, and Google scholar were searched for published studies without restrictions on language, time, or study design (up to May 2020). Studies were included if they assessed postpartum depression using the Edinburg Postnatal Depression Scale (cut-off ≥10), among women who had been exposed to IPV (emotional, physical and/or sexual abuse). The quality of studies was judged according to the Newcastle-Ottawa scale.

Results: A total of 33 studies were included in the review (participants n=131,131). The majority of studies found an association between exposure to IPV and the development of signs of postpartum depression. Overall, studies measured both exposure and outcome in various ways and controlled for a vast number of different confounders. Thirty per cent of the studies were set in low- and lower-middle-income countries while the rest were set in upper-middle- and high-income countries and the association did not differ across settings. Among the studies reporting aOR (n=26) the significant aOR ranged between 1.18-6.87 [95% CI: 1.12-11.78]. The majority of the studies were judged as 'good quality' (n=20/33).

Conclusion: We found evidence of an association between exposure to IPV and the development of signs of postpartum depression. Meta-analysis or individual patient data meta-analysis is required to quantify the magnitude of the association between IPV and postpartum depression.

PROSPERO registration number: CRD42020209435

ARTICLE SUMMARY

Strengths and limitations of this study:

- This review summarizing current knowledge on the association between intimate partner violence and postpartum depression.
- Our review included studies that are measuring postpartum depression using the Edinburg Postpartum Depression Scale with a cut-off ≥10.
- Both intimate partner violence and postpartum depression are measured in various ways which make data in the field very heterogeneous.
- Various adjustment of confounding may affect the association between postpartum depression and intimate partner violence.
- We conducted an appropriate quality assessment of all included studies using the Newcastle-Ottawa Scale.

INTRODUCTION

Intimate partner violence (IPV) – also known as domestic violence – is defined as any behaviour by a current or former partner that causes physical, emotional, or sexual harm[1]. Women are most often the victims of IPV[2-4], and it is a global health issue, which affects one in three women during their lifetime, according to The World Health Organization (WHO)[1].

IPV has several immediate and long-term mental and physical health consequences for the victims, such as depression and physical impairment[5-7]. Further, IPV is adversely associated with several obstetric outcomes, including preterm birth, low birth weight, and miscarriage[8-10]. It may also have a negative effect on a child's development, e.g. delayed cognitive and language development, problems with emotional attachment, and behaviour problems[11 12]. However, the biochemical and psychological pathway between IPV and health is complex, and numerous factors influence this association, including socio-demographic and economic factors[13].

Studies provide varied and imprecise estimates when examining the association between IPV and postpartum depression (PPD)[14-17]. As an example Tho Tran et al (2018) found no association between exposure of physical IPV and PPD (aOR: 0.64; 95% CI: 0.30-1.35)[18], while Chaves et al (2019) reported a significant association between physical IPV and PPD (aOR; 2.53; 95% CI: 1.76-3.63)[17]. These diverse findings may be due to complexities in both the case definition of IPV, which ranges from physical, emotional, and sexual harm, and PPD, which is diagnosed according to different measurement scales. The Edinburgh Postnatal Depression Scale (EPDS) is a well-known

and validated tool for the measurement of PPD, and it is based on a 10-item questionnaire with four response categories ranging from zero to three. Even though it is a validated tool for PPD, it is applied in different ways across studies and countries. The EPDS has been validated in at least 37 languages[19] and studies from different countries have found different cut-off values, e.g. 7 in Lithuania[20] and 13 in the English language version[21]. The many different validated cut-off values may be explained by different cultures and different expressions of mental difficulties. Additionally, there no transparency in factors to be adjusted for, and study designs are often case-control or cross-sectional, both of which may be prone to recall bias[14 15 22].

Previous reviews have aimed to provide an overview of the evidence between IPV and PPD[5 23 24]. However, we assess the methodologic quality of these reviews to be low according to the 'A MeaSurement Tool to Assess systematic Review' (AMSTAR)[25] as most reviews did not adhere to key domains of review quality, i.e. following a prospectively specified or registered protocol, performing a comprehensive search by exploring more than 3 databases, performing searches without language restrictions, undertaking duplicate study selection or considering the quality of included studies. Hence, there is a need for a systematic review of the latest evidence of the field. The aim of this systematic review was to landscape the evidence of IPV and PPD and synthesise the evidence taking confounders and quality into consideration.

METHODS

We conducted a protocol-driven systematic review (PROSPERO ID: CRD42020209435, prospectively registered), which is reported according to the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) guidelines (appendix I).

Search strategy and selection criteria

We searched PubMed, Embase, SCOPUS, Global Health Library, and Google scholar without language, study design, or time restrictions from 27 April to 10 May 2020. The search strategy was developed in collaboration with a librarian from the University of Southern Denmark (SDU). A comprehensive search, using search terms such as "pregnancy" OR "mother" OR "maternal" AND "intimate partner violence" OR "gender-based violence" OR "domestic violence" AND "mental health" OR "postpartum depression" (appendix II).

We included original publications with women exposed to IPV compared to non-exposed women that reported outcomes on PPD. We only included studies, which reported Risk Ratios (RR) or Odds Ratios (OR). We defined IPV in accordance with the WHO definition, i.e. any behaviour an intimate partner can cause; physical harm (e.g. slapping, hitting, kicking, and beating), emotional harm (e.g. controlling behaviours, monitoring their movements, insults, belittling, constant humiliation, intimidation) or sexual harm (e.g. forced sexual intercourse and other forms of sexual coercion). We included studies with women who had ever been exposed to IPV by a current partner or former partner during index pregnancy or in the postpartum period. To increase the homogeneity of the outcome, we only included studies using the Edinburg Postnatal Depression Scale (EPDS) with a cut-off threshold of 10 or above as a measurement of PPD as this has shown to be a reliable and valid cut-off for postpartum depression[19].

The postpartum period was defined as >1 week to 12 months postpartum. Studies were excluded if the postpartum population was restricted to a subgroup, e.g. mothers with HIV or mothers who had newborns that were ill. Additionally, we excluded case reports, case series, conference abstracts, and reviews.

Studies were selected in a two-stage process using Covidence[26]. Firstly, two authors (LBSA and SN) independently screened titles and abstracts to identify eligible studies. Secondly, eligible studies were independently full text screened by two authors (LBSA and SN). Disagreements were resolved after discussion and if an agreement was not reached a third author was consulted (DSL or AKN). One author (LBSA) extracted data from the included studies into a standardised Excel temple. Data extraction included: title, first author, publication year, country, journal name, study quality, area of health, number of participants, population, risk factors in the population, age, setting and site, economic status of country, inclusion criteria, exclusion criteria, time for exposure, time for IPV screening, time for measure PPD, abuse tool, PPD tool, the prevalence of IPV and/or prevalence of PPD among the IPV exposed women, type of IPV, confounders adjusted for, as well as primary and secondary outcomes. Outcome data were verified by a second author (AKN) and disagreements were resolved through discussions.

Quality assessment

The methodological quality of included studies was assessed using the Newcastle Ottawa Scale (NOS) for cohort studies[27] and a modified version of NOS for cross-sectional studies. Two authors independently assessed the quality (LBSA and KA) and judged the following domains: selection

process, comparability, and outcome. Item number one within the outcome domain, "Assessment of outcome" was not judged as the diagnosis of PPD is always self-reported and cannot be measured by medical records or independent blind assessment. According to the NOS scoring system[28 29] cohort studies that scored three or four stars in the selection, one or two in comparability, and two or three stars in the ascertainment of the outcome were regarded to be of 'good quality'. Further, cohort studies that scored two or three in the selection, one in the comparability, and two stars in the outcome ascertainment were considered to be of 'fair quality'. Finally, cohort studies that scored one star in selection or outcome ascertainment or scored zero stars in any of the three domains were judged to have 'low quality'. According to the NOS guidelines for cross-sectional studies, studies were regarded as 'good quality' if rewarded ≥seven stars; 'fair/satisfactory' if rewarded five to six stars, and 'poor/unsatisfactory' if rewarded zero to four stars.

Data synthesis

In the descriptive analysis, we summarised study findings according to the economic status of the country where the study had been conducted. We defined the economic status according to The World Bank using the Gross National Income (GNI) of the country in 2019, i.e. low-income economies are those with a GNI per capital of $1,035 or less; lower-middle economies are those with a GNI per capital between $1,036-$4,045; upper-middle-income economies are those with a GNI per capital between $4,046 and $12,535, and high-income economies are those with a GNI per capital of $12,536 or more[30]. We further categorised the countries in 'Low- and lower-Middle-income Countries' (LMIC) and 'High and upper-Middle-Income countries'(HMIC).

Confounders were categorised within the following eight domains: maternal sociodemographic, childbirth-related, child-related, economic, family-related, maternal-mental health, maternal physical health, and partner-related factors. In Tables 1 and 2, the domains are listed for each study and the number of confounders reported for each domain is listed as "n=x". In table 3, the specific confounders for each domain are reported for the LMIC and HMIC countries.

To create a stringent and more homogenised overview of the association between IPV and postpartum depression, we highlighted results that were reported as either aOR or aRR. These results were summarised in a forest plot according to the results of any IPV, physical IPV, and emotional IPV with descending quality in the vertical axis. If studies reported more than one type of IPV, results for "any IPV" was included in the forest plot. If studies did not report "any IPV", the

results reported in the forest plot were prioritized as follows: physical IPV, emotional IPV, or sexual IPV. The results of all the cross-sectional studies and cohort studies of both HMIC and LMIC reporting OR or RR were all reported in tables 1 and 2, respectively.

RESULTS

A total of 3097 citations were imported for screening, 286 duplicates were removed, and 2811 studies were title-abstract screened. A total of 2411 studies were found irrelevant based on title or abstract, whilst 400 studies were full-text screened. The majority of the studies were excluded due to wrong outcome, e.g. antepartum depression or wrong exposure, e.g. violence from a family member or stranger. Finally, 33 studies – 13 were cross-sectional and 20 cohort studies – were found eligible to be included in the review (Figure 1 and 2). Among the cross-sectional studies, eight were set in HMIC[14 15 31-36] and five in LMIC[37-41] whilst 15 were set in HMIC[17 42-55] and five in LMIC[6 7 18 56 57], among the cohort studies. Among the HMIC, most studies were set in Canada (n=4)[14 32 43 47], Australia (n=3)[17 46 51] and the United States (n=2)[42 53] whilst the most frequent LMIC countries were Ethiopia (n=3)[37 39 41], Bangladesh (n=2)[38 40], and Vietnam (n=2)[6 18]. A total of 131,131 women (median: 1128) were included in the studies, and the sample size varied from 72[56] to 52,509 women[17]. Population age was either reported as mean age, in interval categories, or as a range. The mean ages ranged from 24,6-29,6 years in LMIC and 25-34,5 in HMIC.

Tools to measure the exposure, IPV, varied among the studies. Most of the studies (n=20) used well-known and/or validated IPV screening tools, such as the Abuse Assessment Screen (AAS) (n=5)[17 33 41 44 50], the Composite Abuse Scale (CAS) (n=1)[58], the Severity of Violence Against Women Scale (SVAWS) (n=1)[55], the Conflict Tactics Scale (CTS) (n=2)[15 34], Hurt, Insult, Threaten, Scream tool (HITS) (n=2)[42 53], Index of Spouse Abuse (ISA) (n=1)[35], Violence Against Women Survey (VAWS) (n=1)[32], Antenatal Psychosocial Health Assessment (ALPHA) (n=1)[43], NSW routine Domestic Violence Screening (n=1)[46] or WHO questionnaire based on the domestic violence module in the WHO Multicountry Study on Women's Health and Life Events (n=6)[6 18 36 38 40 48]. Whilst the 12 studies used unspecified questionnaire tools[14 31 37 39 45 49 54 56 57 59-61].

Overall, studies reported IPV in various ways; 16 studies measured "any IPV", defined as women exposed to at least one type of IPV (physical, emotional, sexual)[14 31 32 37 39 41 42 45 47 49 52-55 57 62] whilst 10 studies reported exposure to separate types of IPV, i.e. either physical, emotional and/or sexual violence[6 17 18 33 34 43 44 46 51 56]. Further, seven studies reported both an outcome for "any IPV" and separate IPV types[7 15 35 36 38 48 50]. The primary outcome, PPD, was diagnosed using EPDS,

diagnosed at a cut-off threshold of 10 or above, and the majority of the studies used EPDS with a cut-off at ≥13[7 14 15 17 31 32 39 41 43 45 46 50 51 53 54 56]. Additionally, nine studies used a cut-off ≥10[6 18 33 37 38 40 42 47 55], two studies used cut-off ≥11[44 57] and six studies used cut-off ≥12[34-36 48 49 52].

Overall, the 33 studies adjusted for 48 different confounders. Both LMICs and HMICs were represented in all of the eight confounder domains (Table 3).

Study quality

Figure 2 sums up the study quality of the 20 HMIC and LMIC cohort studies according to the NOS. The first line represents how many studies were judged with an overall good or fair/poor quality and the following lines shows how many studies that fulfil each of the NOS items. Among the 15 HMIC, 11 studies were judged as 'good quality'[17 42 44-48 51 53-55], two studies were judged as 'fair quality'[49 50] and two studies were judged as 'poor quality'[43 52]. Of the five LMIC cohort studies, three were judged as 'good quality'[6 7 18] and two were judged as 'poor quality'[56 57]. Most of the studies that were judged as 'poor quality' were due to inadequate adjustment of confounders. The cross-sectional studies were judged as follows, six were regarded as good quality[35 36 38-41], six of fair quality[14 15 32-34 37], and one of poor quality[31]. The quality judgement for all studies is summarised in tables 1 and 2.

Association between IPV and postpartum depression

The majority of studies, 88% (n=29/33) found an association between exposure to IPV (any or type-specific) and development of postpartum depression (PPD). A total of 23 studies reported "any IPV" and among these, 91% (n=21/23) found a significant association between IPV and PPD. Among the studies, which reported physical violence (n=12)[6 7 15 17 18 34 38 43 46 48 51 56], 75% (n=9/12) found a significant association[6 7 15 17 34 38 43 46 51] and the aOR range was 1.50-3.94; 95% CI: 1.30-6.86). Further, 15 studies reported emotional IPV[6 7 17 18 33 36 38 40 43 44 46 48 50 51 56] and seven studies reported sexual IPV[6 7 16 38 40 43 56]. In addition 67% found an association between emotional IPV and PPD[17 18 33 36 43 44 46 48 50 51] (aOR range: 1.58-4.6; 95% CI: 1.04-5.1) and 42% (n=3/7) found an association between sexual IPV and PPD[6 7 43] (aOR range: 1.98-2.75; 95% Cl: 1.22-6.36)[6 43] (table 1-2).

High-income and upper-middle countries (HMIC)

Figure 3 and 4 illustrates the association of IPV and PPD across HMIC and LMIC with outcomes reported as aOR (n=26/33). Among the HMIC studies (n=23), the prevalence of "IPV overall" varied across studies, and so did the association within the different types of IPV. The prevalence of emotional IPV ranged from 1.7%-28.1%[44 48] among women reporting emotional IPV within the last year, whilst physical IPV had a prevalence range of 1.8%-37.8%[17 34].

The majority of HMIC studies found a significant association between IPV and PPD, which is clarified in figure 3 were almost 90% of the cohort studies (n=7/8) showed a significant association between "any IPV" and PPD with an aOR ranging from 1.18-6.87 (95% CI: 1.09-11.78). For physical IPV, all three studies found a significant association with an aOR ranging from 1.5-3.94 (95% CI: 1.30-6.36). Among the cross-sectional studies, most studies found an association between IPV and PPD; 75% (n=3/4) found a significant association for "any IPV" (aOR range: 4.61-4.30; 95% CI: 1.06,8.70) whilst the only studies reporting "physical IPV" and "emotional IPV", both found a significant result.

Low- and lower-middle-income countries (LMIC)

Figure 4 illustrates the results from LMIC countries that report aOR with the majority being cross-sectional studies (n=5/8). Overall, 75% (n=6/8) found a significant association cross both study designs. The aOR for "any IPV" ranged from 2.51-5.92 (95% CI: 1.67-14.40), whilst it for "physical IPV" ranged from 2.75-4.1(95% CI: 1.19-7.76).

DISCUSSION

Main findings

A total of 33 studies were included in this systematic review of which 10 were cross-sectional and 23 were cohort studies. Of the cross-sectional studies, eight were set in HMIC and five in LMIC and of the cohort studies 15 were set in HMIC whilst 5 were set in LMIC. The studies had considerable heterogeneity in terms of reported IPV exposure with varying cut-off scores ranging from 10-13 on the EPDS tool. Overall, a total of 48 different confounders were controlled for, and the quality of the studies was generally judged to be good. The association between "any IPV" and PPD ranged from aOR 1.18 to 6.87, with the association between specific types of IPV and PPD ranging from aOR 1.5 to 5.93 for physical violence, aOR 1.58 to 4.6 for emotional violence, and

aOR 1.98 to 2.75 for sexual violence. Generally, there were no major differences in the association between HMICs and LMICs, though more cohort studies set in HMICs found an association between emotional IPV and PPD compared to LMICs.

Strengths and limitations

A strength of this review is that it is based on an extensive systematic search of five online databases. Further, we applied the PRISMA guidelines to direct the review, thus a uniform and transparent approach were used to synthesize the latest evidence of IPV exposure and PPD. In addition, we conducted an appropriate quality assessment of all included studies using NOS. However, a limitation of NOS is that the scale has to be adapted to specific research designs, which can lead to the possibility of low agreement between quality assessors [27]. To cover the field of interest in a comprehensive manner, we included both cross-sectional and cohort studies from LMICs and HMICs. This approach may have resulted in heterogeneity across studies and thus limited our ability for more in-depth analysis.

To create a stringent and more homogenized overview, we decided to narrow the inclusion criteria to only studies using EPDS with a cut-off ≥10 and outcome reported as RR or OR. The pre-defined cut-off threshold of ≥10 was chosen to support the global orientation in the review that address PPD across many countries in both HMIC and LMIC and taking the wide range of different validated cut-offs into consideration. Other studies have suggested the following thermology 'possible minor depression' and 'possible major depression' at cut-off ≥10 and ≥13 respectively. This thermology must be kept in mind but will not be used throughout the manuscript where the diagnosis in many cases also could be classified as "signs of postpartum depression". Like every other measurement tool, EDPS has its strength and limitations. With a cut-off at 10, some women may screen false positive. To account for this, we reviewed the studies to consider whether a cut-off at 13 would change the association. But even after excluding studies with cut-off ≥13 the majority of studies still showed an association between IPV and PPD, except only four LMIC studies would be left in the review.

Another limitation of this review is that due to the heterogeneity of the included studies, we were not able to perform a metanalysis. However, we presented aOR from the studies in a forest plot and ordered them according to quality. This approach helps illustrate the association between IPV exposure and PPD while considering the quality of the studies. Another factor that adds to the heterogeneity across studies, is the variance in reported IPV exposure. Variation in measurement

and reporting is an acknowledged problem within women's and newborn health and has led to initiatives that aim to establish Core Outcome Sets (COS). As a result of this initiative, a standardized set of outcome measures has been developed within, e.g. pre-eclampsia [64]. To guide future IPV research there is likewise a need for harmonizing IPV outcome measures and establish a core outcome set for IPV reporting, which has also been suggested elsewhere[63].

Interpretation of findings

IPV and PPD are public health problems with a major impact on women's health. Globally, approximately 1 in 3 women are exposed to IPV[65] and 1-2 in 10 women are suffering from PPD, with prevalence rates being highest in LMICs[66]. In addition to the association with PPD, IPV is associated with severe physical health outcomes for the exposed women as well as adverse pregnancy outcomes[9 10 24] and emotional consequences for the offspring[67 68]. Thus, the burden of IPV has great implications on the well-being of both the mother and the child. When focusing on the present review, a strong association between any IPV and PPD was found. This finding is in line with a previous systematic review and meta-analysis that found exposure to any IPV increased the risk of PPD by 1.5 to 2.0 times[23]. When looking at the specific types of IPV, we found that physical IPV was significantly associated with PPD. We also found an association, between emotional IPV and PPD, although less pronounced. This weaker association may reflect reporting bias since emotional IPV is more difficult to measure than physical IPV. Women who are exposed to emotional IPV may not perceive themselves as victims of abuse. From their perspectives, acts such as shouting or threatening behaviours are often considered a result of a "hot temper". However, women who are living in a relationship where she is being shouted at, threatened or humiliated may lose their sense of self-esteem and independence and thus be at increased risk of developing depression[6]. Finally, a strong association between sexual IPV and PPD was found. Some investigators have noted that pregnant women with a history of sexual abuse may re-experience memories of their abuse during procedures of routine pregnancy care[69 70] as the reactivation of memories of sexual abuse may trigger the development of antepartum and postpartum depression[71].

CONCLUSION

This systematic review contributes to the existing literature on IPV and adverse health outcome by summarizing current knowledge on the association between IPV and PPD. We found evidence of an association between IPV exposure and PPD across all study designs and settings, thus we suggest that large multi-national longitudinal studies where targeted and effective interventions are

prioritized. This may help address the problem of IPV and improve women's health and also allow for future meta-analyses. Further, we recommend well-defined outcome measures and the establishment of core outcome sets to better estimate the association between IPV and associated outcomes.

Contributions

LSBA, VR and DSL conceptualised the study and wrote the protocol. LSBA, SN and DSL included the studies. LSBA did the data extraction and analysed the data and ANK verified it. KA and LBSA made the quality assessment. CW made the forest plot. LBSA and VR drafted the manuscript and DSL, AKN, KA and SN critically revised it. All authors approved the final version of the manuscript.

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Conflict of Interest

No conflicts of interest to declare.

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Appendix, supplementary

Appendix I: PRISMA checklist

Appendix II: Search strategy

Abbreviations:

AAS	Abuse Assessment Score
AN	Antenatal
aOR	Adjusted Odds Ratio
aRR	Adjusted Relative Risk

CI	Confidence Interval
EPDS	Edinburgh Postnatal depression Scale
GNI	Gross National Income
HMIC	High and upper-Middle-Income countries
IPV	Intimate Partner Violence
LMIC	Low- and lower-Middle-Income Countries
NOS	Newcastle-Ottawa scale
OR	Odds Ratio
PP	Postpartum
PPD	Postpartum depression
RR	Relative Risk
SCID	Structured Clinical Interview for DSM-IV
WHO	World Health Organization

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Figures and tables:

Figure 1: Flow diagram of study selection in the review of intimate partner violence and postpartum depression

Figure 2: Quality assessment of cohort studies according to country economic status and stars awarded for each item of the Newcastle-Ottawa Scale.

Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a forest plot ordered according to descending quality.

Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a forest plot ordered according to descending quality.

Table 1: Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Upper-middle and High-income countries.

Table 2: Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Low and Lower-middle-income countries.

Table 3: Confounders adjusted for in the studies (n=33) categorised of the within the following domains.

Table 1. Overview of cohort studies on post-partum depression among IPV victims set in upper-middle and high income Countries

Author, year	Country	Study size	Mean age [cat./ range]	Time of exposure	Measurement of postpartum depression	EDPS cut-off point	Confounders adjusted for (N=no. of factors)	Risk of PPD (95% CI)	Subgroup analysis, risk of PPD	Prevalence of IPV [prevalence of PPD among IPV exposed][a]	NOS score
Adynski H, 2019	USA	2,510	25.6	Lifetime	1m, 6m, 12m, 18m, 24m	≥10	Economic factors (n=5) maternal sociodemographic (n=2).	aOR_{anyIPV}: 1.18 (1.12–1.25)			Good
Chaves K. 2019	Australia	52,509	[<20, 20-39, >40]	<12m	<6w	≥13	Birth-related(n=1), economic factors (n=1), maternal physical health (n=4) maternal mental health (n=1) maternal sociodemographic (n=2).	aOR_{phyIPV}: 2.53 (1.76–3.63)	$aOR_{fearIPV}$: 3.53 (2.50–5.00)	phyIPV: 1.8%, fearIPV: 1.4% [phyIPV: 6.9%, fearIPV: 9.4%]	Good
Dennis DL, 2013	Canada	634	28.5	Lifetime, current	8w	≥13	Unadjusted.	cOR_{phyIPV}: 2.59 (1.21-5.53) cOR_{sexIPV}: 2.23 (1.28-3.89)	$cOR_{emo/humIPV}$: 2.46 (1.37-4.42) $cOR_{emo/fearIPV}$: 3.21 (1.74-5.90)	phyIPV: 7.7 %	Poor
Escribá-Agüir V. 2013	Spain	140	[<27,27-34,>34]	Lifetime, <12m	5m, 12m	≥11	Economic factors (n=2), maternal mental physical health(n=1), maternal sociodemographic (n=2).	aOR_{emoIPV}: 4.11(1.23-13.73)		anyIPV: 11% $emoIPV_{<12m}$: 1.7% [emo: 54.1%]	Good
Flach C. 2011	UK	13,617	27	Antenatal	2m, 8m, 21m, 33m	≥13	Birth-related (n=1), child-related (n=1), economic factors (n=2), maternal physical health (n=2) maternal mental health (n= 1), maternal sociodemographic (n=1).	aOR_{anyIPV}: 1.29 (1.02-1.63)		emoIPV: 6% phyIPV: 2 % emo/phyIPV: 7%	Good
Gaillard A. 2014	France	264		Lifetime	6-8w	≥12	Unadjusted	cOR_{any}: 3.0 (1.1–8.6)			Fair
Ludermir A.B., 2010	Brazil	1045	[18-24, ≥25]	Antenatal	3-6m	≥12	Economic factors (n=2) IPV-type (n=1) partner related (n=1), maternal sociodemographic (n=3), maternal mental health (n=2), length of follow-up.	aOR_{anyIPV}: 1.76 (1.05-2.93) aOR_{emoIPV}: 1.58 (1.04–2.39) aOR_{phyIPV}: 0.91 (0.54–1.54) $aOR_{phy/sexIPV}$: 0.77 (0.27–2.14)	$aOR_{emo,serIPV}$: 2.29 (1.15–4.57) $aOR_{emo,modIPV}$: 1.40 (0.88–2.22)	emoIPV: 28.1% phyIPV: 11.8% sexIPV: 5.7% [phyIPV 48 %]	Good
Malta L.A., 2012	Canada	1319	[<25, 25-34, 35+]	Lifetime	8w	≥10	Economic factors (n=1), maternal sociodemographic (n=2), maternal mental health (n=4).	aOR_{any}: 1.66(0.95-2.90)		anyIPV[22%]	Good

Ogbo FA. 2018	Australia	17,564	[<20, 20-34, >35]	<12m	<6m	≥13	Birth-related (n=1), economic factors (n=1) IPV type (n=1) partner related (n=1), maternal sociodemographic (n=2), maternal mental health (n=1), maternal physical health(n=1).	aOR_{phyIPV}: 1.50 (1.30–1.70)	aOR_{emoIPV}: 4.60 (4.10–5.10)	anyIPV: [8%]	Good
Shwartz N, 2019	Israel	1128	[16-45]	Lifetime	6w-6m	≥10	Economic factors (n=3) maternal mental health (n=2 maternal sociodemographic (n=1), wanted/unwanted pregnancy.	aOR_{anyIPV}: 1.58 (1.07–2.33)		anyIPV: 35.7%	Good
Tsai AC, 2016	South Africa	1238	[≥18]	≤12m	0-2m	≥13	Time-fixed and time-variable covariates.	aOR_{anyIPV}: 1.26 (1.13–1.40)			Good
Velonis AJ, 2017	USA	2018	[18-40]	≤12m	A few weeks (T1), 12m	≥13	Economic factors (n=1), maternal sociodemographic (n=1) maternal mental health (n=1).	aOR_{anyIPV}: 2.06 (1.21– 3.53)		anyIPV: 35.8% [10.4%]	Good
Wikman A, 2019	Sweden	2466	[≥18]	-	6w, 6m	≥12	Unadjusted.	cOR_{anyIPV}: 3.6 (2.40–5.50)[b]	6m FU cOR_{anyIPV}: 3.70 (2.10–6.30)	anyIPV: 4.1%	Poor
Woolhouse H, 2011	Australia	1305	30.9	≤12m	3m, 6m, 12m	≥13	Economic factors (n=1), maternal sociodemographic (n=2), maternal mental health (n=1).	aOR_{phyIPV}: 3.94 (2.44–6.36) aOR_{emoIPV}: 2.72 (1.72–4.13)		anyIPV: 16.6%	Good
Zhang, Y 2011	China	215	28	<12m pre-pregnancy	30-42d	≥13	Economic factors (n=2).	aOR_{anyIPV}: 6.87 (4.01-11.78) aOR_{emo}: 4.03 (1.70-9.62)		anyIPV: 11.3% [25%]	Fair
Cross-sectional studies											
Afshari P., 2019	Republic of Iran	505	-	Antenatal	14d-6m	≥13	Birth-related (n=1), child-related (n=1), economic factors (n=2), maternal mental health (n=3), partner-related (n=1), pregnancy-related (n=1).	aOR_{anyIPV}: 1.49 (0.49-4.59)		anyIPV: [74%]	Poor
Ahmad N. A, 2018	Malaysia	5,727	[Cat.: 18-25,25-30,30-34,>35]	Lifetime	6-16w	≥12	Economic factors (n=3), family-related (n=1), maternal sociodemographic (n=1), partner-related (n=1), pregnancy-related (n=1).	aOR_{anyIPV}: 2.34 (1.12-4.87) aOR_{emoIPV}: 3.79 (1.93-7.45)		phy: 2.6 % emo: 3.7% sex: 1.2% anyIPV: 3,3%	Good

Beydoun H.A., 2010	Canada	6,421	[15-40]	<2y	5-9m	≥13	Birth-related (n=1), economic factors (n=2), maternal sociodemographic (n=3), maternal physical health (n=1) pregnancy-related (n=4), maternal mental health (n=1) type of violence (2).	aOR_{anyIPV}: 1.61 (1.06-2.45)		anyIPV: 5.7[18%]	Fair
deCastro F. 2014	Mexico	604	25	Antenatal	<9m	≥12	Economic factors (n=1), maternal mental health (n=1), pregnancy-related (n=1).		$aOR_{any,sev.}$: 3,9 (1.5-10.5) $aOR_{any,\ mod.}$: 1.2 (0.6-2.8)	[phy: 24.6%, emo 13.1%, sex 6.6%]	Good
Gao, W., 2010	New Zealand	1085	[cat. <20, 20-29, 30-39, <40]	<12m	6w	≥13	Child-related (n=1), economic factors (n=4) maternal sociodemographic (n=1), partner-related (n=1), pregnancy-related (n=2).	aOR_{phy}: 2.34 (1.52-3.60)	$aOR_{min.}$: 2.00 (1.17-3.42) $aOR_{sev.}$: 2.80 (1.61-4.86)	[IPVsev.: 35.8%, IPVminor: 23.9 %]	Fair
Lobato G. 2012	Brazil	811	[Cat. <20, 20-35>35]	Antenatal	5m	≥12	Birth-related (n=1), economic-factors (n=1), maternal sociodemographic (n=1), maternal mental health (n=1), pregnancy-related (n=1).		$aOR_{oneevent}$: 2.47 (1.31-4.66) $aOR_{two/morevents}$: 1.66 (1.00-2.75)	37.8%	Fair
Tiwari A, 2007	Hong Kong	3,245	(≥18)	≤12m	1w	≥10	Family-related (n=1), maternal sociodemographic (n=1), economic factors (n=1).	$aOR_{phy/sex}$: 1.75 (0.84–3.66) aOR_{emo}: 1.84 (1.12–3.02)		9.1%	Fair
Urquia ML, 2011	Canada	6,421	(≥15)	≤2y		≥13	Economic factors (n=1), maternal sociodemographic (n=3).	aOR_{anyIPV}: 4.30 (2.10- 8.70)	$aOR_{anyIPV,AN}$: 3.80 (2.20-6.70)	anyIPV: 10.9% anyIPV,AN: 3.3%	Fair

aOR = adjusted Odds Ratio, AN = Antenatal, EDPS = Edinburgh Postnatal Depression Scale, emo IPV = emotional IPV, emo,hum = "emotional IPV, humiliated", emo.cont.= "emotional IPV, controlling behavior", phyIPV = physical IPV, sexIPV = sexual IPV, PP = postpartum, PPD = postpartum depression.

[a]The prevalence of PPD among the IPV exposed women.

[b] 2m postpartum.

Table 2. Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Low- and Lowermiddle-income Countries

Author, year	Country	Study size	Mean age [range, cat.]	Time of exposure	Measurement of post-partum	EDPS cut-off point	Confounders adjusted for	Risk of PPD (95% CI)	Subgroup analysis	Prevalence of IPV [prevalence of PPD among IPV exposed][a]	NOS score
Cohort studies											
Budhathoki N, 2012	Nepal	72		Lifetime	6w, 10w	≥13	Unadjusted	cOR_{phyIPV}: 1.37 (0.37- 5.05) cOR_{emoIPV}: 1.53 (0.41-5.75) cOR_{sexIPV}: 0.35 (0.04-2.98)		phyIPV: 20.8% emoIPV: 19.4% sexIPV: 13.9% [phyIPV: 26.7%]	Poor
Patel V, 2002	India	270	26	Lifetime, antenatal	6w	≥11	Unadjusted	$RR_{life.anyIPV}$: 2.1 (1.3-3.3)	$RR_{AN.anyIPV}$ 2.6 (1.6-4.3)	$anyIPV_{life}$: 13% $anyIPV_{AN}$: 6%	Poor
Rogathi JJ., 2017	Tanzania	1013	[18–24, 25–34, ≥ 35]	Antenatal	48h, 40w	≥13	Maternal health (N=2), maternal mental health (n=2), maternal sociodemographic (n=1), pregnancy-related (n=1), type of IPV (n=3).	aOR_{anyIPV}: 2.51 (1.67-3.76) aOR_{phyIPV}: 2.15 (1.13-4.11) aOR_{emoIPV}:1.46 (0.92–2.30) aOR_{sexIPV}:1.98 (1.22–3.23)		anyIPV 8.2%	Good
Tho Tran N, 2018	Vietnam	1274	(≥17)	Entire period with present partner	4-12w	≥10	Birth-related (n=1), economic factors (n=2), maternal sociodemographic (n=2), family-related (n=1) partner-related (n=1) IPV-type (n=2)	aOR_{phyIPV}: 0.64 (0.30-1.35) aOR_{sexIPV}: 1.11 (0.59-2.07)	$aOR_{emoIPV.mild.}$: 2.28 (1.35–3.86) $aOR_{emoIPV.mod.}$: 3.15 (1.17–8.51) $aOR_{emoIPV,ser}$: 3.16 (0.83-12.03)	phyIPV: 8% emoIPV: 25.4% sexIPV: 9.5%	Good
Tho Tran N, 2019	Vietnam	1274	26	Antenatal	4-12w	≥10	Birth-related (n=1), economic factors (n=2), maternal sociodemographic (n=2), family-related (n=1), partner-related (n=1), IPV-type (n=2)	aOR_{phyIPV}: 1.93 (1.01-3.73) aOR_{emoIPV}: 1.01 (0.60-1.69) aOR_{sexIPV}: 2.75 (1.19-6.35)		anyIPV: 35.3% emoIPV: 32.3% phyIPV: 3.5% sexIPV: 9.8%	Good
Cross-sectional studies											
Abadiga, 2019	Ethiopia	287	29.6	Within their intimate relationship	<12m	≥10	Unplanned pregnancy, parity, previous depression, substance use, social support	aOR_{anyIPV}: 5.92 (2.44-14.40)		anyIPV: 23.7%	Fair
Abebe, 2019	Ethiopia	555	24.3	Antepartum	>2w–6m	≥13	Birth-related (n=2, family-related (n=1), partner-related (n=1), pregnancy-related (n=1)	aOR_{anyIPV}: 3.16 (1.76-5.67)		anyIPV: 16.4%	Good

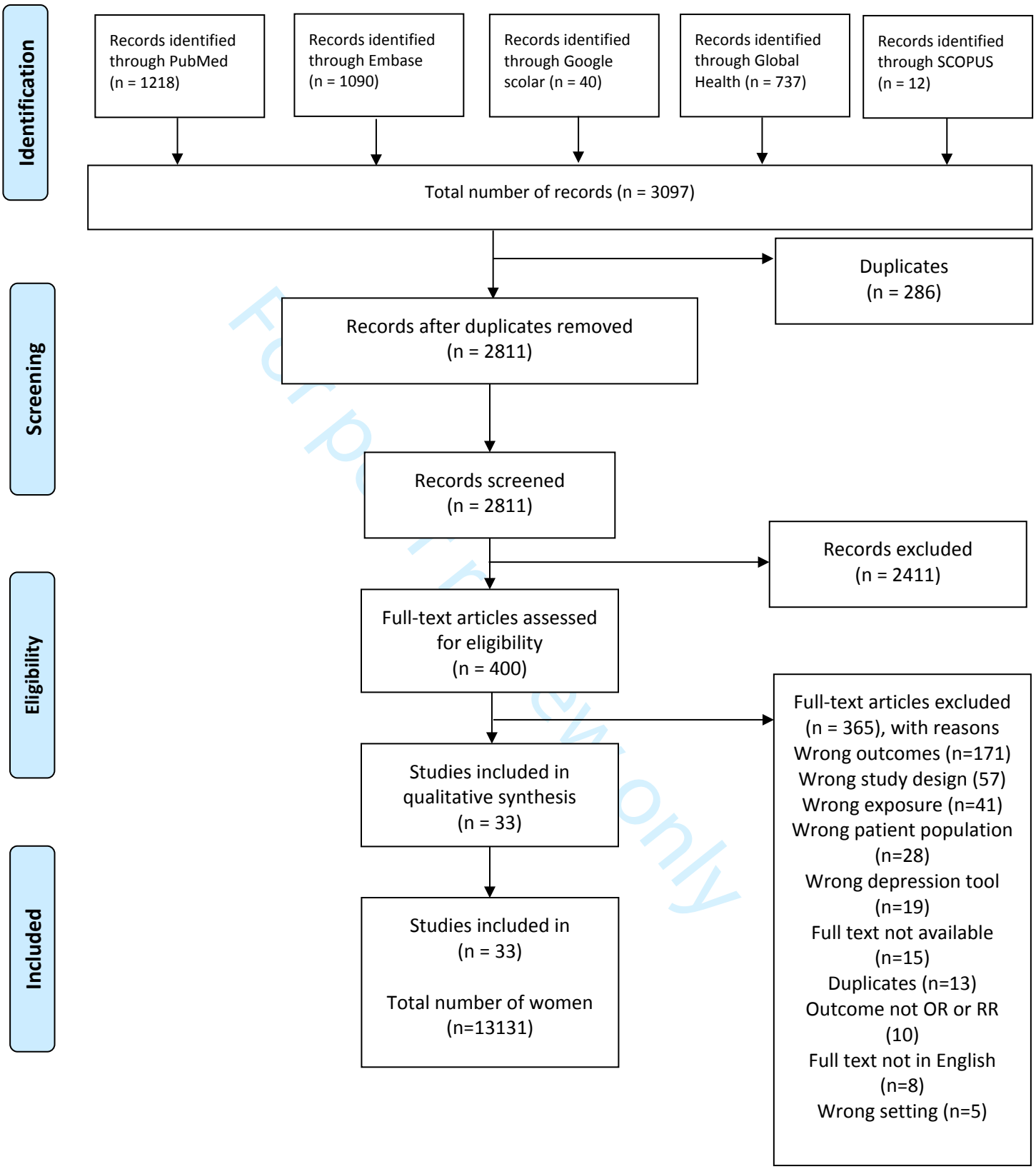
							maternal mental health (n=2).			
Adamu A.F., 2018	Ethiopia	618	28	Perinatal	<6w	≥13	Economic (n=1), family-related (n=1), partner-related (n=1), maternal mental health (n=1).	aOR_{anyIPV}: 3.1 (1.60, 5.90)	[anyIPV: 59.8%]	Good
Islam Md. J. 2017	Bangladesh	426	[14-18, 19-24, >25]	Pregesta., AN, PP	<6m	≥10	Birth-related (n=2), child-related (n=1), economic factors (n=3), family-related (n=1), maternal sociodemographic (n=1), pregnancy related (n=3), partner-related (n=2) maternal mental health (n=3) type of IPV (n=1).	aOR_{phyIPV}: 4.01 (2.07–7.76) aOR_{emoIPV}: 1.61 (0.62–4.17) aOR_{sexIPV}: 1.00 (0.49–2.03)	$anyIPV_{pre}$: 14.3% [$anyIPV_{pre}$: 57.4%] IPV_{AN}:11.3% [$anyIPV_{AN}$: 79%] IPV_{PP}: 9,2% [$anyIPV_{PP}$: 71.8%]	Good
Kabir ZN., 2014	Bangladesh	660	25	Lifetime, AN, PP	6-8m	≥10	Child-related (n=3), economic factors (n=2), family-related (n=1), maternal sociodemographic (n=2), partner-related (n=1), type of IPV (n=1).	aOR_{sexIPV}: 1.09 (0.73-1.64) aOR_{emoIPV}: 1.05 (0.90-1.22) $aOR_{pp,anyIPV}$: 2.83 (1.72-4.64)	phy: 70% phy_{AN}: 18% phy_{PP}: 52% sex_{pp}: 65% emo: 84%	Good

aOR = adjusted Odds Ratio, AN = Antenatal, EDPS = Edinburgh Postnatal depression Scale, emo IPV = emotional IPV, phyIPV = physical IPV, sexIPV = sexual IPV, PP = postpartum, PPD = postpartum depression.
[a]The prevalence of PPD among the IPV exposed women.

Table 3: Confounders adjusted for in the studies (n=33) categorised of the within the following domains.

Confounder categorizes	Both LMIC/HIC	Upper-middle- and high-income countries	Low- and middle-income countries
Birth-related	Gestational age at birth, neonate hospitalization, mode of childbirth	support after birth, interventions during birth.	
Child-related	Gender of child.	Satisfaction with infant's sleep patterns, congenital abnormalities.	Child temperament, breastfeeding initiation, fussy and difficult child.
Economic factors	Income (monthly, annual), employment (maternal or partner), education level (maternal or partner), social support.	Food stamps past year, stressed due to insufficient money, health insurance, homeownership status, poverty status.	
Family-related	History of family physical/mental illness, relation with mother-in-law/own mother.		Family support after delivery.
Maternal mental health	History of mental illness (depression, PPD, other), stressful life events.	Low energy/optimism, chronic stress	Self-esteem
Maternal physical health	Substance use.	Alcohol use, smoking, body mass index.	HIV-status.
Maternal sociodemographic	Maternal age, marital status/cohabitation.	Ethnicity/race/immigration,	Age at first pregnancy.
Partner-related	Relationship satisfaction.	Partners alcohol consumption.	Partner's preference of child's gender, woman's autonomous for decision making.
Pregnancy-related	Parity, antenatal depression, pregnancy type (undesired, unplanned).	Antenatal health problems, reaction to pregnancy.	Number of under-five children
Type of violence	Type of IPV (phy, psy, sex, past IPV, fear or partner, controlling behaviour).	History of abuse as a child. Violence from family member. Violence from stranger.	Antenatal violence.

Figure 1: flow diagram of study selection in the review of intimate partner violence and postpartum depression



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Figure 2: Quality assessment of cohort studies according to country economic status and stars awarded for each item of the Newcastle-Ottawa Scale.

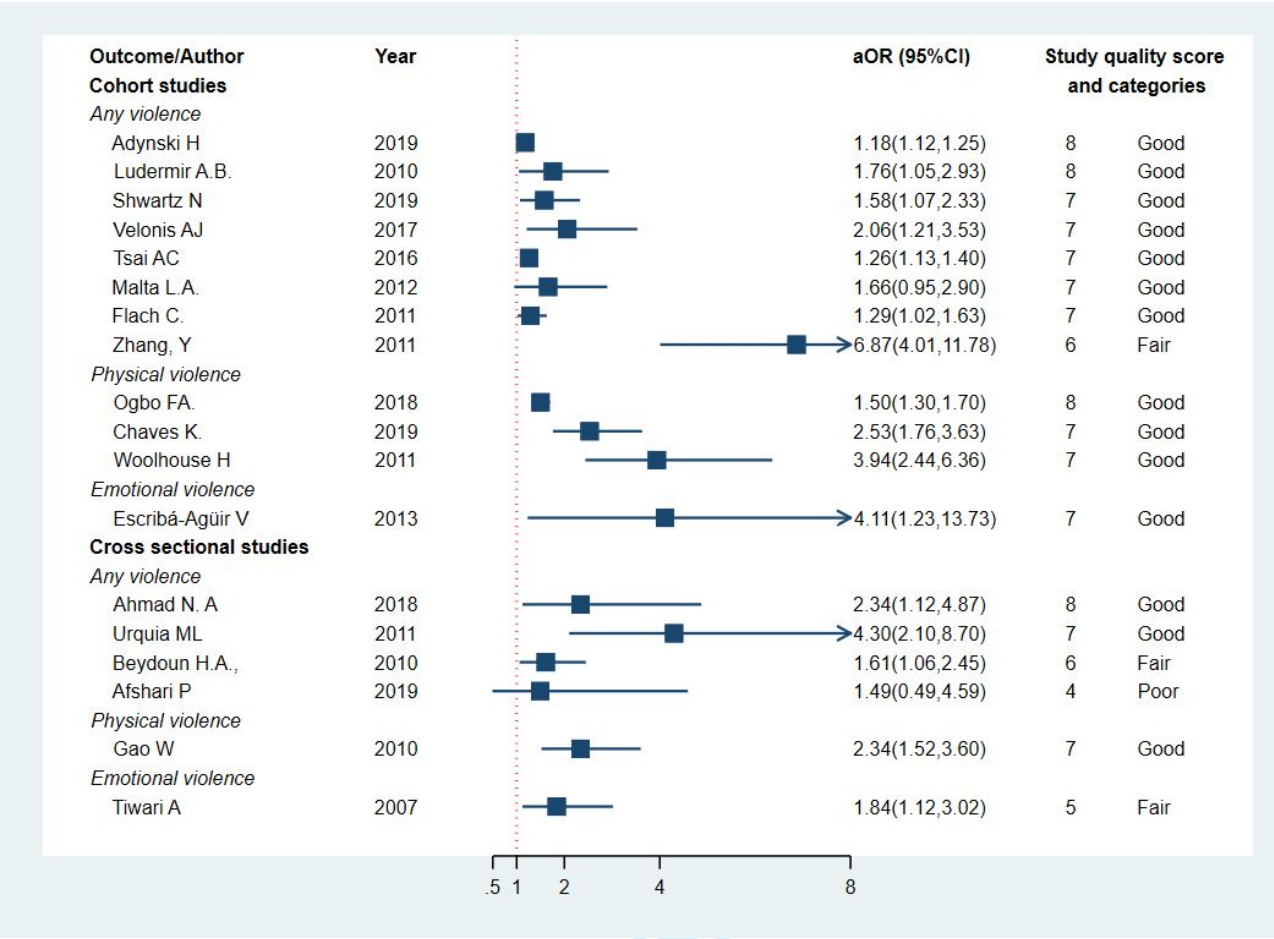


Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a forest plot ordered according to descending quality.

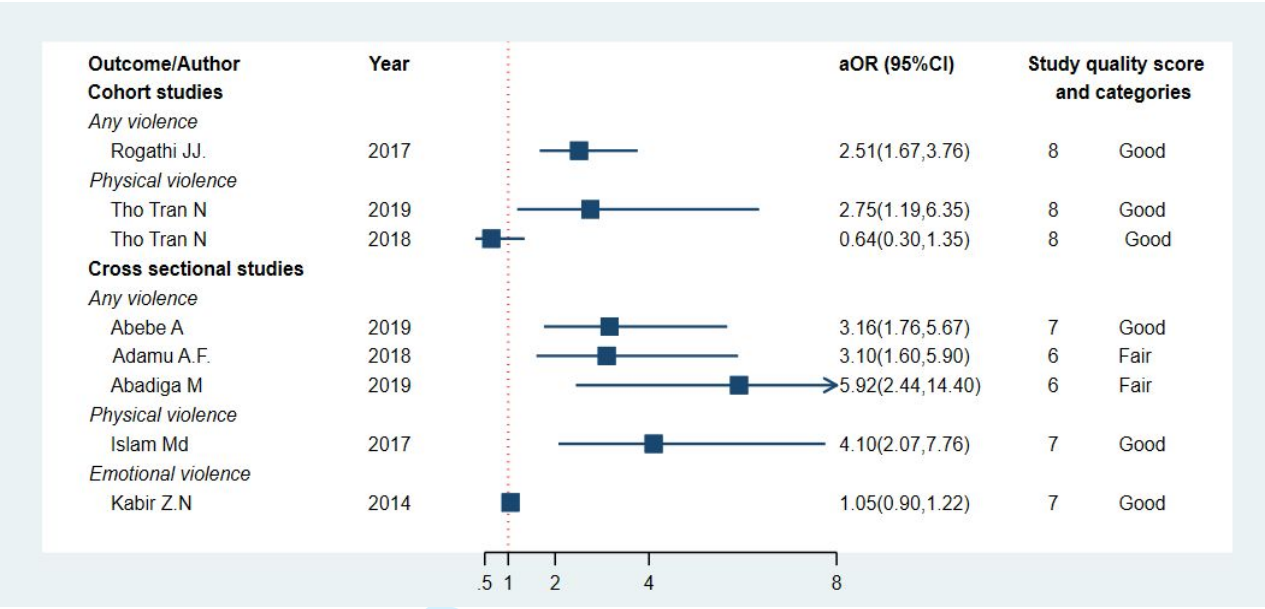


Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a forest plot ordered according to descending quality.

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4 l 116-119
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5, l 130-131

PRISMA 2009 Checklist

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6-7, l173-195

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	8 l 244-251
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7 l 197-201
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-8
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9-10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	10-11
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	11-12
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	12

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

PRISMA 2009 Checklist

For more information, visit: **www.prisma-statement.org**.

Appendix: search strategy

Embase Classic + Embase (1947-2020 May 8): Searched on the 10th of Maj 2020

#1	Spouse abuse.mp or exp. Partner violence
#2	Exp. Battered women/or spousal abuse.mp
#3	Domestic violence.mp or exp. Domestic violence
#4	Exp. dating violence
#5	Exp. Family violence/or wife abuse.mp
#6	Psychological violence.mp or exp. emotional abuse
#7	Violence/or exp. human rights/
#8	Exp. gender based violence/
#9	Violence against women.mp
#10	*physical abuse/
#11	Physical maltreatment.mp
#12	*sexual violence/or *sexual abuse/
#13	Exp. Family violence/
#14	*emotional abuse/
#15	Controlling behavior.mp
#16	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15
#17	Mothers.mp
#18	Maternal.mp
#19	Pregnancy/or pregnancy.mp
#20	17 or 18 or 19
#21	16 and 20
#22	Postpartum depression.mp or exp. Postnatal depression/
#23	Postnatal depression.mp. or puerperal depression/ exp. Postnatal depression
#24	Posttraumatic stress disorder/
#25	*mental health/
#26	22 or 23 or 24 or 25
#21	21 and 26

Global health, EBSCOhost: Searched on the 10th of Maj 2020

S1	Spouse abuse OR intimate partner violence OR partner violence OR domestic violence OR dating violence OR wife abuse OR (psychological violence or abuse) OR (gender based violence or violence against women) OR physical abuse OR physical maltreatment OR sex offenses OR (sexual violence or sexual assault or rape) or family abuse OR emotional abuse OR controlling behavior OR wife beating
S2	Postpartum depression OR post traumatic stress disorder OR postnatal depression OR depressive disorder OR (mental health or mental illness or mental disorder or psychiatric illness)
S3	(mothers or mother or motherhood or maternal) OR pregnancy
S4	S1 AND S2 AND S3

Scopus: Searched on the 10th of Maj 2020

TITLE-ABS-KAY (“spouse abuse”) OR TITLE-ABS-KAY (“intimate partner violence”) OR TITLE-ABS-KAY (“domestic violence”) OR TITLE-ABS-KAY (“dating violence”) OR TITLE-ABS-KAY (“wife abuse”) OR TITLE-ABS-KAY (“psychological violence”) OR TITLE-ABS-KAY (“gender-based violence”) OR TITLE-ABS-KAY (“physical abuse”) OR TITLE-ABS-KAY (“physical maltreatment”) OR TITLE-ABS-KAY (“sex offenses”) OR TITLE-ABS-KAY (“sexual violence”) OR TITLE-ABS-KAY (“battered women”) OR TITLE-ABS-KAY (“violence against women”) OR TITLE-ABS-KAY (“family violence”) OR TITLE-ABS-KAY (“emotional abuse”) OR TITLE-ABS-KAY (“controlling behavior”) OR TITLE-ABS-KAY (“wife beating”) AND TITLE-ABS-KAY (“mother”) OR TITLE-ABS-KAY (“pregnancy”) OR TITLE-ABS-KAY (“maternal”) AND TITLE-ABS-KAY (“postpartum depression”) OR TITLE-ABS-KAY (“postnatal depression”) OR TITLE-ABS-KAY (“mental disorder”) OR TITLE-ABS-KAY (“post-traumatic stress disorders”) OR TITLE-ABS-KAY (“depressive disorder”) OR TITLE-ABS-KAY (“mental health”) OR TITLE-ABS-KAY (“mental health associations”)

Pubmed: Searched on the 27th of April

((((((((((((((((((("spouse abuse"[MeSH Terms] OR "intimate partner violence"[MeSH Terms]) OR "spouse abuse"[MeSH Terms]) OR "domestic violence"[MeSH Terms]) OR "domestic violence"[MeSH Terms]) OR ((((("intimate partner violence"[MeSH Terms] OR (("intimate"[All Fields] AND "partner"[All Fields]) AND "violence"[All Fields])) OR "intimate partner violence"[All Fields]) OR ("dating"[All Fields] AND "violence"[All Fields])) OR "dating violence"[All Fields])) OR ((((((("psychologic"[All Fields] OR "psychological"[All Fields]) OR "psychologically"[All Fields]) OR "psychologization"[All Fields]) OR "psychologized"[All Fields]) OR "psychologizing"[All Fields]) AND ((("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields]))) OR ((((("spouse abuse"[MeSH Terms] OR ("spouse"[All Fields] AND "abuse"[All Fields])) OR "spouse abuse"[All Fields]) OR ("wife"[All Fields] AND "abuse"[All Fields])) OR "wife abuse"[All Fields])) OR ((((("gender-based violence"[MeSH Terms] OR ("gender based"[All Fields] AND "violence"[All Fields])) OR "gender based violence"[All Fields]) OR (("gender"[All Fields] AND "based"[All Fields]) AND "violence"[All Fields])) OR "gender based violence"[All Fields])) OR ((("exposure to violence"[MeSH Terms] OR ("exposure"[All Fields] AND "violence"[All Fields])) OR "exposure to violence"[All Fields])) OR ((("physical abuse"[MeSH Terms] OR ("physical"[All Fields] AND "abuse"[All Fields])) OR "physical abuse"[All Fields])) OR ((((("physical abuse"[MeSH Terms] OR ("physical"[All Fields] AND "abuse"[All Fields])) OR "physical abuse"[All Fields]) OR ("physical"[All Fields] AND "maltreatment"[All Fields])) OR "physical maltreatment"[All Fields])) OR ((((("sex offenses"[MeSH Terms] OR ("sex"[All Fields] AND "offenses"[All Fields])) OR "sex offenses"[All Fields]) OR ("sexual"[All Fields] AND "violence"[All Fields])) OR "sexual violence"[All Fields])) OR ("rape"[MeSH Terms] OR "rape"[All Fields])) OR (("battered women"[MeSH Terms] OR ("battered"[All Fields] AND "women"[All Fields])) OR "battered women"[All Fields])) OR (((((((((("couple s"[All Fields] OR "coupled"[All Fields]) OR "coupling"[All Fields]) OR "couplings"[All Fields]) OR "family characteristics"[MeSH Terms]) OR ("family"[All Fields] AND "characteristics"[All Fields])) OR "family characteristics"[All Fields]) OR "couple"[All Fields]) OR "couples"[All Fields]) AND

(("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields])) OR (((((("emoting"[All Fields] OR "emotion s"[All Fields]) OR "emotions"[MeSH Terms]) OR "emotions"[All Fields]) OR "emotion"[All Fields]) OR "emotional"[All Fields]) OR "emotive"[All Fields]) AND ((("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields])) OR ((((((((((("economical"[All Fields] OR "economics"[MeSH Terms]) OR "economics"[All Fields]) OR "economic"[All Fields]) OR "economically"[All Fields]) OR "economics"[MeSH Subheading]) OR "economization"[All Fields]) OR "economize"[All Fields]) OR "economized"[All Fields]) OR "economizes"[All Fields]) OR "economizing"[All Fields]) AND ((((((((((("abusable"[All Fields] OR "abuse s"[All Fields]) OR "abused"[All Fields]) OR "abuser"[All Fields]) OR "abuser s"[All Fields]) OR "abusers"[All Fields]) OR "abuses"[All Fields]) OR "abusing"[All Fields]) OR "abusive"[All Fields]) OR "abusively"[All Fields]) OR "abusiveness"[All Fields]) OR "substance-related disorders"[MeSH Terms]) OR ("substance related"[All Fields] AND "disorders"[All Fields])) OR "substance related disorders"[All Fields]) OR "abuse"[All Fields]))) OR (((((((((("isolate"[All Fields] OR "isolate s"[All Fields]) OR "isolated"[All Fields]) OR "isolates"[All Fields]) OR "isolating"[All Fields]) OR "isolation and purification"[MeSH Subheading]) OR ("isolation"[All Fields] AND "purification"[All Fields])) OR "isolation and purification"[All Fields]) OR "isolation"[All Fields]) OR "isolations"[All Fields])) OR (("violence against women"[Journal] OR (("violence"[All Fields] AND "against"[All Fields]) AND "women"[All Fields])) OR "violence against women"[All Fields]))
AND
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AND
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Landscaping the evidence of intimate partner violence and postpartum depression: A systematic review

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Landscaping the evidence of intimate partner violence and postpartum depression: A systematic review

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Word count: 4480

ABSTRACT

Objective: To assess the evidence of the association between exposure to intimate partner violence (IPV) and postpartum depression. IPV during pregnancy can have immediate and long-term physical and mental health consequences for the family. Therefore, it has been hypothesized that intimate partner violence may affect the risk of developing postpartum depression.

Methods: A systematic review was conducted according to the PRISMA guidelines. Pubmed, Embase, Global Health Library, Scopus, and Google scholar were searched for published studies without restrictions on language, time, or study design (up to May 2020). Studies were included if they assessed postpartum depression using the Edinburg Postnatal Depression Scale (cut-off ≥10), among women who had been exposed to IPV (emotional, physical and/or sexual abuse). The quality of studies was judged according to the Newcastle-Ottawa scale.

Results: A total of 33 studies were included in the review (participants n=131,131). The majority of studies found an association between exposure to IPV and the development of signs of postpartum depression. Overall, studies measured both exposure and outcome in various ways and controlled for a vast number of different confounders. Thirty per cent of the studies were set in low- and lower-middle-income countries while the rest were set in upper-middle- and high-income countries and the association did not differ across settings. Among the studies reporting aOR (n=26), the significant aOR ranged between 1.18-6.87 [95% CI: 1.12-11.78]. The majority of the studies were judged as 'good quality' (n=20/33).

Conclusion: We found evidence of an association between exposure to IPV and the development of signs of postpartum depression. Meta-analysis or individual patient data meta-analysis is required to quantify the magnitude of the association between IPV and postpartum depression.

PROSPERO registration number: CRD42020209435

ARTICLE SUMMARY

Strengths and limitations of this study:

- Our review used a uniform definition of postpartum depression (EPDS ≥10), allowing for a meaningful comparison across trials.
- We conducted an appropriate quality assessment of all included studies using the Newcastle-Ottawa scale.
- A limitation is the lack of a strictly uniform method for detection of intimate partner violence and postpartum depression, which make data in the field very heterogeneous.
- Another limitation is the broad range of confounders adjusted for in the 33 studies, which may limit meaningful comparison and affect the association between postpartum depression and intimate partner violence.

INTRODUCTION

Intimate partner violence (IPV) – also known as domestic violence – is defined as any behaviour by a current or former partner that causes physical, emotional, or sexual harm[1]. Women are most often the victims of IPV[2-4], and it is a global health issue, which affects one in three women during their lifetime, according to The World Health Organization (WHO)[1].

IPV has several immediate and long-term mental and physical health consequences for the victims, such as depression and physical impairment[5-7]. Further, IPV is adversely associated with several obstetric outcomes, including preterm birth, low birth weight, and miscarriage[8-10]. It may also have a negative effect on a child's development, e.g. delayed cognitive and language development, problems with emotional attachment, and behaviour problems[11 12]. However, the biochemical and psychological pathway between IPV and health is complex, and numerous factors influence this association, including socio-demographic and economic factors[13].

Studies provide varied and imprecise estimates when examining the association between IPV and postpartum depression (PPD)[14-17]. As an example Tho Tran et al (2018) found no association between exposure of physical IPV and PPD (aOR: 0.64; 95% CI: 0.30-1.35)[18], while Chaves et al (2019) reported a significant association between physical IPV and PPD (aOR; 2.53; 95% CI: 1.76-3.63)[17]. These diverse findings may be due to complexities in both the case definition of IPV, which ranges from physical, emotional, and sexual harm, and PPD, which is diagnosed according to different measurement scales. The Edinburgh Postnatal Depression Scale (EPDS) is a well-known and validated tool for the measurement of PPD, and it is based on a 10-item questionnaire with four response categories ranging from zero to three. Even though it is a validated tool for PPD, it is

applied in different ways across studies and countries. The EPDS has been validated in at least 37 languages[19] and studies from different countries have found different cut-off values, e.g. 7 in Lithuania[20] and 13 in the English language version[21]. The many different validated cut-off values may be explained by different cultures and different expressions of mental difficulties. Previous reviews have aimed to provide an overview of the evidence between IPV and PPD[5 22 23]. However, we assess the methodologic quality of these reviews to be low according to the 'A MeaSurement Tool to Assess systematic Review' (AMSTAR)[24] as most reviews did not adhere to key domains of review quality, i.e. following a prospectively specified or registered protocol, performing a comprehensive search by exploring more than 3 databases, performing searches without language restrictions, undertaking duplicate study selection or considering the quality of included studies. Hence, there is a need for a systematic review of the latest evidence of the field across countries and economic conditions. The aim of this systematic review was to landscape the evidence of IPV and PPD in both high-income countries and low-income countries and synthesise the evidence taking confounders and quality into consideration.

METHODS

We conducted a protocol-driven systematic review (PROSPERO ID: CRD42020209435, prospectively registered), which is reported according to the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) guidelines (appendix I).

Search strategy and selection criteria

We searched PubMed, Embase, SCOPUS, Global Health Library, and Google scholar without any restrictions on language, study design, or time from 27 April to 10 May 2020. The search strategy was developed in collaboration with a librarian from the University of Southern Denmark (SDU). A comprehensive search, using search terms such as "pregnancy" OR "mother" OR "maternal" AND "intimate partner violence" OR "gender-based violence" OR "domestic violence" AND "mental health" OR "postpartum depression" (appendix II).

We included original publications with women exposed to IPV compared to non-exposed women that reported outcomes on PPD. We only included studies, which reported Risk Ratios (RR) or Odds Ratios (OR). We defined IPV in accordance with the WHO definition, i.e. any behaviour an intimate partner can cause; physical harm (e.g. slapping, hitting, kicking, and beating), emotional harm (e.g. controlling behaviours, monitoring their movements, insults, belittling, constant humiliation, intimidation) or sexual harm (e.g. forced sexual intercourse and other forms of sexual

coercion). We included studies with women who had ever been exposed to IPV by a current partner or former partner during index pregnancy or in the postpartum period. To increase the homogeneity of the outcome, we only included studies using the Edinburg Postnatal Depression Scale (EPDS) with a cut-off threshold of 10 or above as a measurement of PPD as this has shown to be a reliable and valid cut-off for postpartum depression[19].

The postpartum period was defined as >1 week to 12 months postpartum. Studies were excluded if the postpartum population was restricted to a subgroup, e.g. mothers with HIV or mothers who had newborns that were ill. Additionally, we excluded case reports, case series, conference abstracts, and reviews.

Studies were selected in a two-stage process using Covidence[25]. Firstly, two authors (LBSA and SN) independently screened titles and abstracts to identify eligible studies. Secondly, eligible studies were independently full text screened by two authors (LBSA and SN). Disagreements were resolved after discussion and if an agreement was not reached a third author was consulted (DSL or AKN). One author (LBSA) extracted data from the included studies into a standardised Excel temple. Data extraction included: title, first author, publication year, country, journal name, study quality, area of health, number of participants, population, risk factors in the population, age, setting and site, economic status of country, inclusion criteria, exclusion criteria, time for exposure, time for IPV screening, time for measure PPD, abuse tool, PPD tool, the prevalence of IPV and/or prevalence of PPD among the IPV exposed women, type of IPV, confounders adjusted for, as well as primary and secondary outcomes. Outcome data were verified by a second author (AKN) and disagreements were resolved through discussions.

Quality assessment

The methodological quality of included studies was assessed using the Newcastle Ottawa Scale (NOS) for cohort studies[26] and a modified version of NOS for cross-sectional studies. Two authors independently assessed the quality (LBSA and KA) and judged the following domains: selection process, comparability, and outcome. Item number one within the outcome domain, "Assessment of outcome" was not judged as the diagnosis of PPD is always self-reported and cannot be measured by medical records or independent blind assessment. According to the NOS scoring system[27 28] cohort studies that scored three or four stars in the selection, one or two in comparability, and two or three stars in the ascertainment of the outcome were regarded to be of 'good quality'. Further, cohort studies that scored two or three in the selection, one in the comparability, and two stars in the outcome ascertainment were considered to be of 'fair quality'. Finally, cohort studies that scored

one star in selection or outcome ascertainment or scored zero stars in any of the three domains were judged to have 'low quality'. According to the NOS guidelines for cross-sectional studies, studies were regarded as 'good quality' if rewarded ≥seven stars; 'fair/satisfactory' if rewarded five to six stars, and 'poor/unsatisfactory' if rewarded zero to four stars.

Data synthesis

In the descriptive analysis, we summarised study findings according to the economic status of the country where the study had been conducted. We defined the economic status according to The World Bank using the Gross National Income (GNI) of the country in 2019, i.e. low-income economies are those with a GNI per capital of $1,035 or less; lower-middle economies are those with a GNI per capital between $1,036-$4,045; upper-middle-income economies are those with a GNI per capital between $4,046 and $12,535, and high-income economies are those with a GNI per capital of $12,536 or more[29]. We further categorised the countries in 'Low- and lower-Middle-income Countries' (LMIC) and 'High and upper-Middle-Income countries'(HMIC).

Confounders were categorised within the following ten domains: maternal sociodemographic, childbirth-related, child-related, economic, family-related, maternal-mental health, maternal physical health, partner-related factors, type of violence and pregnancy related. In Tables 1 and 2, the domains are listed for each study and the number of confounders reported for each domain is listed as "n=x". In table 3, the specific confounders for each domain are clustered for the LMIC and HMIC countries.

To create a stringent and more homogenised overview of the association between IPV and PPD, we highlighted results that were reported as either aOR or aRR. These results were summarised in a forest plot according to the results of any IPV, physical IPV, and emotional IPV with descending quality in the vertical axis. If studies reported more than one type of IPV, results for "any IPV" was included in the forest plot. If studies did not report "any IPV", the results reported in the forest plot were prioritized as follows: physical IPV, emotional IPV, or sexual IPV. The results of all the cross-sectional studies and cohort studies of both HMIC and LMIC reporting OR or RR were all reported in tables 1 and 2, respectively.

Patient and public involvement

No patients involved.

RESULTS

A total of 3097 citations were imported for screening, 286 duplicates were removed, and 2811 studies were title-abstract screened. A total of 2411 studies were found irrelevant based on title or abstract, whilst 400 studies were full-text screened. The majority of the studies were excluded due to wrong outcomes, e.g. antepartum depression or wrong exposure, e.g. violence from a family member or stranger. Finally, 33 studies – 13 were cross-sectional and 20 cohort studies – were found eligible to be included in the review (Figure 1 and 2). Among the cross-sectional studies, eight were set in HMIC[14 15 30-35] and five in LMIC[36-40] whilst 15 were set in HMIC[17 41-54] and five in LMIC[6 7 18 55 56], among the cohort studies. Among the HMIC, most studies were set in Canada (n=4)[14 31 42 46], Australia (n=3)[17 45 50] and the United States (n=2)[41 52] whilst the most frequent LMIC countries were Ethiopia (n=3)[36 38 40], Bangladesh (n=2)[37 39], and Vietnam (n=2)[6 18]. A total of 131,131 women were included in the studies, and the sample size varied from 72[55] to 52,509 women[17] (median: 1128). Population age was either reported as mean age, in interval categories, or as a range. The mean ages ranged from 24,6-29,6 years in LMIC and 25,0-34,5 in HMIC.

Tools to measure the exposure, IPV, varied among the studies. Most of the studies (n=20) used well-known and/or validated IPV screening tools, such as the Abuse Assessment Screen (AAS) (n=5)[17 32 40 43 49], the Composite Abuse Scale (CAS) (n=1)[50], the Severity of Violence Against Women Scale (SVAWS) (n=1)[54], the Conflict Tactics Scale (CTS) (n=2)[15 33], Hurt, Insult, Threaten, Scream tool (HITS) (n=2)[41 52], Index of Spouse Abuse (ISA) (n=1)[34], Violence Against Women Survey (VAWS) (n=1)[31], Antenatal Psychosocial Health Assessment (ALPHA) (n=1)[42], NSW routine Domestic Violence Screening (n=1)[45] or WHO questionnaire based on the domestic violence module in the WHO Multicountry Study on Women's Health and Life Events (n=6)[6 18 35 37 39 47]. Whilst the 12 studies used unspecified questionnaire tools[7 14 30 36 38 44 46 48 51 53 55 56]. Overall, studies reported IPV in various ways; 16 studies measured "any IPV", defined as women exposed to at least one type of IPV (physical, emotional, sexual)[14 30 31 36 38 40 41 44 46 48 51-54 56 57] whilst 10 studies reported exposure to separate types of IPV, i.e. either physical, emotional and/or sexual violence[6 17 18 32 33 42 43 45 50 55]. Further, seven studies reported both an outcome for "any IPV" and separate IPV types[7 15 34 35 37 47 49]. The primary outcome, PPD, was diagnosed using EPDS, diagnosed at a cut-off threshold of 10 or above, and the majority of the studies used EPDS with a cut-off at ≥13[7 14 15 17 30 31 38 40 42 44 45 49 50 52 53 55]. Additionally, nine studies used a cut-off ≥10[6 18 32 36 37 39 41 46 54], two studies used cut-off ≥11[43 56] and six studies used cut-off ≥12[33-35 47 48 51].

Overall, the 33 studies adjusted for 48 different confounders. Both LMICs and HMICs were represented in all of the eight confounder domains (Table 3).

Table 3: Confounders adjusted for in the studies (n=33) clustered within the following domains

Confounder domains	Both LMIC/HIC	Upper-middle- and high-income countries	Low- and middle-income countries
Birth-related	▪ Gestational age at birth ▪ Neonate hospitalization ▪ Mode of childbirth	▪ Support after birth ▪ Interventions during birth	
Child-related	▪ Gender of child	▪ Satisfaction with infant's sleep patterns ▪ Congenital abnormalities	▪ Child temperament ▪ Breastfeeding initiation ▪ Fussy and difficult child
Economic factors	▪ Income (monthly, annual) ▪ Employment (maternal or partner) ▪ Education level (maternal or partner) ▪ Social support	▪ Food stamps past year ▪ Stressed due to insufficient money ▪ Health insurance ▪ Homeownership status ▪ Poverty status	
Family-related	▪ History of family physical/mental illness ▪ Relation with mother-in-law/own mother		▪ Family support after delivery
Maternal mental health	▪ History of mental illness (depression, PPD, other) ▪ stressful life events	▪ Low energy/optimism ▪ Chronic stress	▪ Self-esteem
Maternal physical health	▪ Substance use	▪ Alcohol use, smoking, body mass index	▪ HIV-status
Maternal sociodemographic	▪ Maternal age, marital status/cohabitation	▪ Ethnicity/race/immigration	▪ Age at first pregnancy
Partner-related	▪ Relationship satisfaction	▪ Partners alcohol consumption	▪ Partner's preference of child's gender ▪ Woman's autonomous for decision making
Pregnancy-related	▪ Parity ▪ Antenatal depression ▪ Pregnancy type (undesired, unplanned)	▪ Antenatal health problems ▪ Reaction to pregnancy	▪ Number of under-five children
Type of violence	▪ Type of IPV (phy, psy, sex) ▪ Past IPV ▪ Fear of partner ▪ Controlling behaviour	▪ History of abuse as a child ▪ Violence from family member ▪ Violence from stranger	▪ Antenatal violence

Study quality

Figure 2 sums up the study quality of the 20 HMIC and LMIC cohort studies according to the NOS. The first line represents how many studies were judged with an overall good or fair/poor quality

and the following lines shows how many studies that fulfil each of the NOS items. Among the 15 HMIC, 11 studies were judged as 'good quality'[17 41 43-47 50 52-54], two studies were judged as 'fair quality'[48 49] and two studies were judged as 'poor quality'[42 51]. Of the five LMIC cohort studies, three were judged as 'good quality'[6 7 18] and two were judged as 'poor quality'[55 56]. Most of the studies that were judged as 'poor quality' were due to inadequate adjustment of confounders. The cross-sectional studies were judged as follows, six were regarded as good quality[34 35 37-40], six of fair quality[14 15 31-33 36], and one of poor quality[30]. The quality judgement for all studies is summarised in tables 1 and 2.

Association between IPV and postpartum depression

The majority of studies, 88% (n=29/33) found an association between exposure to IPV (any or type-specific) and development of PPD. A total of 23 studies reported "any IPV" and among these, 91% (n=21/23) found a significant association between IPV and PPD. Among the studies, which reported physical violence (n=12)[6 7 15 17 18 33 37 42 45 47 50 55], 75% (n=9/12) found a significant association[6 7 15 17 33 37 42 45 50] (aOR range was 1.50-3.94; 95% CI: 1.30-6.86). Further, 15 studies reported emotional IPV[6 7 17 18 32 35 37 39 42 43 45 47 49 50 55] and seven studies reported sexual IPV[6 7 16 37 39 42 55]. In addition 67% found an association between emotional IPV and PPD[17 18 32 35 42 43 45 47 49 50] (aOR range: 1.58-4.6; 95% CI: 1.04-5.1) and 42% (n=3/7) found an association between sexual IPV and PPD[6 7 42] (aOR range: 1.98-2.75; 95% Cl: 1.22-6.36)[6 42] (table 1-2).

Table 1. Overview of cohort studies on post-partum depression among IPV victims set in upper-middle and high income Countries

Author, year	Country	Study size	Mean age [cat./ range]	Time of exposure	Measurement of postpartum depression	EDPS cut-off point	Confounders adjusted for (n=no. of factors)[c]	Risk of PPD (95% CI)	Subgroup analysis, risk of PPD	Prevalence of IPV [prevalence of PPD among IPV exposed][a]	NOS score
Cohort studies											
Adynski H, 2019	USA	2,510	25.6	Lifetime	1m, 6m, 12m, 18m, 24m	≥10	Economic factors (n=5); Maternal sociodemographic (n=2)	aOR_{anyIPV}: 1.18 (1.12–1.25)			Good
Chaves K, 2019	Australia	52,509	[<20, 20-39, >40]	<12m	<6w	≥13	Birth-related (n=1); Economic factors (n=1); Maternal physical health (n=4); Maternal mental health (n=1); Maternal sociodemographic (n=2)	aOR_{phyIPV}: 2.53 (1.76–3.63)	$aOR_{fearIPV}$: 3.53 (2.50–5.00)	phyIPV: 1.8%, fearIPV: 1.4% [phyIPV: 6.9%, fearIPV: 9.4%]	Good
Dennis DL, 2013	Canada	634	28.5	Lifetime, current	8w	≥13	Unadjusted	cOR_{phyIPV}: 2.59 (1.21-5.53) cOR_{sexIPV}: 2.23 (1.28-3.89)	$cOR_{emo/humIPV}$: 2.46 (1.37-4.42) $cOR_{emo/fearIPV}$: 3.21 (1.74-5.90)	phyIPV: 7.7 %	Poor
Escribá-Agüir V, 2013	Spain	140	[<27,27-34,>34]	Lifetime, <12m	5m, 12m	≥11	Economic factors (n=2); Maternal mental physical health (n=1); Maternal sociodemographic (n=2)	aOR_{emoIPV}: 4.11 (1.23-13.73)		anyIPV: 11% $emoIPV_{<12m}$: 1.7% [emo: 54.1%]	Good
Flach C, 2011	UK	13,617	27	Antenatal	2m, 8m, 21m, 33m	≥13	Birth-related (n=1); Child-related (n=1); Economic factors (n=2); Maternal physical health (n=2); Maternal mental health (n= 1); Maternal sociodemographic (n=1)	aOR_{anyIPV}: 1.29 (1.02-1.63)		emoIPV: 6% phyIPV: 2 % emo/phyIPV: 7%	Good
Gaillard A, 2014	France	264		Lifetime	6-8w	≥12	Unadjusted	cOR_{any}: 3.0 (1.1–8.6)			Fair
Ludermir AB, 2010	Brazil	1045	[18-24, ≥25]	Antenatal	3-6m	≥12	Economic factors (n=2); IPV-type (n=1); Partner related (n=1); Maternal sociodemographic (n=3); Maternal mental health (n=2); Length of follow-up (n=1)	aOR_{anyIPV}: 1.76 (1.05-2.93) aOR_{emoIPV}: 1.58 (1.04–2.39) aOR_{phyIPV}: 0.91 (0.54–1.54) $aOR_{phy/sexIPV}$: 0.77 (0.27–2.14)	$aOR_{emo,serIPV}$: 2.29 (1.15–4.57) $aOR_{emo,modIPV}$: 1.40 (0.88–2.22)	emoIPV: 28.1% phyIPV: 11.8% sexIPV: 5.7% [phyIPV: 48 %]	Good
Malta LA, 2012	Canada	1319	[<25, 25-34, 35+]	Lifetime	8w	≥10	Economic factors (n=1); Maternal sociodemographic (n=2); Maternal mental health (n=4)	aOR_{any}: 1.66 (0.95-2.90)		anyIPV: [22%]	Good
Ogbo FA, 2018	Australia	17,564	[<20, 20-34, >35]	<12m	<6m	≥13	Birth-related (n=1); Economic factors (n=1); IPV type (n=1); Partner related (n=1); Maternal sociodemographic (n=2); Maternal mental health	aOR_{phyIPV}: 1.50 (1.30–1.70)	aOR_{emoIPV}: 4.60 (4.10–5.10)	anyIPV: [8%]	Good

							(n=1); Maternal physical health(n=1)			
Shwartz N, 2019	Israel	1128	[16-45]	Lifetime	6w-6m	≥10	Economic factors (n=3); Maternal mental health (n=2); Maternal sociodemographic (n=1); Wanted/unwanted pregnancy (n=1)	aOR_{anyIPV}: 1.58 (1.07–2.33)		anyIPV: 35.7%	Good
Tsai AC, 2016	South Africa	1238	[≥18]	≤12m	0-2m	≥13	Time-fixed and time-variable covariates (n=1)	aOR_{anyIPV}: 1.26 (1.13–1.40)			Good
Velonis AJ, 2017	USA	2018	[18-40]	≤12m	A few weeks (T1), 12m	≥13	Economic factors (n=1); Maternal sociodemographic (n=1); Maternal mental health (n=1)	aOR_{anyIPV}: 2.06 (1.21– 3.53)		anyIPV: 35.8% [10.4%]	Good
Wikman A, 2019	Sweden	2466	[≥18]	-	6w, 6m	≥12	Unadjusted	cOR_{anyIPV}: 3.6 (2.40–5.50)[b]	6m FU: cOR_{anyIPV}: 3.70 (2.10–6.30)	anyIPV: 4.1%	Poor
Woolhouse H, 2011	Australia	1305	30.9	≤12m	3m, 6m, 12m	≥13	Economic factors (n=1); Maternal sociodemographic (n=2); Maternal mental health (n=1)	aOR_{phyIPV}: 3.94 (2.44–6.36) aOR_{emoIPV}: 2.72 (1.72–4.13)		anyIPV: 16.6%	Good
Zhang, Y 2011	China	215	28	<12m pre-pregnancy	30-42d	≥13	Economic factors (n=2)	aOR_{anyIPV}: 6.87 (4.01-11.78) aOR_{emoIPV}: 4.03 (1.70-9.62)		anyIPV: 11.3% [25%]	Fair
Cross-sectional studies											
Afshari P, 2019	Republic of Iran	505	-	Antenatal	14d-6m	≥13	Birth-related (n=1); Child-related (n=1); Economic factors (n=2); Maternal mental health (n=3); Partner-related (n=1); Pregnancy-related (n=1)	aOR_{anyIPV}: 1.49 (0.49-4.59)		anyIPV: [74%]	Poor
Ahmad NA, 2018	Malaysia	5,727	[Cat.: 18-25,25-30,30-34,>35]	Lifetime	6-16w	≥12	Economic factors (n=3); Family-related (n=1); Maternal sociodemographic (n=1); Partner-related (n=1); Pregnancy-related (n=1)	aOR_{anyIPV}: 2.34 (1.12-4.87) aOR_{emoIPV}: 3.79 (1.93-7.45)		phy: 2.6 % emo: 3.7% sex: 1.2% anyIPV: 3,3%	Good
Beydoun HA, 2010	Canada	6,421	[15-40]	<2y	5-9m	≥13	Birth-related (n=1); Economic factors (n=2); Maternal sociodemographic (n=3); Maternal physical health (n=1); Pregnancy-related (n=4); Maternal mental health (n=1); Type of violence ((n=2)	aOR_{anyIPV}: 1.61 (1.06-2.45)		anyIPV: 5.7[18%]	Fair

Table 2. Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Low- and Lowermiddle-income Countries

Author, year	Country	Study size	Mean age [range, cat.]	Time of exposure	Measurement of post-partum	EDPS cut-off point	Confounders adjusted for (n=no. of factors)[b]	Risk of PPD (95% CI)	Subgroup analysis	Prevalence of IPV [prevalence of PPD among IPV exposed][a]	NOS score
Cohort studies											
Budhathoki N, 2012	Nepal	72		Lifetime	6w, 10w	≥13	Unadjusted	cOR_{phyIPV}: 1.37 (0.37- 5.05) cOR_{emoIPV}: 1.53 (0.41-5.75) cOR_{sexIPV}: 0.35 (0.04-2.98)		phyIPV: 20.8% emoIPV: 19.4% sexIPV: 13.9% [phyIPV: 26.7%]	Poor
Patel V, 2002	India	270	26	Lifetime, antenatal	6w	≥11	Unadjusted	$RR_{life.anyIPV}$: 2.1 (1.3-3.3)	$RR_{AN.anyIPV}$: 2.6 (1.6-4.3)	$anyIPV_{life}$: 13% $anyIPV_{AN}$: 6%	Poor
Rogathi JJ, 2017	Tanzania	1013	[18–24, 25–34, ≥ 35]	Antenatal	48h, 40w	≥13	Maternal health (n=2); Maternal mental health (n=2); Maternal sociodemographic (n=1); Pregnancy-related (n=1); Type of IPV (n=3)	aOR_{anyIPV}: 2.51 (1.67-3.76) aOR_{phyIPV}: 2.15 (1.13-4.11) aOR_{emoIPV}: 1.46 (0.92–2.30) aOR_{sexIPV}: 1.98 (1.22–3.23)		anyIPV: 8.2%	Good
Tho Tran N, 2018	Vietnam	1274	≥17	Entire period with present partner	4-12w	≥10	Birth-related (n=1); Economic factors (n=2); Maternal sociodemographic (n=2); Family-related (n=1); Partner-related (n=1); IPV-type (n=2)	aOR_{phyIPV}: 0.64 (0.30-1.35) aOR_{sexIPV}: 1.11 (0.59-2.07)	$aOR_{emoIPV.mild.}$: 2.28 (1.35–3.86) $aOR_{emoIPV.mod.}$: 3.15 (1.17–8.51) $aOR_{emoIPV,ser}$: 3.16 (0.83-12.03)	phyIPV: 8% emoIPV: 25.4% sexIPV: 9.5%	Good
Tho Tran N, 2019	Vietnam	1274	26	Antenatal	4-12w	≥10	Birth-related (n=1); Economic factors (n=2); Maternal sociodemographic (n=2); Family-related (n=1); Partner-related (n=1); IPV-type (n=2)	aOR_{phyIPV}: 1.93 (1.01-3.73) aOR_{emoIPV}: 1.01 (0.60-1.69) aOR_{sexIPV}: 2.75 (1.19-6.35)		anyIPV: 35.3% emoIPV: 32.3% phyIPV: 3.5% sexIPV: 9.8%	Good
Cross-sectional studies											
Abadiga M, 2019	Ethiopia	287	29.6	Within their intimate relationship	<12m	≥10	Economic factors (n=1); Pregnancy related (n=1); Maternal mental health (n=1)	aOR_{anyIPV}: 5.92 (2.44-14.40)		anyIPV: 23.7%	Fair
Abebe A, 2019	Ethiopia	555	24.3	Antepartum	>2w–6m	≥13	Birth-related (n=2); Family-related (n=1); Partner-related (n=1); Pregnancy-related (n=1); Maternal mental health (n=2)	aOR_{anyIPV}: 3.16 (1.76-5.67)		anyIPV: 16.4%	Good
Adamu AF, 2018	Ethiopia	618	28	Perinatal	<6w	≥13	Economic (n=1); Family-related (n=1); Partner-related (n=1); Maternal mental health (n=1)	aOR_{anyIPV}: 3.1 (1.60, 5.90)		[anyIPV: 59.8%]	Good

Islam Md J, 2017	Bangladesh	426	[14-18, 19-24, >25]	Pregestational, antepartum, postpartum	<6m	≥10	Birth-related (n=2); Child-related (n=1); Economic factors (n=3); Family-related (n=1); Maternal sociodemographic (n=1); Pregnancy related (n=3); Partner-related (n=2); Maternal mental health (n=3); Type of IPV (n=1)	aOR_{phyIPV}: 4.01 (2.07–7.76) aOR_{emoIPV}: 1.61 (0.62–4.17) aOR_{sexIPV}: 1.00 (0.49–2.03)		$anyIPV_{pre}$: 14.3% [$anyIPV_{pre}$: 57.4%] IPV_{AN}:11.3% [$anyIPV_{AN}$: 79%] IPV_{PP}: 9,2% [$anyIPV_{PP}$: 71.8%]	Good
Kabir ZN, 2014	Bangladesh	660	25	Lifetime, antepartum, postpartum	6-8m	≥10	Child-related (n=3); Economic factors (n=2); Family-related (n=1); Maternal sociodemographic (n=2); Partner-related (n=1); Type of IPV (n=1)	aOR_{sexIPV}: 1.09 (0.73-1.64) aOR_{emoIPV}: 1.05 (0.90-1.22) $aOR_{pp,anyIPV}$: 2.83 (1.72-4.64)		phyIPV: 70% $phyIPV_{AN}$: 18% $phyIPV_{PP}$: 52% $sexIPV_{pp}$: 65% emoIPV: 84%	Good

aOR = adjusted Odds Ratio, AN = Antenatal, EDPS = Edinburgh Postnatal depression Scale, emo IPV = emotional IPV, phyIPV = physical IPV, sexIPV = sexual IPV, PP = postpartum, PPD = postpartum depression.

[a]The prevalence of PPD among the IPV exposed women.

[b] Confounder domains adjusted for in the studies. The clustering is shown in table 3

High-income and upper-middle countries (HMIC)

Figure 3 and 4 illustrates the association of IPV and PPD across HMIC and LMIC with outcomes reported as aOR (n=26/33). Among the HMIC studies (n=23), the prevalence of "IPV overall" varied across studies, and so did the association within the different types of IPV. The prevalence of emotional IPV ranged from 1.7%-28.1%[43 47] among women reporting emotional IPV within the last year, whilst physical IPV had a prevalence range of 1.8%-37.8%[17 33].

The majority of HMIC studies found a significant association between IPV and PPD, which is clarified in figure 3 were almost 90% of the cohort studies (n=7/8) showed a significant association between "any IPV" and PPD with an aOR ranging from 1.18-6.87 (95% CI: 1.09-11.78). For physical IPV, all three studies found a significant association with an aOR ranging from 1.5-3.94 (95% CI: 1.30-6.36). Among the cross-sectional studies, most studies found an association between IPV and PPD; 75% (n=3/4) found a significant association for "any IPV" (aOR range: 4.61-4.30; 95% CI: 1.06-8.70) whilst the only studies reporting "physical IPV" and "emotional IPV", both found a significant result.

Low- and lower-middle-income countries (LMIC)

Figure 4 illustrates the results from LMIC countries that report aOR with the majority being cross-sectional studies (n=5/8). Overall, 75% (n=6/8) found a significant association across both study designs. The aOR for "any IPV" ranged from 2.51-5.92 (95% CI: 1.67-14.40), whilst it for "physical IPV" ranged from 2.75-4.1(95% CI: 1.19-7.76).

DISCUSSION

A total of 33 studies were included in this systematic review of which 13 were cross-sectional and 20 were cohort studies. Of the cross-sectional studies, eight were set in HMIC and five in LMIC and of the cohort studies 15 were set in HMIC whilst 5 were set in LMIC. The studies had considerable heterogeneity in terms of reported IPV exposure with varying cut-off scores ranging from 10-13 on the EPDS tool. The main findings, the association between "any IPV" and PPD ranged from aOR 1.18 to 6.87, with the association between specific types of IPV and PPD ranging

from aOR 1.50 to 5.93 for physical violence, aOR 1.58 to 4.60 for emotional violence, and aOR 1.98 to 2.75 for sexual violence. These results are in accordance with previous systematic reviews by Halim et al., Bacchus et al., Beydoun et al. and Necho et al[5 22 23 58].

The quality of the studies included in the present review was generally assessed to be good and if studies were assessed as "poor quality" it was mostly due to missing adjustment of confounders. Overall, a total of 48 different confounders were controlled for with most of the studies controlling for maternal sociodemographic characteristics,[23]. Surprisingly, only half of the studies controlled for history of depression, though it is a well-known risk factor for developing PPD[58]. None of the studies adjusted for risk factors such as poor postpartum sleep and vitamin D deficiency, which is reported as risk factors in a systematic review from 2020. In addition, studies from both HICs and LMICs have shown an association between unintended pregnancy and postpartum depression with risk estimates of 2.0 and 2.5, respectively[59 60]. Further, research has shown that emotional violence has an influence on fertility as to decreased control of fertility, abortion and non-planned pregnancy[61].

Generally, there were no major differences in the association between HMICs and LMICs, though more cohort studies set in HMICs found an association between emotional IPV and PPD compared to LMICs. According to our current knowledge, this review is the first of its kind which divides the results into HMIC and LMIC countries. The authors decided to do so because of the great cultural and economic differences that exist between HMIC and LMIC countries, in an attempt to make the results more homogeneous.

When focusing on the present review, a strong association between any IPV and PPD was found. This finding is in line with a previous systematic review and meta-analysis that found exposure to any IPV increased the risk of PPD by 1.5 to 2.0 times[22]. Research examining the pathways between IPV and PPD is sparse. Traditionally, PPD is believed to be largely caused by hormonal and other physiological changes associated with pregnancy and childbirth[62]. Additionally, it is recognized that PPD is also associated with various psychological, socioeconomic, and cultural factors[63-66]. It is further acknowledged that stressful events like IPV exposure can cause an imbalance between environmental demands and individual resources which may lead to decreased resistance, increased susceptibility to mental health problems and consequently the onset of depression[67].

Not only is IPV a major stressor and a traumatic event that can lead to depression, but it is also known that IPV affects the victim's trust in others, fear, coping styles and levels of isolation which

additionally may increase the risk of depression[68]. In addition, people who suffer from depression are known to have symptoms like irritability, loss of energy and enjoyment, sensitivity to criticism and generally pessimism, which may seem burdensome or unreasonable for the spouses[69]. Thus, there may be a bi-directional association between IPV and depression. Hence not only is IPV associated with an increased risk of subsequent symptoms of depression but also depression symptoms may be associated with an increased risk of subsequent IPV[53].

When looking at the specific types of IPV, we found that physical IPV was significantly associated with PPD. We also found an association, between emotional IPV and PPD, although less pronounced. This weaker association may reflect reporting bias since emotional IPV is more difficult to measure than physical IPV. Women who are exposed to emotional IPV may not perceive themselves as victims of abuse. From their perspectives, acts such as shouting or threatening behaviours are often considered a result of a "hot temper". However, women who are living in a relationship where she is being shouted at, threatened or humiliated may lose their sense of self-esteem and independence and thus be at increased risk of developing depression[6]. Finally, a strong association between sexual IPV and PPD was found. Some investigators have noted that pregnant women with a history of sexual abuse may re-experience memories of their abuse during procedures of routine pregnancy care[70 71] as the reactivation of memories of sexual abuse may trigger the development of antepartum and postpartum depression[72].

Identification of IPV victims is crucial in the fight against IPV. When focusing on pregnant women, antenatal care provides a window of opportunity for identifying women exposed to IPV. The effectiveness of IPV screening has been evaluated in a Cochrane review from 2015 where screening was compared with standard care. The screening was associated with 4.5-fold odds for identification of pregnant women exposed to IPV[73]. IPV screening should ideally go hand in hand with harm reduction interventions like counselling e.g. in sessions on video or telephone to improve empowerment, reduce isolation and start safety planning. These interventions may affect both IPV and PPD. However, if IPV and depression are intertwined in a vicious cycle as described above, these mutually reinforcing effects could undermine the success of video or telephone-based IPV interventions. Thus, combined interventions involving a multi-component approach which both address the spouse and includes cognitive-behavioural therapy may be more effective in interrupting the cycle of IPV and depression[74].

A strength of this review is that it is based on an extensive systematic search of five online databases. Further, we applied the PRISMA guidelines to direct the review, thus a uniform and transparent approach were used to synthesize the latest evidence of IPV exposure and PPD. In addition, we conducted an appropriate quality assessment of all included studies using NOS. However, a limitation of NOS is that the scale has to be adapted to specific research designs, which can lead to the possibility of low agreement between quality assessors[26]. To cover the field of interest in a comprehensive manner, we included both cross-sectional and cohort studies from LMICs and HMICs. This approach may have resulted in heterogeneity across studies and thus limited our ability for more in-depth analysis.

To create a stringent and more homogenized overview, we decided to narrow the inclusion criteria to only studies using EPDS with a cut-off ≥10 and outcome reported as RRs or ORs. The pre-defined cut-off threshold of ≥10 was chosen to support the global orientation in the review that address PPD across many countries in both HMIC and LMIC and taking the wide range of different validated cut-offs into consideration. Other studies have suggested the following thermology 'possible minor depression' and 'possible major depression' at cut-off ≥10 and ≥13 respectively. This terminology must be kept in mind but will not be used throughout the manuscript where the diagnosis in many cases also could be classified as "signs of postpartum depression". Like every other measurement tool, EDPS has its strength and limitations. With a cut-off at 10, some women may screen false positive. To account for this, we reviewed the studies to consider whether a cut-off at 13 would change the association. But even after excluding studies with cut-off ≥13 the majority of studies still showed an association between IPV and PPD, except only four LMIC studies would be left in the review.

Another limitation of this review is that due to the heterogeneity of the included studies, we were not able to perform a metanalysis. However, we presented aOR from the studies in a forest plot and ordered them according to quality. This approach helps illustrate the association between IPV exposure and PPD while considering the quality of the studies. Another factor that adds to the heterogeneity across studies, is the variance in reported IPV exposure. Variation in measurement and reporting is an acknowledged problem within women's and newborn health and has led to initiatives that aim to establish Core Outcome Sets (COS). As a result of this initiative, a standardized set of outcome measures has been developed within, e.g. pre-eclampsia[75]. To guide

future IPV research there is likewise a need for harmonizing IPV outcome measures and establish a core outcome set for IPV reporting, which has also been suggested elsewhere[76].

CONCLUSION

This systematic review contributes to the existing literature on IPV and adverse health outcome by summarizing current knowledge on the association between IPV and PPD. We found evidence of an association between IPV exposure and PPD across all study designs and settings, thus we suggest that large multi-national longitudinal studies where targeted and effective interventions are prioritized. This may help address the problem of IPV and improve women's health and also allow for future meta-analyses. Further, we recommend well-defined outcome measures and the establishment of core outcome sets to better estimate the association between IPV and associated outcomes.

Contributions

LSBA, VR and DSL conceptualised the study and wrote the protocol. LSBA, SN and DSL included the studies. LSBA did the data extraction and analysed the data and ANK verified it. KA and LBSA made the quality assessment. CW made the forest plot. LBSA and VR drafted the manuscript and DSL, AKN, KA and SN critically revised it. All authors approved the final version of the manuscript.

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Conflict of Interest

No conflicts of interest to declare.

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Appendix, supplementary

Appendix I: PRISMA checklist

Appendix II: Search strategy

Data Availability Statement

No additional data available.

Abbreviations:

AAS	Abuse Assessment Score
AN	Antenatal
aOR	Adjusted Odds Ratio
aRR	Adjusted Relative Risk
CI	Confidence Interval
EPDS	Edinburgh Postnatal depression Scale
GNI	Gross National Income
HMIC	High and upper-Middle-Income countries
IPV	Intimate Partner Violence
LMIC	Low- and lower-Middle-Income Countries
NOS	Newcastle-Ottawa scale
OR	Odds Ratio
PP	Postpartum
PPD	Postpartum depression
RR	Relative Risk
SCID	Structured Clinical Interview for DSM-IV
WHO	World Health Organization

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Figures and tables:

Figure 1: Flow diagram of study selection in the review of intimate partner violence and postpartum depression.

Figure 2: Quality assessment of cohort studies according to country economic status and stars awarded for each item of the Newcastle-Ottawa Scale.

Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a forest plot ordered according to descending quality.

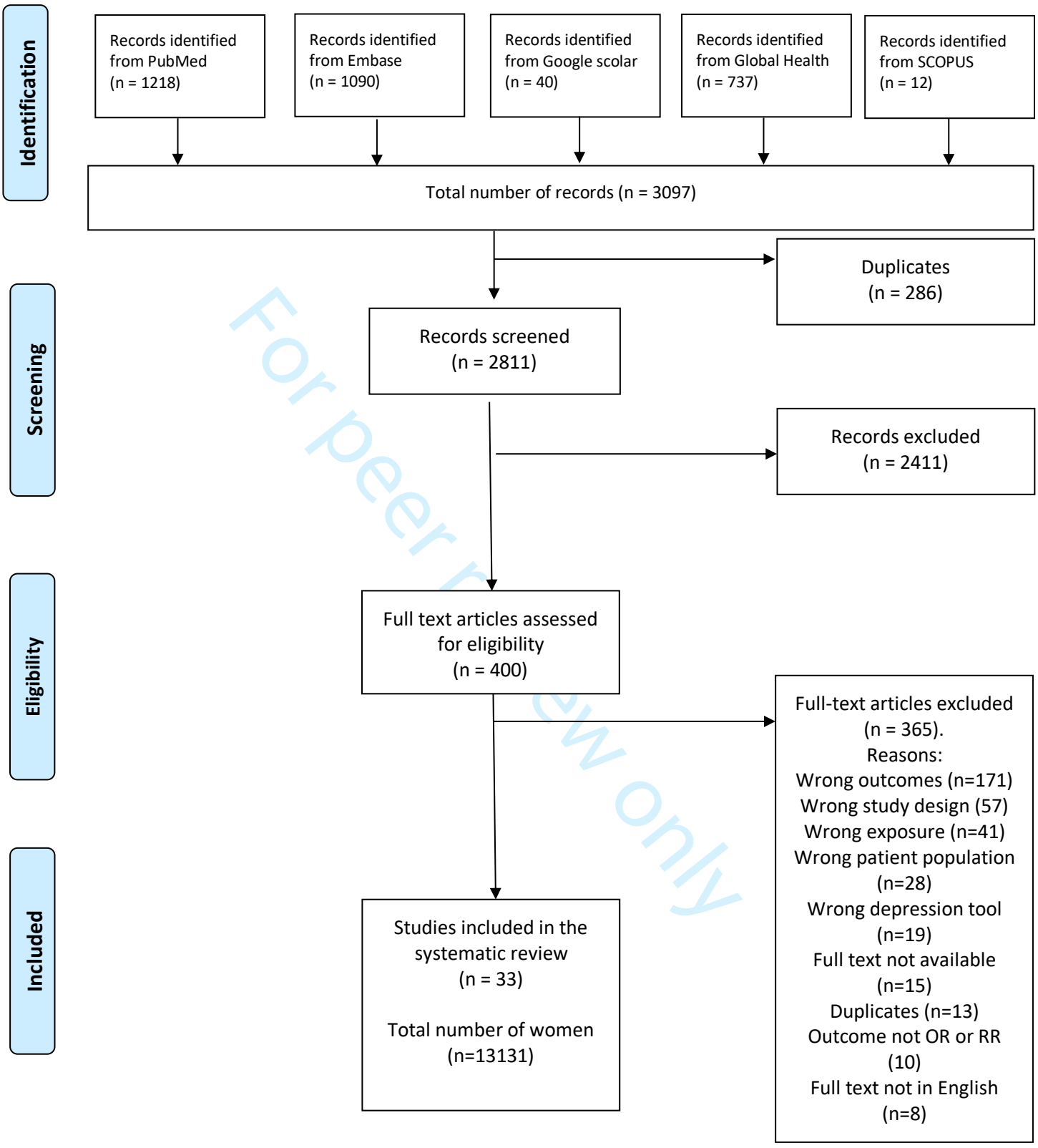
Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a forest plot ordered according to descending quality.

Table 1: Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Upper-middle and High-income countries.

Table 2: Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Low and Lower-middle-income countries.

Table 3: Confounders adjusted for in the studies (n=33) clustered within the following domains.

Figure 1: flow diagram of study selection in the review of intimate partner violence and postpartum depression



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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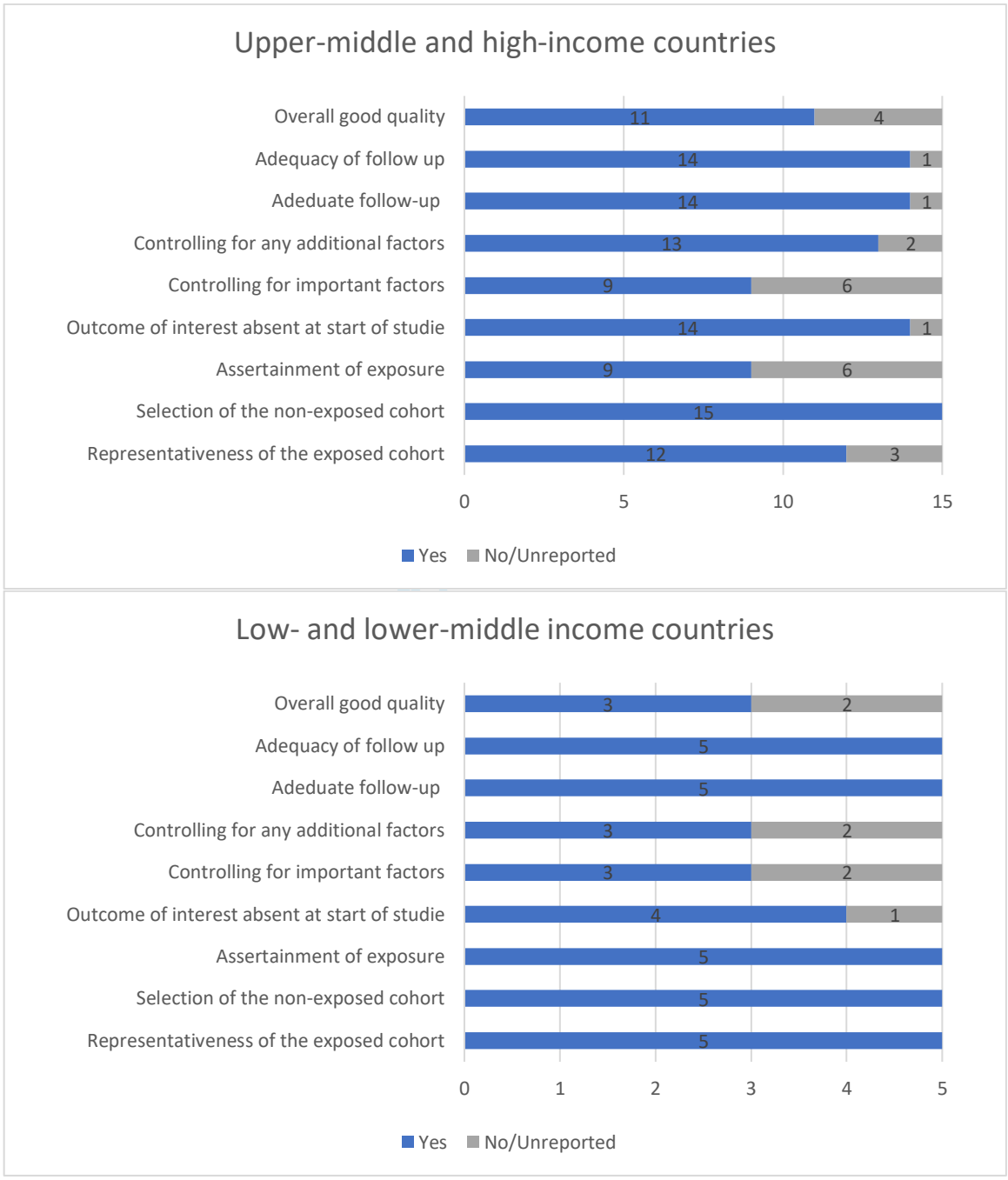

Figure 2: Quality assessment of cohort studies (X-axis) according to country economic status. Stars/points was awarded in each category of the Newcastle-Ottawa Scale (Y-axis). When awarded 7 stars/points or more the article was entitled 'yes'

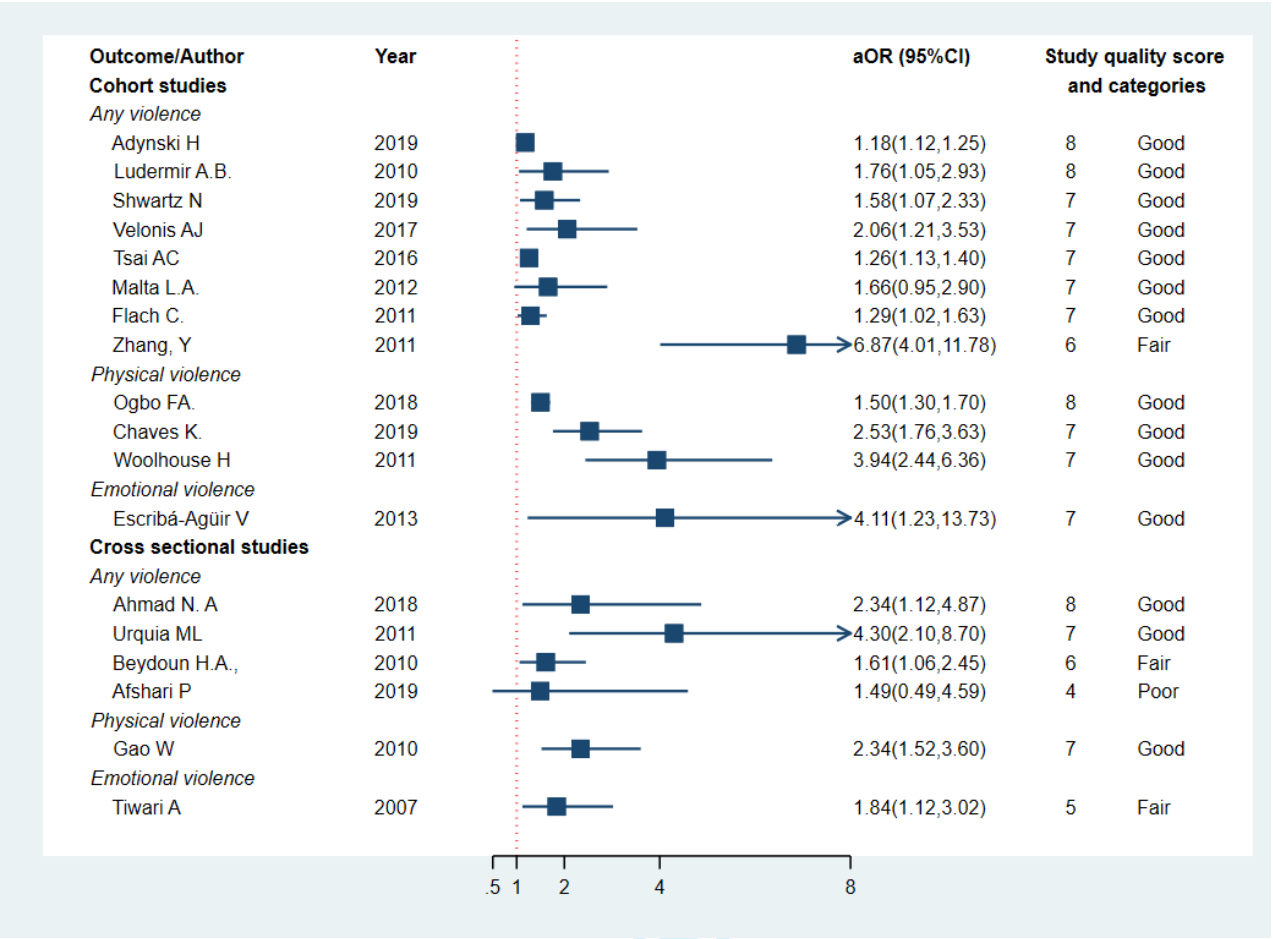

Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a forest plot ordered according to descending quality.

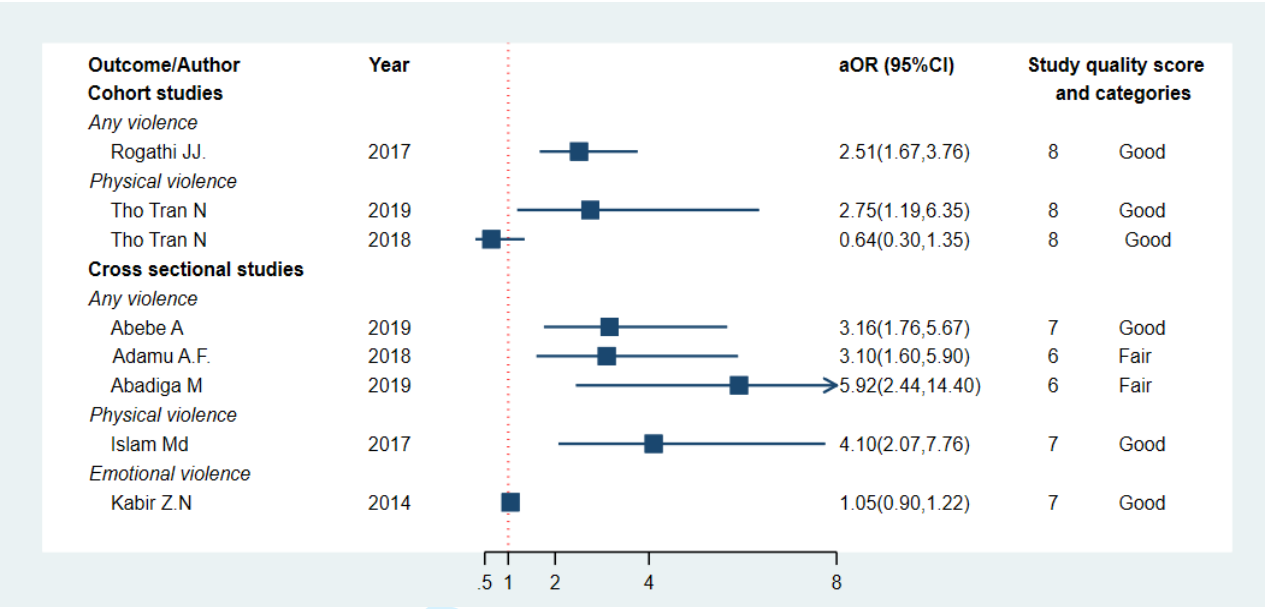

Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a forest plot ordered according to descending quality.

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4 l 116-119
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5, l 130-131

PRISMA 2009 Checklist

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6-7, l173-195

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	8 l 244-251
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7 l 197-201
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-8
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9-10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	10-11
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	11-12
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	12

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

PRISMA 2009 Checklist

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Appendix: search strategy

Embase Classic + Embase (1947-2020 May 8): Searched on the 10th of Maj 2020

#1	Spouse abuse.mp or exp. Partner violence
#2	Exp. Battered women/or spousal abuse.mp
#3	Domestic violence.mp or exp. Domestic violence
#4	Exp. dating violence
#5	Exp. Family violence/or wife abuse.mp
#6	Psychological violence.mp or exp. emotional abuse
#7	Violence/or exp. human rights/
#8	Exp. gender based violence/
#9	Violence against women.mp
#10	*physical abuse/
#11	Physical maltreatment.mp
#12	*sexual violence/or *sexual abuse/
#13	Exp. Family violence/
#14	*emotional abuse/
#15	Controlling behavior.mp
#16	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15
#17	Mothers.mp
#18	Maternal.mp
#19	Pregnancy/or pregnancy.mp
#20	17 or 18 or 19
#21	16 and 20
#22	Postpartum depression.mp or exp. Postnatal depression/
#23	Postnatal depression.mp. or puerperal depression/ exp. Postnatal depression
#24	Posttraumatic stress disorder/
#25	*mental health/
#26	22 or 23 or 24 or 25
#21	21 and 26

Global health, EBSCOhost: Searched on the 10th of Maj 2020

S1	Spouse abuse OR intimate partner violence OR partner violence OR domestic violence OR dating violence OR wife abuse OR (psychological violence or abuse) OR (gender based violence or violence against women) OR physical abuse OR physical maltreatment OR sex offenses OR (sexual violence or sexual assault or rape) or family abuse OR emotional abuse OR controlling behavior OR wife beating
S2	Postpartum depression OR post traumatic stress disorder OR postnatal depression OR depressive disorder OR (mental health or mental illness or mental disorder or psychiatric illness)
S3	(mothers or mother or motherhood or maternal) OR pregnancy
S4	S1 AND S2 AND S3

Scopus: Searched on the 10th of Maj 2020

TITLE-ABS-KAY (“spouse abuse”) OR TITLE-ABS-KAY (“intimate partner violence”) OR TITLE-ABS-KAY (“domestic violence”) OR TITLE-ABS-KAY (“dating violence”) OR TITLE-ABS-KAY (“wife abuse”) OR TITLE-ABS-KAY (“psychological violence”) OR TITLE-ABS-KAY (“gender-based violence”) OR TITLE-ABS-KAY (“physical abuse”) OR TITLE-ABS-KAY (“physical maltreatment”) OR TITLE-ABS-KAY (“sex offenses”) OR TITLE-ABS-KAY (“sexual violence”) OR TITLE-ABS-KAY (“battered women”) OR TITLE-ABS-KAY (“violence against women”) OR TITLE-ABS-KAY (“family violence”) OR TITLE-ABS-KAY (“emotional abuse”) OR TITLE-ABS-KAY (“controlling behavior”) OR TITLE-ABS-KAY (“wife beating”) AND TITLE-ABS-KAY (“mother”) OR TITLE-ABS-KAY (“pregnancy”) OR TITLE-ABS-KAY (“maternal”) AND TITLE-ABS-KAY (“postpartum depression”) OR TITLE-ABS-KAY (“postnatal depression”) OR TITLE-ABS-KAY (“mental disorder”) OR TITLE-ABS-KAY (“post-traumatic stress disorders”) OR TITLE-ABS-KAY (“depressive disorder”) OR TITLE-ABS-KAY (“mental health”) OR TITLE-ABS-KAY (“mental health associations”)

Pubmed: Searched on the 27th of April

((((((((((((((((((("spouse abuse"[MeSH Terms] OR "intimate partner violence"[MeSH Terms]) OR "spouse abuse"[MeSH Terms]) OR "domestic violence"[MeSH Terms]) OR "domestic violence"[MeSH Terms]) OR ((((("intimate partner violence"[MeSH Terms] OR (("intimate"[All Fields] AND "partner"[All Fields]) AND "violence"[All Fields])) OR "intimate partner violence"[All Fields]) OR ("dating"[All Fields] AND "violence"[All Fields])) OR "dating violence"[All Fields])) OR ((((((("psychologic"[All Fields] OR "psychological"[All Fields]) OR "psychologically"[All Fields]) OR "psychologization"[All Fields]) OR "psychologized"[All Fields]) OR "psychologizing"[All Fields]) AND ((("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields]))) OR ((((("spouse abuse"[MeSH Terms] OR ("spouse"[All Fields] AND "abuse"[All Fields])) OR "spouse abuse"[All Fields]) OR ("wife"[All Fields] AND "abuse"[All Fields])) OR "wife abuse"[All Fields])) OR ((((("gender-based violence"[MeSH Terms] OR ("gender based"[All Fields] AND "violence"[All Fields])) OR "gender based violence"[All Fields]) OR (("gender"[All Fields] AND "based"[All Fields]) AND "violence"[All Fields])) OR "gender based violence"[All Fields])) OR (("exposure to violence"[MeSH Terms] OR ("exposure"[All Fields] AND "violence"[All Fields])) OR "exposure to violence"[All Fields])) OR (("physical abuse"[MeSH Terms] OR ("physical"[All Fields] AND "abuse"[All Fields])) OR "physical abuse"[All Fields])) OR ((((("physical abuse"[MeSH Terms] OR ("physical"[All Fields] AND "abuse"[All Fields])) OR "physical abuse"[All Fields]) OR ("physical"[All Fields] AND "maltreatment"[All Fields])) OR "physical maltreatment"[All Fields])) OR ((((("sex offenses"[MeSH Terms] OR ("sex"[All Fields] AND "offenses"[All Fields])) OR "sex offenses"[All Fields]) OR ("sexual"[All Fields] AND "violence"[All Fields])) OR "sexual violence"[All Fields])) OR ("rape"[MeSH Terms] OR "rape"[All Fields])) OR (("battered women"[MeSH Terms] OR ("battered"[All Fields] AND "women"[All Fields])) OR "battered women"[All Fields])) OR (((((((((("couple s"[All Fields] OR "coupled"[All Fields]) OR "coupling"[All Fields]) OR "couplings"[All Fields]) OR "family characteristics"[MeSH Terms]) OR ("family"[All Fields] AND "characteristics"[All Fields])) OR "family characteristics"[All Fields]) OR "couple"[All Fields]) OR "couples"[All Fields]) AND
((("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields]))) OR (((((((("emoting"[All Fields] OR "emotion s"[All Fields]) OR "emotions"[MeSH Terms]) OR "emotions"[All Fields]) OR "emotion"[All Fields]) OR "emotional"[All Fields]) OR "emotive"[All

Fields]) AND ((("violence"[MeSH Terms] OR "violence"[All Fields]) OR "violence s"[All Fields]) OR "violences"[All Fields])))) OR ((((((((((("economical"[All Fields] OR "economics"[MeSH Terms]) OR "economics"[All Fields]) OR "economic"[All Fields]) OR "economically"[All Fields]) OR "economics"[MeSH Subheading]) OR "economization"[All Fields]) OR "economize"[All Fields]) OR "economized"[All Fields]) OR "economizes"[All Fields]) OR "economizing"[All Fields]) AND ((((((((((((("abusable"[All Fields] OR "abuse s"[All Fields]) OR "abused"[All Fields]) OR "abuser"[All Fields]) OR "abuser s"[All Fields]) OR "abusers"[All Fields]) OR "abuses"[All Fields]) OR "abusing"[All Fields]) OR "abusive"[All Fields]) OR "abusively"[All Fields]) OR "abusiveness"[All Fields]) OR "substance-related disorders"[MeSH Terms]) OR ("substance related"[All Fields] AND "disorders"[All Fields])) OR "substance related disorders"[All Fields]) OR "abuse"[All Fields])))) OR (((((((((("isolate"[All Fields] OR "isolate s"[All Fields]) OR "isolated"[All Fields]) OR "isolates"[All Fields]) OR "isolating"[All Fields]) OR "isolation and purification"[MeSH Subheading]) OR ("isolation"[All Fields] AND "purification"[All Fields])) OR "isolation and purification"[All Fields]) OR "isolation"[All Fields]) OR "isolations"[All Fields])) OR (("violence against women"[Journal] OR (("violence"[All Fields] AND "against"[All Fields]) AND "women"[All Fields])) OR "violence against women"[All Fields]))
AND
((((("pregnancy in adolescence"[MeSH Terms] OR "pregnant women"[MeSH Terms]) OR (("perinatal"[All Fields] OR "perinatally"[All Fields]) OR "perinatals"[All Fields])) OR ((((("postpartum period"[MeSH Terms] OR ("postpartum"[All Fields] AND "period"[All Fields])) OR "postpartum period"[All Fields]) OR ("postpartum"[All Fields] AND "women"[All Fields])) OR "postpartum women"[All Fields])) OR "pre-pregnancy"[All Fields])) AND (((((("depression, postpartum"[MeSH Terms] OR "mental disorders"[MeSH Terms]) OR "mental health associations"[MeSH Terms]) OR "stress disorders, post-traumatic"[MeSH Terms]) OR ((((("depression, postpartum"[MeSH Terms] OR ("depression"[All Fields]
AND
"postpartum"[All Fields])) OR "postpartum depression"[All Fields]) OR (("post"[All Fields] AND "natal"[All Fields]) AND "depression"[All Fields])) OR "post natal depression"[All Fields])) OR (((((("birth s"[All Fields] OR "birthed"[All Fields]) OR "birthing"[All Fields]) OR "parturition"[MeSH Terms]) OR "parturition"[All Fields]) OR "birth"[All Fields]) OR "births"[All Fields]) AND ((((((((((((("consciousness disorders"[MeSH Terms] OR ("consciousness"[All Fields] AND "disorders"[All Fields])) OR "consciousness disorders"[All Fields]) OR "depressed"[All Fields]) OR "depression"[MeSH Terms]) OR "depression"[All Fields]) OR "depressions"[All Fields]) OR "depression s"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR ("depressive"[All Fields] AND "disorder"[All Fields])) OR "depressive disorder"[All Fields]) OR "depressivity"[All Fields]) OR "depressive"[All Fields]) OR "depressively"[All Fields]) OR "depressiveness"[All Fields]) OR "depressives"[All Fields])))