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

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| Complete List of Authors: | Ankerstjerne, Lea; Odense University Hospital, Department of Gynaecology and Obstetrics; University of Southern Denmark, Institute of Clinical Research Laizer, Sweetness; Kilimanjaro Christian Medical College Andreasen, Karen; Odense Universitetshospital, Gynaecology and Obstetrics Normann, Anne Katrine; Odense University Hospital, Deparment of Obstetrics and Gynecology Wu, Chunsen; University of Southern Denmark, Department of Clinical Research; Odense Universitetshospital, Obstetrics and Gynaecology Linde, Ditte; Odense Universitetshospital, Obstetrics and Gynaecology; University of Southern Denmark, Institute of Clinical Research Rasch, Vibeke; Odense Universitetshospital, Department of Gynaecology and Obstetrics; University of Southern Denmark, Institute of Clinical Research |
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| 5 6 | 1 | Landscaping the evidence of intimate partner violence and postpartum |
| 7 8 | 2 | depression: A systematic review |
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| 11 12 | 4 | Lea Bo Sønderlund Ankerstjerne ^{a,b} , Sweetness Naftal Laizer ^c , Karen Andreasen ^a , Anne Katrine |
| 13 14 | 5 | Normann ^b , Chunsen Wu ^{b,a} , Ditte Søndergaard Linde ^{a,b,e} , Vibeke Rasch ^{a,b} |
| 15 16 | 6 | |
| 17 | 7 | ^a Department of Gynaecology and Obstetrics, Odense University Hospital, Odense, Denmark |
| 18 19 | 8 | ^b Department of Clinical Research, University of Southern Denmark, Odense, Denmark |
| 20 | 9 | °Department of Kilimanjaro Clinical Research Institute, Kilimanjaro, Tanzania |
| 21 22 | 10 | ^e Department of Public Health, University of Southern Denmark, Esbjerg, Denmark |
| 23 24 | 11 | |
| 25 26 27 28 29 30 | 12 13 14 15 16 | <i>Corresponding author:</i> Lea Bo Sønderlund Ankerstjerne, Department of Gynaecology and Obstetrics, Odense University Hospital and department of Clinical Research, University of Southern Denmark, Kløvervænget 10, 10. sal,5000 Odense C, Denmark, ph.: +4521360642, e-mail: <u>lea.ankerstjerne@rsyd.dk</u> ORCID ID and QR Code: <u>https://orcid.org/0000-0002-0704-4482</u> |
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| 3 4 5 6 7 8 | 373839 | ABSTRACT Objective: To assess the evidence of the association between exposure to IPV and postpartum |
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| 6 7 | 39 | Objective: To assess the evidence of the association between exposure to IPV and postpartum |
| | | |
| | 4.0 | depression. IPV during pregnancy can have immediate and long-term physical and mental health |
| 9 10 | 40 | consequences for the family. Therefore, it has been hypothesized that intimate partner violence may |
| 11 12 | 41 | affect the risk of developing postpartum depression. |
| 13 | 42 | Methods: A systematic review was conducted according to the PRISMA guidelines. Pubmed, |
| 14 15 | 43 | Embase, Global Health Library, Scopus, and Google scholar were searched for published studies |
| 16 17 | 44 | without restrictions on language, time, or study design (up to May 2020). Studies were included if |
| 18 19 | 45 | they assessed postpartum depression using the Edinburg Postnatal Depression Scale (cut-off ≥10), |
| 20 | 46 | among women who had been exposed to IPV (emotional, physical and/or sexual abuse). The quality |
| 21 22 | 47 | of studies was judged according to the Newcastle-Ottawa scale. |
| 23 24 | 48 | Results : A total of 33 studies were included in the review (participants n=131,131). The majority of |
| 25 26 | 49 | studies found an association between exposure to IPV and the development of signs of postpartum |
| 27 | 50 | depression. Overall, studies measured both exposure and outcome in various ways and controlled |
| 28 29 | 51 | for a vast number of different confounders. Thirty per cent of the studies were set in low- and |
| 30 31 | 52 | lower-middle-income countries while the rest were set in upper-middle- and high-income countries |
| 32 33 | 53 | and the association did not differ across settings. Among the studies reporting aOR (n=26) the |
| 34 | 54 | significant aOR ranged between 1.18-6.87 [95% CI: 1.12-11.78]. The majority of the studies were |
| 35 36 | 55 | judged as 'good quality' (n=20/33). |
| 37 38 | 56 | Conclusion: We found evidence of an association between exposure to IPV and the development of |
| | 57 | signs of postpartum depression. Meta-analysis or individual patient data meta-analysis is required to |
| 40 41 | 58 | quantify the magnitude of the association between IPV and postpartum depression. |
| 42 43 | 59 | PROSPERO registration number: CRD42020209435 |
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68 ARTICLE SUMMARY

69 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.

80 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 harm¹. Women are most often
the victims of IPV²⁻⁴, 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 impairment⁵⁻⁷. Further, IPV is adversely associated with several
 obstetric outcomes, including preterm birth, low birth weight, and miscarriage⁸⁻¹⁰. 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 factors¹³.

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 53 95 (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 58 98 different measurement scales. The Edinburgh Postnatal Depression Scale (EPDS) is a well-known

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| 4 5 99 | and validated tool for the measurement of PPD, and it is based on a 10-item questionnaire with four |
| 6 100 | response categories ranging from zero to three. Even though it is a validated tool for PPD, it is |
| 7 8 101 | applied in different ways across studies and countries. The EPDS has been validated in at least 37 |
| 9 10 102 | languages ¹⁹ and studies from different countries have found different cut-off values, e.g. 7 in |
| ¹¹ 103 | Lithuania ²⁰ and 13 in the English language version ²¹ . The many different validated cut-off values |
| 12 13 104 | may be explained by different cultures and different expressions of mental difficulties. |
| 14 15 105 | Additionally, there no transparency in factors to be adjusted for, and study designs are often case- |
| 16 17 106 | control or cross-sectional, both of which may be prone to recall bias ^{14 15 22} . |
| 18 | Draviews reviews have simple to provide on every investigation of the avoid map hot way IDV and $DDD5^{23}$ |
| 19 107 20 21 108 | 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 |
| ²² 109 23 | MeaSurement Tool to Assess systematic Review' (AMSTAR) ²⁵ as most reviews did not adhere to |
| 24 110 25 | key domains of review quality, i.e. following a prospectively specified or registered protocol, |
| 26 111 27 112 | performing a comprehensive search by exploring more than 3 databases, performing searches |
| ²⁷ ₂₈ 112 | without language restrictions, undertaking duplicate study selection or considering the quality of |
| ²⁹ 113 30 | included studies. Hence, there is a need for a systematic review of the latest evidence of the field. |
| 31 114 32 | The aim of this systematic review was to landscape the evidence of IPV and PPD and synthesise the |
| ³² ₃₃ 115 34 | evidence taking confounders and quality into consideration. |
| ³⁵ 36 116 | METHODS |
| 36 37 117 | We conducted a protocol-driven systematic review (PROSPERO ID: CRD42020209435, |
| 38 39 118 | prospectively registered), which is reported according to the 'Preferred Reporting Items for |
| 40 41 119 | Systematic Reviews and Meta-Analyses' (PRISMA) guidelines (appendix I). |
| ⁴² 120 | |
| 43 ¹²⁰ 44 121 | Search strategy and selection criteria |
| 45 46 122 | We searched PubMed, Embase, SCOPUS, Global Health Library, and Google scholar without |
| 47 48 123 | language, study design, or time restrictions from 27 April to 10 May 2020. The search strategy was |
| ⁴⁹ 124 | developed in collaboration with a librarian from the University of Southern Denmark (SDU). A |
| 50 51 125 | comprehensive search, using search terms such as "pregnancy" OR "mother" OR "maternal" AND |
| 52 53 126 | "intimate partner violence" OR "gender-based violence" OR "domestic violence" AND "mental |
| ⁵⁴ 55 127 | health" OR "postpartum depression" (appendix II). |
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129 We included original publications with women exposed to IPV compared to non-exposed women 130 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 131 í₁₀ 132 intimate partner can cause; physical harm (e.g. slapping, hitting, kicking, and beating), emotional ¹¹ 133 harm (e.g. controlling behaviours, monitoring their movements, insults, belittling, constant 12 13 134 humiliation, intimidation) or sexual harm (e.g. forced sexual intercourse and other forms of sexual 14 15 135 coercion). We included studies with women who had ever been exposed to IPV by a current partner יי 17 136 or former partner during index pregnancy or in the postpartum period. To increase the homogeneity 18 137 of the outcome, we only included studies using the Edinburg Postnatal Depression Scale (EPDS) 19 with a cut-off threshold of 10 or above as a measurement of PPD as this has shown to be a reliable 20 1 38 21 21 22 139 and valid cut-off for postpartum depression¹⁹.

²³ 140 The postpartum period was defined as >1 week to 12 months postpartum. Studies were excluded if 25 141 the postpartum population was restricted to a subgroup, e.g. mothers with HIV or mothers who had 27 142 newborns that were ill. Additionally, we excluded case reports, case series, conference abstracts, 20° 143 and reviews.

Studies were selected in a two-stage process using Covidence²⁶. Firstly, two authors (LBSA and 32 1 4 5 34 146 SN) independently screened titles and abstracts to identify eligible studies. Secondly, eligible ³⁵ 147 studies were independently full text screened by two authors (LBSA and SN). Disagreements were 37 148 resolved after discussion and if an agreement was not reached a third author was consulted (DSL or 39 1 4 9 AKN). One author (LBSA) extracted data from the included studies into a standardised Excel 40 41 150 temple. Data extraction included: title, first author, publication year, country, journal name, study 42 43 151 quality, area of health, number of participants, population, risk factors in the population, age, setting 44 1 5 2 and site, economic status of country, inclusion criteria, exclusion criteria, time for exposure, time 46 153 for IPV screening, time for measure PPD, abuse tool, PPD tool, the prevalence of IPV and/or 47 48 154 prevalence of PPD among the IPV exposed women, type of IPV, confounders adjusted for, as well ⁴⁹ 155 as primary and secondary outcomes. Outcome data were verified by a second author (AKN) and disagreements were resolved through discussions. 51 1 56

54 157 **Quality assessment**

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⁵⁵ 158 56 The methodological quality of included studies was assessed using the Newcastle Ottawa Scale 57 1 59 (NOS) for cohort studies²⁷ and a modified version of NOS for cross-sectional studies. Two authors 58 59 160 independently assessed the quality (LBSA and KA) and judged the following domains: selection 60

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.

73 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 more³⁰. We further categorised the countries in 'Low- and lower-Middleincome 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

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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.

¹⁰₁₁ 196 **RESULTS**

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12 12¹197 A total of 3097 citations were imported for screening, 286 duplicates were removed, and 2811 ¹⁴ 198 studies were title-abstract screened. A total of 2411 studies were found irrelevant based on title or 15 16 199 abstract, whilst 400 studies were full-text screened. The majority of the studies were excluded due 17 18 200 to wrong outcome, e.g. antepartum depression or wrong exposure, e.g. violence from a family ¹⁹₂₀201 member or stranger. Finally, 33 studies – 13 were cross-sectional and 20 cohort studies – were ²¹ 202 22 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 LMIC³⁷⁻⁴¹ whilst 15 were set in HMIC^{17 42-55} and five in 23 203 ²⁴ 25 204 LMIC⁶⁷¹⁸⁵⁶⁵⁷, among the cohort studies. Among the HMIC, most studies were set in Canada ²⁶ 205 $(n=4)^{14}$ 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 28 206 29 30 207 131,131 women (median: 1128) were included in the studies, and the sample size varied from 72⁵⁶ ³¹ 32 208 to 52,509 women¹⁷. Population age was either reported as mean age, in interval categories, or as a ³³ 209 range. The mean ages ranged from 24,6-29,6 years in LMIC and 25-34,5 in HMIC. 34

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36 37 211 Tools to measure the exposure, IPV, varied among the studies. Most of the studies (n=20) used ³⁸₃₉212 well-known and/or validated IPV screening tools, such as the Abuse Assessment Screen (AAS) 40 213 (n=5)^{17 33 41 44 50}, the Composite Abuse Scale (CAS) (n=1)⁵⁸, the Severity of Violence Against 41 42 214 Women Scale (SVAWS) (n=1)⁵⁵, the Conflict Tactics Scale (CTS) (n=2)^{15 34}, Hurt, Insult, Threaten, 43 44 215 Scream tool (HITS) (n=2)^{42 53}, Index of Spouse Abuse (ISA) (n=1)³⁵, Violence Against Women 45 46 216 Survey (VAWS) (n=1)³², Antenatal Psychosocial Health Assessment (ALPHA) (n=1)⁴³, NSW 47 217 routine Domestic Violence Screening (n=1)⁴⁶ or WHO questionnaire based on the domestic 48 violence module in the WHO Multicountry Study on Women's Health and Life Events (n=6)6 18 36 38 49 218 ⁵⁰ 51 219 ^{40 48}. Whilst the 12 studies used unspecified questionnaire tools^{14 31 37 39 45 49 54 56 57 59-61}. ⁵² 220 Overall, studies reported IPV in various ways; 16 studies measured "any IPV", defined as women 53 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 54 221 55 56 222 10 studies reported exposure to separate types of IPV, i.e. either physical, emotional and/or sexual ⁵⁷ 223 violence^{6 17 18 33 34 43 44 46 51 56}. Further, seven studies reported both an outcome for "any IPV" and 59 224 separate IPV types^{7 15 35 36 38 48 50}. The primary outcome, PPD, was diagnosed using EPDS,

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diagnosed at a cut-off threshold of 10 or above, and the majority of the studies used EPDS with a cut-off at $\geq 13^{7}$ ¹⁴ ¹⁵ ¹⁷ ³¹ ³² ³⁹ ⁴¹ ⁴³ ⁴⁵ ⁴⁶ ⁵⁰ ⁵¹ ⁵³ ⁵⁴ ⁵⁶. Additionally, nine studies used a cut-off $\geq 10^{6}$ ¹⁸ ³³ ³⁷ $^{38\ 40\ 42\ 47\ 55}$, two studies used cut-off $\ge 11^{44\ 57}$ and six studies used cut-off $\ge 12^{34-36\ 48\ 49\ 52}$. 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'⁶⁷¹⁸ and two were judged as 'poor quality'⁵⁶⁵⁷. 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 quality³¹. 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 typespecific) 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 $(n=12)^{67 15 17 18 34 38 43 46 48 51 56}$, 75% (n=9/12)found a significant association⁶⁷¹⁵¹⁷³⁴³⁸⁴³⁴⁶⁵¹ and the aOR range was 1.50-3.94; 95% CI: 1.30-6.86). Further, 15 studies reported emotional IPV⁶⁷¹⁷¹⁸³³³⁶³⁸⁴⁰⁴³⁴⁴⁴⁶⁴⁸⁵⁰⁵¹⁵⁶ and seven studies reported sexual IPV⁶⁷¹⁶³⁸⁴⁰⁴³⁵⁶. 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 PPD⁶⁷⁴³ (aOR range: 1.98-2.75; 95% Cl: 1.22-6.36)⁶⁴³ (table 1-2).

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1 2 3 4 255 High-income and upper-middle countries (HMIC) 5 6 256 Figure 3 and 4 illustrates the association of IPV and PPD across HMIC and LMIC with outcomes 7 reported as aOR (n=26/33). Among the HMIC studies (n=23), the prevalence of "IPV overall" 257 8 9 , 10²⁵⁸ varied across studies, and so did the association within the different types of IPV. The prevalence of ¹¹ 259 emotional IPV ranged from 1.7%-28.1%^{44 48} among women reporting emotional IPV within the last 12 13 260 year, whilst physical IPV had a prevalence range of 1.8%-37.8%^{17 34}. 14 15 261 The majority of HMIC studies found a significant association between IPV and PPD, which is $^{16}_{17}262$ clarified in figure 3 were almost 90% of the cohort studies (n=7/8) showed a significant association 18 263 between "any IPV" and PPD with an aOR ranging from 1.18-6.87 (95% CI: 1.09-11.78). For 19 physical IPV, all three studies found a significant association with an aOR ranging from 1.5-3.94 20 264 21 22 265 (95% CI: 1.30-6.36). Among the cross-sectional studies, most studies found an association between ²³₂₄266 IPV and PPD; 75% (n=3/4) found a significant association for "any IPV" (aOR range: 4.61-4.30; 25 267 95% CI: 1.06,8.70) whilst the only studies reporting "physical IPV" and "emotional IPV", both 26 27 268 found a significant result. ²⁸ 29 269 ³⁰₃₁270 Low- and lower-middle-income countries (LMIC) 32 271 Figure 4 illustrates the results from LMIC countries that report aOR with the majority being cross-33 34 272 sectional studies (n=5/8). Overall, 75% (n=6/8) found a significant association cross both study ³⁵ 36 273 designs. The aOR for "any IPV" ranged from 2.51-5.92 (95% CI: 1.67-14.40), whilst it for ³⁷ 274 "physical IPV" ranged from 2.75-4.1(95% CI: 1.19-7.76)." 39 2 7 5 40 41 42 276 DISCUSSION 43 44 277 **Main findings** 45 46⁴⁵278 A total of 33 studies were included in this systematic review of which 10 were cross-sectional and ⁴⁷ 279 23 were cohort studies. Of the cross-sectional studies, eight were set in HMIC and five in LMIC 48 49 280 and of the cohort studies 15 were set in HMIC whilst 5 were set in LMIC. The studies had 50 51 281 considerable heterogeneity in terms of reported IPV exposure with varying cut-off scores ranging ⁵² 53 282 from 10-13 on the EPDS tool. Overall, a total of 48 different confounders were controlled for, and ⁵⁴ 283 the quality of the studies was generally judged to be good. The association between "any IPV" and 56 284 PPD ranged from aOR 1.18 to 6.87, with the association between specific types of IPV and PPD

- ⁵⁷ ₅₈285 ranging from aOR 1.5 to 5.93 for physical violence, aOR 1.58 to 4.6 for emotional violence, and
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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.

¹¹₁₂290 **Strengths and limitations**

13 291 A strength of this review is that it is based on an extensive systematic search of five online 14 15 292 databases. Further, we applied the PRISMA guidelines to direct the review, thus a uniform and 16 17 293 transparent approach were used to synthesize the latest evidence of IPV exposure and PPD. In ¹⁸ 294 19 addition, we conducted an appropriate quality assessment of all included studies using NOS. 20 2 9 5 However, a limitation of NOS is that the scale has to be adapted to specific research designs, which 21 22 296 can lead to the possibility of low agreement between quality assessors ²⁷. To cover the field of ²³₂₄297 interest in a comprehensive manner, we included both cross-sectional and cohort studies from ²⁵ 298 26 LMICs and HMICs. This approach may have resulted in heterogeneity across studies and thus 27 299 limited our ability for more in-depth analysis.

28 ²⁰₂₉ 300 To create a stringent and more homogenized overview, we decided to narrow the inclusion criteria ³⁰ 31</sub> 301 to only studies using EPDS with a cut-off ≥10 and outcome reported as RR or OR. The pre-defined ³² 302 cut-off threshold of ≥ 10 was chosen to support the global orientation in the review that address PPD 34 3 0 3 across many countries in both HMIC and LMIC and taking the wide range of different validated 35 36 304 cut-offs into consideration. Other studies have suggested the following thermology 'possible minor ³⁷ 38 305 depression' and 'possible major depression' at cut-off ≥ 10 and ≥ 13 respectively. This thermology ³⁹ 306 must be kept in mind but will not be used throughout the manuscript where the diagnosis in many 41 307 cases also could be classified as "signs of postpartum depression". Like every other measurement 42 43 308 tool, EDPS has its strength and limitations. With a cut-off at 10, some women may screen false 44 45 309 positive. To account for this, we reviewed the studies to consider whether a cut-off at 13 would 46 47 310 change the association. But even after excluding studies with cut-off ≥13 the majority of studies 48 3 1 1 still showed an association between IPV and PPD, except only four LMIC studies would be left in 49 50 312 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

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318 and reporting is an acknowledged problem within women's and newborn health and has led to 319 initiatives that aim to establish Core Outcome Sets (COS). As a result of this initiative, a 320 standardized set of outcome measures has been developed within, e.g. pre-eclampsia ⁶⁴. To guide , 10 321 future IPV research there is likewise a need for harmonizing IPV outcome measures and establish a 11 322 12 core outcome set for IPV reporting, which has also been suggested elsewhere⁶³.

15 324 **Interpretation of findings**

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16 17 325 IPV and PPD are public health problems with a major impact on women's health. Globally, ¹⁸ 326 approximately 1 in 3 women are exposed to IPV⁶⁵ and 1-2 in 10 women are suffering from PPD, with prevalence rates being highest in LMICs⁶⁶. In addition to the association with PPD, IPV is 20 3 27 21 22 328 associated with severe physical health outcomes for the exposed women as well as adverse ²³ 24 329 pregnancy outcomes^{9 10 24} and emotional consequences for the offspring^{67 68}. Thus, the burden of ²⁵ 330 26 IPV has great implications on the well-being of both the mother and the child. When focusing on 27 331 the present review, a strong association between any IPV and PPD was found. This finding is in line 28 ²⁰₂₉ 332 with a previous systematic review and meta-analysis that found exposure to any IPV increased the ³⁰ 333 risk of PPD by 1.5 to 2.0 times²³. When looking at the specific types of IPV, we found that physical 32 3 3 4 IPV was significantly associated with PPD. We also found an association, between emotional IPV 33 34 3 35 and PPD, although less pronounced. This weaker association may reflect reporting bias since ³⁵ 36</sub> 336 emotional IPV is more difficult to measure than physical IPV. Women who are exposed to ³⁷ 337 38 emotional IPV may not perceive themselves as victims of abuse. From their perspectives, acts such 39 3 38 as shouting or threatening behaviours are often considered a result of a "hot temper". However, 40 41 339 women who are living in a relationship where she is being shouted at, threatened or humiliated may 42 43 340 lose their sense of self-esteem and independence and thus be at increased risk of developing 44 341 depression⁶. Finally, a strong association between sexual IPV and PPD was found. Some 45 46 3 4 2 investigators have noted that pregnant women with a history of sexual abuse may re-experience 47 48 343 memories of their abuse during procedures of routine pregnancy care^{69 70} as the reactivation of ⁴⁹ 50 344 memories of sexual abuse may trigger the development of antepartum and postpartum depression⁷¹.

52 3 4 5 CONCLUSION

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54 3 4 6 This systematic review contributes to the existing literature on IPV and adverse health outcome by ⁵⁵ 56 347 summarizing current knowledge on the association between IPV and PPD. We found evidence of an ⁵⁷ 348 association between IPV exposure and PPD across all study designs and settings, thus we suggest 58 59 3 4 9 that large multi-national longitudinal studies where targeted and effective interventions are 60

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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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5 367 Conflict of Interest

68 No conflicts of interest to declare.

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 assisting in developing the database search strings.

Appendix, supplementary

- ²374 Appendix I: PRISMA checklist
- ⁹375 Appendix II: Search strategy

54 378 Abbreviations:

| 55 379 | AAS | Abuse Assessment Score |
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| $\frac{56}{57}380$ | AN | Antenatal |
| 58 381 | aOR | Adjusted Odds Ratio |
| 59 382 60 | aRR | Adjusted Relative Risk |

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| ⁴ 383 | CI | Confidence Interval |
| 5 204 | EPDS | Edinburgh Postnatal depression Scale |
| 6 384 7 385 | | |
| 7 385 8 386 | GNI | Gross National Income |
| 9 500 | HMIC | High and upper-Middle-Income countries |
| 10 387 | IPV | Intimate Partner Violence |
| 11 388 | LMIC | Low- and lower-Middle-Income Countries |
| ¹² 389 | NOS | Newcastle-Ottawa scale |
| 13 390 | OR | Odds Ratio |
| 15 391 | РР | Postpartum |
| ¹⁶ 392 | PPD | Postpartum depression |
| 17 18 393 | RR | Relative Risk |
| 19 394 | SCID | Structured Clinical Interview for DSM-IV |
| 20 395 | WHO | World Health Organization |
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| 51 52 639 | |
| ⁵³ 640 54 | Figures and tables: |
| 55 641 56 | Figure 1: Flow diagram of study selection in the review of intimate partner violence and postpartum |
| 57 642 | depression |
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| 3 4 5 643 | Figure 2: Quality assessment of cohort studies according to country economic status and stars |
| 5 6 644 | awarded for each item of the Newcastle-Ottawa Scale. |
| 7 8 645 | Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a |
| 9 10 646 | forest plot ordered according to descending quality. |
| ¹⁰ 647 | Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a |
| 12 13 648 | forest plot ordered according to descending quality. |
| 14 15 649 | Table 1: Overview of cross-sectional and cohort studies on postpartum depression among IPV |
| $\frac{16}{17}650$ | victims set in Upper-middle and High-income countries. |
| ¹⁸ 651 | Table 2: Overview of cross-sectional and cohort studies on postpartum depression among IPV |
| 19 20 652 | victims set in Low and Lower-middle-income countries. |
| $21 \\ 22 653$ | |
| $\frac{23}{24}654$ | Table 3: Confounders adjusted for in the studies (n=33) categorised of the within the following domains. |
| 24 25 655 | |
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| $\frac{28}{29}657$ | |
| ³⁰ 658 31 | |
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| $\frac{35}{36}661$ | |
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Page 21 of 36 BMJ Open 1 2 Table 1. Overview of cohort studies on post-partum depression among IPV victims set in upper-middle and high income Countries

| | | | | | • | • • | | e | •• | <u>v</u> | | |
|-------------------------|------------------------------|-----------|---------------|---------------------------------|----------------------|---|------------------------------|---|--|--|---|--------------|
| | Author, /ear | 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 PPD4 NO O | Prevalence of IPV [prevalence of PPD among IPV exposed] ^a | NOS score |
| | Adynski I, 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) | 18 Ma | | Good |
| 5) | 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 _{phylPV} : 2.53 (1.76–3.63) | aOR ⁷ _{68ar/PV} : 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; 2.46 (1.37-4.42) cOR; 3.21 (1.74-5.90) | phyIPV: 7.7 % | Poor |
| Ā | 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 _{emolPV} : 4.11(1.23-13.73) | ed from http | anyIPV: 11% emoIPV _{<12m} : 1.7% [emo: 54.1%] | Good |
| 9 7 2 1 2 3 | 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) | http://bmjopen.bmj.co | emoIPV: 6% phyIPV: 2 % emo/phyIPV: 7% | Good |
| 10 | Gaillard A. 2014 | France | 264 | | Lifetime | 6-8w | ≥12 | Unadjusted | cOR _{any} : 3.0 (1.1–8.6) | om/ | | Fair |
| A | 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 aOR bo,serIPV: 2.29 (1.15–4.57) aOR bo,modIPV: 1.40 (0.88–2.22) iii No No | emoIPV: 28.1% phyIPV: 11.8% sexIPV: 5.7% [phyIPV 48 %] | Good |
| 2 L 3 2 1 | //alta 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) | 4 by guest. F | anylPV[22%] | Good |
| 5 7 3 9 | | | | | | | | | | 2024 by guest. Protected by copyright. | | |
| 3 | | | | | | For peer revi | ew only - | - http://bmjopen.bmj.co | m/site/about/guidelines.xhtr | nl | | |

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| 1 2 3 | | | | | | | | | | 6/bmjopen-2021-051 | | |
| 4 5 6 7 8 9 | Ogbo FA. 2018 | Australia | 17,564 | [<20, 20- 34, >35] | | <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 _{phylPv} : 1.50 (1.30–1.70) | aOR aOR 01 18 May 20 20 20 20 20 20 20 20 20 20 | anyIPV: [8%] | Good |
| 10 11 12 13 14 | 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 _{anylPV} : 1.58 (1.07–2.33) | | anylPV: 35.7% | Good |
| 15 16 | 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) | e difre | | Good |
| 17 18 19 | 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 _{anylPv} : 2.06 (1.21– 3.53) | Downloaded from http://bmj | anyIPV: 35.8% [10.4%] | Good |
| 20 21 22 23 | Wikman A, 2019 | Sweden | 2466 | [≥18] | - | 6w, 6m | ≥12 | Unadjusted. | cOR _{anyIPV} : 3.6 (2.40–5.50) ^b | 6m 🖗 cOR [®] _{yIPV} : 3.70 (2.10–6.30) | anylPV: 4.1% | Poor |
| 22 23 24 25 26 27 | Woolhou se 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 _{phylPV} : 3.94 (2.44–6.36) aOR _{emolPV} : 2.72 (1.72–4.13) | bmj.com/ on | anyIPV: 16.6% | Good |
| 27 | 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) | April | anyIPV: 11.3% [25%] | Fair |
| 2 8 29 | Cross-sect | ctional studies | 5 | | | | | | | 20, 2 | | |
| 30 31 32 33 34 | 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 _{anylPv} : 1.49 (0.49-4.59) | 2024 by guest. | anyIPV: [74%] | Poor |
| 35 36 37 38 39 | 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) | Protected by co | phy: 2.6 % emo: 3.7% sex: 1.2% anyIPV: 3,3% | Good |
| 40 41 42 43 | | | | | | | | | | dopyright. | | |
| 43 44 45 | | | | | | For peer revie | ew only - | http://bmjopen.bmj.cor | m/site/about/guidelines.xht | .ml | | |

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| 4 5 7 8 9 10 | 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 _{anylPV} : 1.61 (1.06-2.45) | 1426 on 18 May 2022. | anyIPV: 5.7[18%] | Fair |
| 11 12 13 | deCastro F. 2014 | Mexico | 604 | 25 | Antenatal | <9m | ≥12 | Economic factors (n=1), maternal mental health (n=1), pregnancy-related (n=1). | | aOR _{Uy,sev} .: 3,9 (1.5-10.5) aOR _{Uy,mod} .: 1.2 (0.6-2.8) | [phy: 24.6%, emo 13.1%, sex 6.6%] | Good |
| 1 4 15 16 17 18 | 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 aOR 30 30 30 30 30 30 30 30 30 30 30 30 30 | [IPVsev.: 35.8%, IPVminor: 23.9 %] | Fair |
| 19 20 21 22 23 | 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 Prevent: 2.47 (1.31-4.66) aOR Proving the second secon | 37.8% | Fair |
| 24 25 26 27 | 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) | m/ on Ap | 9.1% | Fair |
| 27 28 29 | 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 ^E myIPV,AN: 3.80 (2.20-6.70) | anyIPV: 10.9% anyIPV,AN: 3.3% | Fair |
| 31 - | IP\/ E | PP = postpartu e of PPD amo | m PPD = no | etnartum den | receion | natal Depression | Scale, emo I | PV = emotional IPV, emo,hum | = "emotional IPV, humiliated", emo. | .cont.= 'Onotional IPV, controlling be | havior", phyIPV = physica | I IPV, sexIPV |
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| 35 36 | | | | | | | | | | Protected by copyright. | | |
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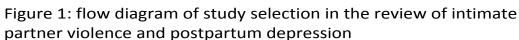
| year size [range, cl.] exposure partum of post- partum cut- off point for off off off prevalence of point sc prevalence of partum sc sc Gohort studies | | | | | | | • • | • | U U | | | |
|--|-------------|--------------|------|---------|--------------|----------------|-------------|--|---|---|---------------------------------|--------------|
| Burdhafhold Nepal 72 Lifetime 6w, 10w 213 Unadjusted coR _{max} : 137 (0.37.5.06) coR _{max} : 133 (0.15.75) coR _{max} : 0.251 (167.57) coR _{max} : 0.251 (167.37) phylPV: 20.8% and PV: 13.4% and PV: 13.4% and PV: 13.4% and PV: 13.4% phylPV: 20.8% and PV: 20.8% | | Country | | [range, | | nt of post- | cut- off | • | Risk of PPD (95% CI) | 1426 | [prevalence of PPD among IPV | NOS score |
| Construction Construction< | Cohort stud | lies | | | | | | | | 00 | | |
| Patel V. India 270 2.6 Lifetime, antenatal antenatal second-mographic (n=2), maternal sociod-mographic (n=1), perganacy-related (n | | Nepal | 72 | | Lifetime | 6w, 10w | ≥13 | Unadjusted | cOR _{emolPV} : 1.53 (0.41-5.75) | May 2022 | emoIPV: 19.4% sexIPV: 13.9% | Poor |
| Tho TranVietnam1274(217)Entire period with present partner4-12w with present partner210Bith-related (n=1), accidemographic (n= 2), family-related (n=1) pertner-related (n=1) pertner-related (n=1)COmpany. 00-02 (C-0.0135) aCResenve.sci 3.16 (1.76-5.67)approx/content 2.2.8 (1.35-3.86) aCResenve.sci 3.16 (1.76-5.67)phylPV: 8% accidemographic (n= 2), family-related (n=1) pertner-related (n=1) pertner-related (n=1)accidemographic (n= 2), family-related (n=1) pertner-related (n=1) pertner-related (n=1)accidemographic (n= 2), family-related (n=1) accidemographic (n= 2), family-related (n=1) pertner-related (n=1)accidemographic (n= 2), family-related (n=1) accidemographic (n=2), accidemographic (n=2), pertner-related (n=1)accidemographic (n= 2), family-related (n=1), accidemographic (n=), pertner-related (n=1), pertner-related (n=1), p | | India | 270 | 26 | | 6w | ≥11 | Unadjusted | RR _{life.anyIPV} : 2.1 (1.3-3.3) | RR _{I anylPV} 2.6 (1.6-4.3) | | Poor |
| The Tran Vietnam 1274 (≥17) Entire period with present partner 210 Birth-related (n=1), economic factors (n=2), maternal (n=1), partner-related (n=1), partner-related (n=1), | | Tanzania | 1013 | 25–34, | Antenatal | 48h, 40w | ≥13 | maternal mental health (n=2), maternal sociodemographic (n=1), pregnancy-related (n=1), | aOR _{phylPV} : 2.15 (1.13-4.11) aOR _{emolPV} :1.46 (0.92–2.30) | | anyIPV 8.2% | Good |
| The Tran N, 2019 Vietnam 1274 26 Antenatal 4-12w ≥10 Birth-related (n=1), economic factors (n=2), maternal 2), family-related (n=1), partner-related (n=1), aOR _{momPriv} : 5.92 (2.44-14.40) partner-related (n=1), partner-related (n=1), partner-related (n=1), partner-related (n=1), aOR _{momPriv} : 5.92 (2.44-14.40) partner-related (n=1), partner-related (n=1), partner-related (n=1), aOR _{momPriv} : 5.92 (2.44-14.40) partner-related (n=1), partner-related (n=1), aOR _{momPriv} : 5.92 (2.44-14.40) partner-related (n=1), aoNR _{momPriv} : 5.92 (2.44-14.40) partner | | Vietnam | 1274 | (≥17) | with present | 4-12w | ≥10 | Birth-related (n=1), economic factors (n=2), maternal sociodemographic (n= 2), family-related (n=1) partner-related (n=1) | | aOR _{emolPV.mid} : 2.28 (1.35–3.86) aOR _{emolPV.mod} : 3.15 (1.17–8.51) aOR _{emolPV.ser} : 3.16 (0.83-12.03) | emoIPV: 25.4% | Good |
| Cross-sectional studies 287 29.6 Within their intimate relationship <12m ≥10 Unplanned pregnancy, parity, previous depression, substance use, social support aOR _{amyIPV} : 5.92 (2.44-14.40) 202 anyIPV: 23.7% Fair Abebe, 2019 Ethiopia 555 24.3 Antepartum >2w-6m ≥13 Birth-related (n=2, family-related (n=1), parture-related (n=1), pregnancy-related (n=1) aOR _{amyIPV} : 3.16 (1.76-5.67) anyIPV: 16.4% Goo Abebe, 2019 Ethiopia 555 24.3 Antepartum >2w-6m ≥13 Birth-related (n=2, family-related (n=1), pregnancy-related (n=1) aOR _{amyIPV} : 3.16 (1.76-5.67) anyIPV: 16.4% Goo Abebe, 2019 Fair Fair Fair aoR _{amyIPV} : 3.16 (1.76-5.67) anyIPV: 16.4% Goo Abebe, 2019 Fair Fair Fair aoR _{amyIPV} : 3.16 (1.76-5.67) anyIPV: 16.4% Goo Abebe, 2019 Fair Fair Fair Fair Fair Fair Fair Fair Abebe, 2019 Fair Fair Fair Fair Fair Fair Fair Fair Abebe, 2019 Fair Fair Fair <td< td=""><td></td><td>Vietnam</td><td>1274</td><td>26</td><td>Antenatal</td><td>4-12w</td><td>≥10</td><td>Birth-related (n=1), economic factors (n=2), maternal sociodemographic (n= 2), family-related (n=1), partner-related (n=1),</td><td>aOR_{emolPV}: 1.01 (0.60-1.69)</td><td>omj.com/ on Apri</td><td>emoIPV: 32.3% phyIPV: 3.5%</td><td>Good</td></td<> | | 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), | aOR _{emolPV} : 1.01 (0.60-1.69) | omj.com/ on Apri | emoIPV: 32.3% phyIPV: 3.5% | Good |
| Abebe, 2019 Ethiopia 555 24.3 Antepartum >2w=6m ≥13 Birth-related (n=2, family-related (n=1), pregnancy-related (n=1) aOR _{anylPV} : 3.16 (1.76-5.67) st. | Cross-secti | onal studies | | | | | | | | 1 20, | | |
| partner-related (n=1). pregnancy-related (n=1) by copyright. | | Ethiopia | 287 | 29.6 | intimate | <12m | ≥10 | parity, previous depression, substance | aOR _{anyIPV} : 5.92 (2.44-14.40) | | anyIPV: 23.7% | Fair |
| by copyright. | | Ethiopia | 555 | 24.3 | Antepartum | >2w–6m | ≥13 | Birth-related (n=2, family-related (n=1), partner-related (n=1), | aOR _{anyIPV} : 3.16 (1.76-5.67) | - | anyIPV: 16.4% | Good |
| by copyright. | | | | | | | | | | ected | | |
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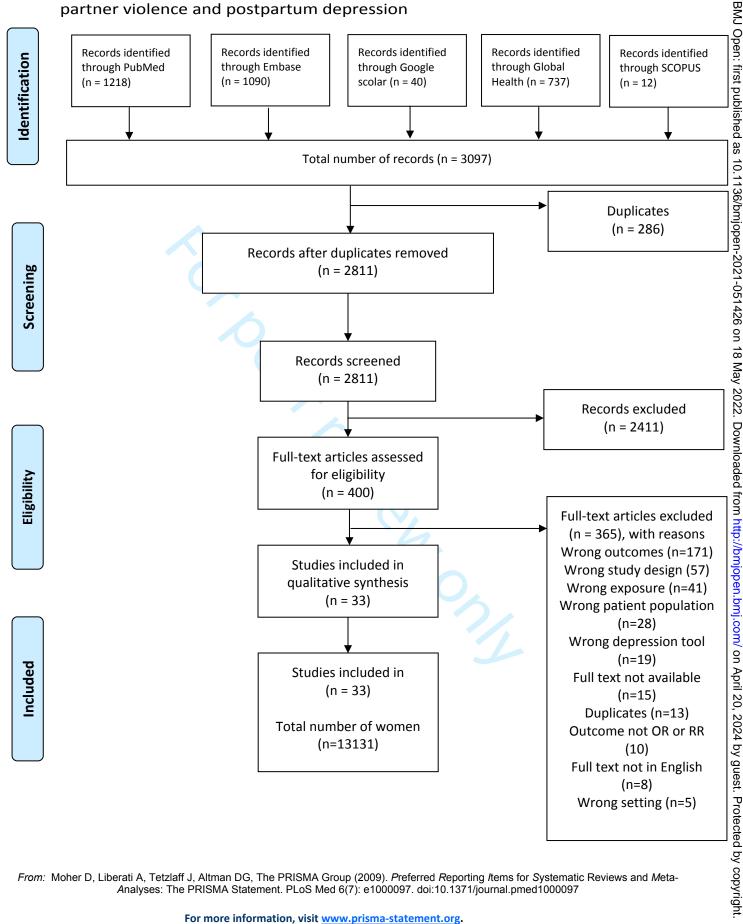
BMJ Open Page 2 Page 2

| Pag | e 25 of 36 | | | | | | | BMJ Open | | 6/bmjopen | | |
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| 1 2 3 | | | | | | | | | | 6/bmjopen-2021-051426 | | |
| 4 | | | | | | | | maternal mental health (n=2). | | 426 | | |
| 6 7 8 | 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) | on 18 May | [anyIPV: 59.8%] | Good |
| 9 10 11 12 13 14 15 | 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) | 2022. Downloaded | anyIPV _{pre} : 14.3% [anyIPV _{pre} : 57.4%] IPV _{AN} :11.3% [anyIPV _{AN} : 79%] IPV _{PP} : 9,2% [anyIPV _{PP} : 71.8%] | Good |
| 16 17 18 19 20 | Kabir ZN., 2014 | Bangladesh | 660 | 25 | Lifetime, AN, PP | | ≥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) | from http://bmjop | phy: 70% phy _{AN} : 18% phy _{PP} : 52% sex _{pp} : 65% emo: 84% | Good |
| | | | | | | | | | | | | |
| 22°T | R = adjusted C ne prevalence o | odds Ratio, AN = of PPD among th | Antenatal, ie IPV expo | , EDPS = Edinb osed women. | urgh Postnatal de | pression Scale, | emo IPV = | emotional IPV, phyIPV = phys | ical IPV, sexIPV = sexual IPV, PP = μ | - D | ession. | |
| 22 ⁻ TI 23 | R = adjusted C | odds Ratio, AN = of PPD among th | Antenatal, le IPV expo | , EDPS = Edinb osed women. | urgh Postnatal de | pression Scale, | emo IPV = | emotional IPV, phyIPV = phys | | br | ression. | |
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| 22⊤1 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 | IR = adjusted C | 0dds Ratio, AN = of PPD among th | Antenatal, le IPV expo | , EDPS = Edinb osed women. | urgh Postnatal de | pression Scale, | emo IPV = | emotional IPV, phyIPV = phys | | .brnj.com/ on April 20, 2024 by guest. | ession. | |
| 22⊤1 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 | IR = adjusted C | 0dds Ratio, AN = of PPD among th | Antenatal, e IPV expo | , EDPS = Edinb osed women. | urgh Postnatal de | pression Scale, | emo IPV = | emotional IPV, phyIPV = phys | | .brnj.com/ on April 20, 2024 by guest. | ession. | |
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| Table 3: Confounders adjusted for in the studies (n=33) categorised of the within the following | g |
|---|---|
| domains. | |

| domains. Confounder | Both LMIC/HIC | Upper-middle- and | Low- and middle- |
|-------------------------------|--|--|---|
| categorizes | | high-income countries | 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 decisio 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. |





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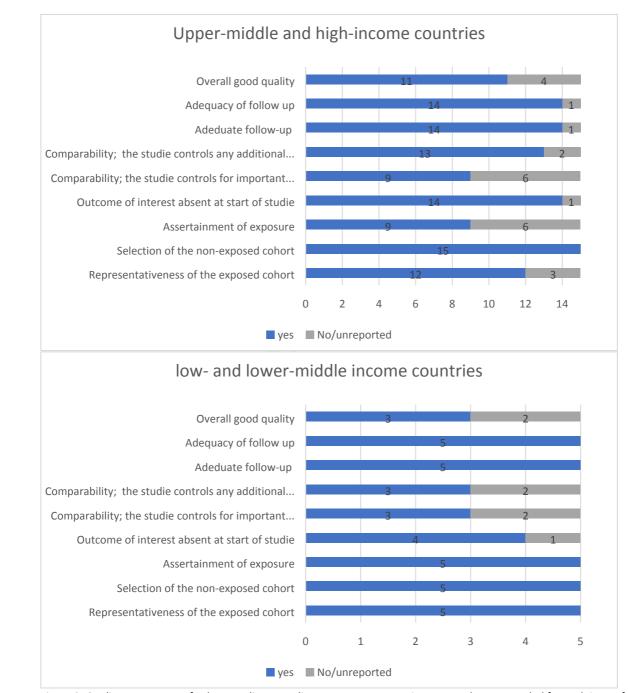


Figure 2: Quality assessment of cohort studies according to country economic status and stars awarded for each item of the Newcastle-Ottawa Scale.

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| Outcome/Author | Year | | aOR (95%CI) | Study | quality scor |
|-------------------------|------|---------------------------------------|-------------------|-------|--------------|
| Cohort studies | | 1 | | and | categories |
| Any violence | | 1 | | | |
| Adynski H | 2019 | | 1.18(1.12,1.25) | 8 | Good |
| Ludermir A.B. | 2010 | | 1.76(1.05,2.93) | 8 | Good |
| Shwartz N | 2019 | | 1.58(1.07,2.33) | 7 | Good |
| Velonis AJ | 2017 | | 2.06(1.21,3.53) | 7 | Good |
| Tsai AC | 2016 | | 1.26(1.13,1.40) | 7 | Good |
| Malta L.A. | 2012 | | 1.66(0.95,2.90) | 7 | Good |
| Flach C. | 2011 | - | 1.29(1.02,1.63) | 7 | Good |
| Zhang, Y | 2011 | · · · · · · · · · · · · · · · · · · · | 6.87(4.01,11.78) | 6 | Fair |
| Physical violence | | - | | | |
| Ogbo FA. | 2018 | | 1.50(1.30,1.70) | 8 | Good |
| Chaves K. | 2019 | | 2.53(1.76,3.63) | 7 | Good |
| Woolhouse H | 2011 | · · · · · · · · · · · · · · · · · · · | 3.94(2.44,6.36) | 7 | Good |
| Emotional violence | | | | | |
| Escribá-Agüir V | 2013 | | →4.11(1.23,13.73) | 7 | Good |
| Cross sectional studies | | | | | |
| Any violence | | | | | |
| Ahmad N. A | 2018 | | 2.34(1.12,4.87) | 8 | Good |
| Urquia ML | 2011 | _ | →4.30(2.10,8.70) | 7 | Good |
| Beydoun H.A., | 2010 | | 1.61(1.06,2.45) | 6 | Fair |
| Afshari P | 2019 | | 1.49(0.49,4.59) | 4 | Poor |
| Physical violence | | | | | |
| Gao W | 2010 | | 2.34(1.52,3.60) | 7 | Good |
| Emotional violence | | | | | |
| Tiwari A | 2007 | | 1.84(1.12,3.02) | 5 | Fair |
| | | | | | |
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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.

| Page | 31 | of 36 |
|------|----|-------|
| | | |

| Outcome/Author Cohort studies | Year | aOR (95% | | Study quality score and categories | |
|----------------------------------|------|------------|------------|---------------------------------------|--|
| Any violence | | | un | a categories | |
| Rogathi JJ. | 2017 | 2.51(1.67 | (,3.76) 8 | Good | |
| Physical violence | | | | | |
| Tho Tran N | 2019 | 2.75(1.19 | 9,6.35) 8 | Good | |
| Tho Tran N | 2018 | 0.64(0.30 |),1.35) 8 | Good | |
| Cross sectional studie | es | | | | |
| Any violence | | | | | |
| Abebe A | 2019 | 3.16(1.76 | 6,5.67) 7 | Good | |
| Adamu A.F. | 2018 | 3.10(1.60 |),5.90) 6 | Fair | |
| Abadiga M | 2019 | →5.92(2.44 | 4,14.40) 6 | Fair | |
| Physical violence | | | | | |
| Islam Md | 2017 | 4.10(2.07 | (,7.76) 7 | Good | |
| Emotional violence | | | | | |
| Kabir Z.N | 2014 | 1.05(0.90 |),1.22) 7 | Good | |

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

| | | BMJ Open | Page 32 of |
|------------------------------------|-----|--|--------------------|
| PRISMA 2 | 009 | BMJ Open 36/bmj Checklist 622 | |
| Section/topic | # | Checklist item | Reported on page # |
| TITLE | | S S | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| ABSTRACT | | ay 20 | |
| 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. | 4 116- 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 & y 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, I 130- 131 |

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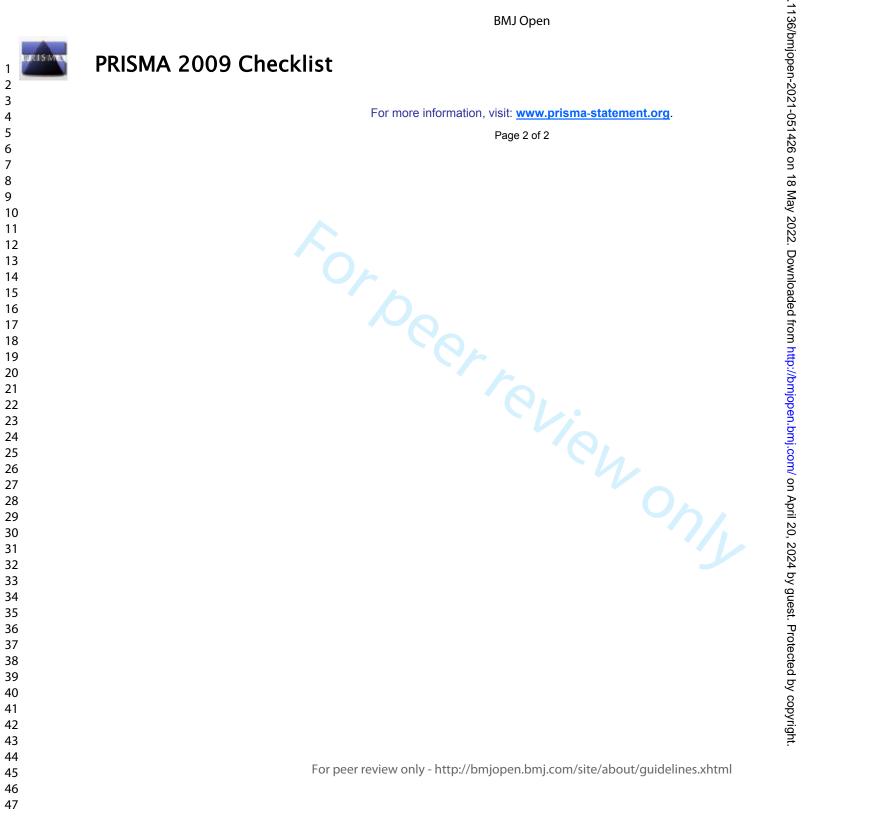
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PRISMA 2009 Checklist

| 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 |
|-------------------------------|----|--|-----------------------|
| | | Page 1 of 2 | |
| 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). | 8 244- 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. | 7 197- 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 gonsistency. | |
| 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 | | <u> </u> | |
| 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 implication between the research. | 11-12 |
| FUNDING | | by c | |
| 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 |

45 From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA-Group/(2009)n Brefetted/Reportingentemajfor Systematic Reviews and Metan Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097



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 ("mother") OR TITLE-ABS-KAY ("postnatal depression") 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

((((((()()()()())))) 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

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((("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])

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"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]) OR "depression s"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR ("depressive"[All Fields] AND "disorder"[All Fields])) OR "depressive disorder"[MeSH Terms]) OR "depressive"[All Fields]) OR "depressive"[All Fields])) OR "depressive disorder"[MeSH Terms]) OR "depressive"[All Fields]) OR "depressive"[All Fields])) OR "depressive disorder"[All Fields]) OR "depressive"[All Fields]) OR "depressive"[All Fields])) OR "depressive disorder"[All Fields]) OR "depressive"[All Fields]) OR "depressive"[All Fields])) OR "depressively"[All Fields]) OR "depressive][All Fields]) OR "depressive"[All Fields])) OR "depressively"[All Fields]) OR "depressive][All Fields]) OR

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

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| 5 6 | 1 | Landscaping the evidence of intimate partner violence and postpartum |
| 7 8 9 | 2 | depression: A systematic review |
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| 11 12 | 4 | Lea Bo Sønderlund Ankerstjerne ^{a,b} , Sweetness Naftal Laizer ^c , Karen Andreasen ^a , Anne Katrine |
| 13 14 | 5 | Normann ^b , Chunsen Wu ^{b,a} , Ditte Søndergaard Linde ^{a,b,e} , Vibeke Rasch ^{a,b} |
| 15 16 | 6 7 | ^a Department of Gynaecology and Obstetrics, Odense University Hospital, Odense, Denmark |
| 17 18 | 8 | ^b Department of Clinical Research, University of Southern Denmark, Odense, Denmark |
| 19 20 | 9 | ^c Department of Kilimanjaro Clinical Research Institute, Kilimanjaro, Tanzania |
| 21 | 10 | ^e Department of Public Health, University of Southern Denmark, Esbjerg, Denmark |
| 22 23 | 11 | Department of Fubile Health, Oniversity of Southern Definiark, Esojerg, Definiark |
| 24 25 26 27 28 29 30 | 12 13 14 15 16 | <i>Corresponding author:</i> Lea Bo Sønderlund Ankerstjerne, Department of Gynaecology and Obstetrics, Odense University Hospital and department of Clinical Research, University of Southern Denmark, Kløvervænget 10, 10. sal,5000 Odense C, Denmark, ph.: +4521360642, e-mail lea.ankerstjerne@rsyd.dk ORCID ID and QR Code: https://orcid.org/0000-0002-0704-4482 |
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| 3 4 | 37 | ABSTRACT |
| 5 6 | 38 | Objective: To assess the evidence of the association between exposure to intimate partner violence |
| 7 8 | 39 | (IPV) and postpartum depression. IPV during pregnancy can have immediate and long-term |
| 9 10 | 40 | physical and mental health consequences for the family. Therefore, it has been hypothesized that |
| 11 | 41 | intimate partner violence may affect the risk of developing postpartum depression. |
| 12 13 | 42 | Methods: A systematic review was conducted according to the PRISMA guidelines. Pubmed, |
| 14 15 | 43 | Embase, Global Health Library, Scopus, and Google scholar were searched for published studies |
| 16 17 | 44 | without restrictions on language, time, or study design (up to May 2020). Studies were included if |
| 18 | 45 | they assessed postpartum depression using the Edinburg Postnatal Depression Scale (cut-off ≥ 10), |
| 19 20 | 46 | among women who had been exposed to IPV (emotional, physical and/or sexual abuse). The quality |
| 21 22 | 47 | of studies was judged according to the Newcastle-Ottawa scale. |
| 23 24 | 48 | Results : A total of 33 studies were included in the review (participants n=131,131). The majority of |
| 25 26 | 49 | studies found an association between exposure to IPV and the development of signs of postpartum |
| 27 | 50 | depression. Overall, studies measured both exposure and outcome in various ways and controlled |
| 28 29 | 51 | for a vast number of different confounders. Thirty per cent of the studies were set in low- and |
| 30 31 | 52 | lower-middle-income countries while the rest were set in upper-middle- and high-income countries |
| 32 33 | 53 | and the association did not differ across settings. Among the studies reporting aOR (n=26), the |
| 34 | 54 | significant aOR ranged between 1.18-6.87 [95% CI: 1.12-11.78]. The majority of the studies were |
| 35 36 | 55 | judged as 'good quality' (n=20/33). |
| 37 38 | 56 | Conclusion: We found evidence of an association between exposure to IPV and the development of |
| 39 40 | 57 | signs of postpartum depression. Meta-analysis or individual patient data meta-analysis is required to |
| 41 | 58 | quantify the magnitude of the association between IPV and postpartum depression. |
| 42 43 | 59 | PROSPERO registration number: CRD42020209435 |
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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. 22 78

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 harm¹. Women are most often the victims of IPV²⁻⁴, 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 impairment⁵⁻⁷. Further, IPV is adversely associated with several obstetric outcomes, including preterm birth, low birth weight, and miscarriage⁸⁻¹⁰. 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 problems¹¹¹². However, the biochemical and 42 89 psychological pathway between IPV and health is complex, and numerous factors influence this association, including socio-demographic and economic factors¹³.

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 37 100 languages¹⁹ and studies from different countries have found different cut-off values, e.g. 7 in 101 Lithuania²⁰ and 13 in the English language version²¹. The many different validated cut-off values 102 j₁₀ 103 may be explained by different cultures and different expressions of mental difficulties. Previous ¹¹ 104 reviews have aimed to provide an overview of the evidence between IPV and PPD^{5 22 23}. However, 13 105 we assess the methodologic quality of these reviews to be low according to the 'A MeaSurement 15 106 Tool to Assess systematic Review' (AMSTAR)²⁴ as most reviews did not adhere to key domains of יי 17 107 review quality, i.e. following a prospectively specified or registered protocol, performing a 18 108 comprehensive search by exploring more than 3 databases, performing searches without language 20 109 restrictions, undertaking duplicate study selection or considering the quality of included studies. --22 110 Hence, there is a need for a systematic review of the latest evidence of the field across countries and 23 111 24 economic conditions. The aim of this systematic review was to landscape the evidence of IPV and 25 1 1 2 PPD in both high-income countries and low-income countries and synthesise the evidence taking confounders and quality into consideration. 27 113

14 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).

⁸119 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

Page 6 of 35

4 132 coercion). We included studies with women who had ever been exposed to IPV by a current partner 5 6 133 or former partner during index pregnancy or in the postpartum period. To increase the homogeneity 7 of the outcome, we only included studies using the Edinburg Postnatal Depression Scale (EPDS) 134 8 9 í₁₀ 135 with a cut-off threshold of 10 or above as a measurement of PPD as this has shown to be a reliable ¹¹ 136 and valid cut-off for postpartum depression¹⁹.

13 1 37 The postpartum period was defined as >1 week to 12 months postpartum. Studies were excluded if 14 15 138 the postpartum population was restricted to a subgroup, e.g. mothers with HIV or mothers who had 17 139 newborns that were ill. Additionally, we excluded case reports, case series, conference abstracts, 18 140 and reviews. 19

Studies were selected in a two-stage process using Covidence²⁵. Firstly, two authors (LBSA and 20 141 21 --22 142 SN) independently screened titles and abstracts to identify eligible studies. Secondly, eligible ²³ 143 studies were independently full text screened by two authors (LBSA and SN). Disagreements were 25 144 resolved after discussion and if an agreement was not reached a third author was consulted (DSL or 26 27 145 AKN). One author (LBSA) extracted data from the included studies into a standardised Excel 28 20 29 146 temple. Data extraction included: title, first author, publication year, country, journal name, study ³⁰ 147 quality, area of health, number of participants, population, risk factors in the population, age, setting 31 32 1 4 8 and site, economic status of country, inclusion criteria, exclusion criteria, time for exposure, time 33 ₃₄ 149 for IPV screening, time for measure PPD, abuse tool, PPD tool, the prevalence of IPV and/or ³⁵ 36 150 prevalence of PPD among the IPV exposed women, type of IPV, confounders adjusted for, as well 37 151 as primary and secondary outcomes. Outcome data were verified by a second author (AKN) and 38 39 1 5 2 disagreements were resolved through discussions.

42¹153 **Quality assessment**

⁴³ 154 The methodological quality of included studies was assessed using the Newcastle Ottawa Scale 44 45 1 5 5 (NOS) for cohort studies²⁶ and a modified version of NOS for cross-sectional studies. Two authors 46 47 156 independently assessed the quality (LBSA and KA) and judged the following domains: selection 48 49 157 process, comparability, and outcome. Item number one within the outcome domain, "Assessment of ⁵⁰ 158 outcome" was not judged as the diagnosis of PPD is always self-reported and cannot be measured 51 by medical records or independent blind assessment. According to the NOS scoring system^{27 28} 52 1 59 53 54 160 cohort studies that scored three or four stars in the selection, one or two in comparability, and two ⁵⁵ 161 56 or three stars in the ascertainment of the outcome were regarded to be of 'good quality'. Further, 57 162 cohort studies that scored two or three in the selection, one in the comparability, and two stars in the 58 59 163 outcome ascertainment were considered to be of 'fair quality'. Finally, cohort studies that scored

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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.

169 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 more²⁹. We further categorised the countries in 'Low- and lower-Middleincome 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 crosssectional studies and cohort studies of both HMIC and LMIC reporting OR or RR were all reported in tables 1 and 2, respectively.

⁵ 193 Patient and public involvement
⁶
7 194 No patients involved.

196 **RESULTS**

197 A total of 3097 citations were imported for screening, 286 duplicates were removed, and 2811 198 studies were title-abstract screened. A total of 2411 studies were found irrelevant based on title or 10 199 abstract, whilst 400 studies were full-text screened. The majority of the studies were excluded due 12¹¹200 to wrong outcomes, e.g. antepartum depression or wrong exposure, e.g. violence from a family ¹³ 201 member or stranger. Finally, 33 studies – 13 were cross-sectional and 20 cohort studies – were 15 202 found eligible to be included in the review (Figure 1 and 2). Among the cross-sectional studies, 16 17 203 eight were set in HMIC^{14 15 30-35} and five in LMIC³⁶⁻⁴⁰ whilst 15 were set in HMIC^{17 41-54} and five in $^{18}_{19}204$ LMIC⁶⁷¹⁸⁵⁵⁵⁶, among the cohort studies. Among the HMIC, most studies were set in Canada 20 205 $(n=4)^{14} = 31^{12} = 46$. Australia $(n=3)^{17} = 45^{50}$ and the United States $(n=2)^{41} = 52^{11}$ 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 22 206 23 24 207 131,131 women were included in the studies, and the sample size varied from 72⁵⁵ to 52,509 ²⁵₂₆ 208 women¹⁷ (median: 1128). Population age was either reported as mean age, in interval categories, or 27 209 as a range. The mean ages ranged from 24,6-29,6 years in LMIC and 25,0-34,5 in HMIC.

³⁰ ₃₁211 Tools to measure the exposure, IPV, varied among the studies. Most of the studies (n=20) used ³² 212 33 well-known and/or validated IPV screening tools, such as the Abuse Assessment Screen (AAS) 34 2 1 3 (n=5)^{17 32 40 43 49}, the Composite Abuse Scale (CAS) (n=1)⁵⁰, the Severity of Violence Against ₃₆214 Women Scale (SVAWS) (n=1)⁵⁴, the Conflict Tactics Scale (CTS) (n=2)^{15 33}, Hurt, Insult, Threaten, ³⁷₃₈215 Scream tool (HITS) $(n=2)^{41}$ ⁵², Index of Spouse Abuse (ISA) $(n=1)^{34}$, Violence Against Women ³⁹216 Survey (VAWS) (n=1)³¹, Antenatal Psychosocial Health Assessment (ALPHA) (n=1)⁴², NSW 41 217 routine Domestic Violence Screening (n=1)⁴⁵ or WHO questionnaire based on the domestic 42 43 218 violence module in the WHO Multicountry Study on Women's Health and Life Events (n=6)^{6 18 35 37} 44 45 219 ^{39 47}. Whilst the 12 studies used unspecified questionnaire tools^{7 14 30 36 38 44 46 48 51 53 55 56}. 46 2 2 0 Overall, studies reported IPV in various ways; 16 studies measured "any IPV", defined as women 47 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 48 221 ⁴⁹₅₀ 222 10 studies reported exposure to separate types of IPV, i.e. either physical, emotional and/or sexual 51 223 52 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, 53 224 54 55 225 diagnosed at a cut-off threshold of 10 or above, and the majority of the studies used EPDS with a ⁵⁶ 57 226 cut-off at $\geq 13^{7}$ ¹⁴ ¹⁵ ¹⁷ ³⁰ ³¹ ³⁸ ⁴⁰ ⁴² ⁴⁴ ⁴⁵ ⁴⁹ ⁵⁰ ⁵² ⁵³ ⁵⁵. Additionally, nine studies used a cut-off $\geq 10^{6}$ ¹⁸ ³² ³⁶ ⁵⁸ 227 59 3739414654, two studies used cut-off $\ge 11^{4356}$ and six studies used cut-off $\ge 12^{33-35474851}$. 60

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- 4 Overall, the 33 studies adjusted for 48 different confounders. Both LMICs and HMICs were 228 5
- 6 229 represented in all of the eight confounder domains (Table 3).

1 2 3

| Confounder domains | Both LMIC/HIC | Upper-middle- and high-income countries | Low- and middl income countrie | | |
|--------------------------------|---|--|---|--|--|
| Birth-related Child-related | Gestational age at birth Neonate hospitalization Mode of childbirth Gender of child | Support after birth Interventions during birth Satisfaction with infant's sleep patterns Congenital abnormalities | Child ter Breastfe initiation Fussy and | | |
| 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 | child | | |
| Family-related | History of family physical/mental illness Relation with mother- in-law/own mother | | Family s delivery | | |
| Maternal mental health | History of mental illness (depression, PPD, other) stressful life events | Low energy/optimism Chronic stress | Self-este | | |
| Maternal physical health | Substance use | Alcohol use, smoking, body mass index | HIV-stat | | |
| Maternal sociodemographic | Maternal age, marital status/cohabitation | Ethnicity/race/immigrat ion | Age at f pregnar | | |
| Partner-related | Relationship satisfaction | Partners alcohol consumption | Partner' preferer child's g Woman autonon decision | | |
| Pregnancy-related | Parity Antenatal depression Pregnancy type (undesired, unplanned) | Antenatal health problems Reaction to pregnancy | Number five chile | | |
| 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 | Antenat | | |

⁵⁵ 232 56 **Study quality**

57 233 Figure 2 sums up the study quality of the 20 HMIC and LMIC cohort studies according to the NOS. 58

59 234 The first line represents how many studies were judged with an overall good or fair/poor quality

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235 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 236 quality'^{48 49} and two studies were judged as 'poor quality'^{42 51}. Of the five LMIC cohort studies, 237 j₁₀ 238 three were judged as 'good quality'⁶⁷¹⁸ and two were judged as 'poor quality'⁵⁵⁵⁶. Most of the 11 239 studies that were judged as 'poor quality' were due to inadequate adjustment of confounders. The 12 cross-sectional studies were judged as follows, six were regarded as good quality^{34 35 37-40}, six of fair 13 240 14 15 241 quality^{14 15 31-33 36}, and one of poor quality³⁰. The quality judgement for all studies is summarised in $^{16}_{17}242$ tables 1 and 2.

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²⁰ 244 Association between IPV and postpartum depression

The majority of studies, 88% (n=29/33) found an association between exposure to IPV (any or type-22 2 4 5 23 ²³₂₄246 specific) and development of PPD. A total of 23 studies reported "any IPV" and among these, 91% ²⁵₂₆247 (n=21/23) found a significant association between IPV and PPD. Among the studies, which reported physical violence $(n=12)^{6715171833374245475055}$, 75% (n=9/12) found a significant 27 248 28 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 29 249 30 30 31 250 reported emotional IPV⁶⁷¹⁷¹⁸³²³⁵³⁷³⁹⁴²⁴³⁴⁵⁴⁷⁴⁹⁵⁰⁵⁵ and seven studies reported sexual IPV⁶⁷¹⁶³⁷³⁹ ³² 251 ^{42 55}. In addition 67% found an association between emotional IPV and PPD^{17 18 32 35 42 43 45 47 49 50} 33 (aOR range: 1.58-4.6; 95% CI: 1.04-5.1) and 42% (n=3/7) found an association between sexual IPV 34 2 5 2 35 and PPD⁶⁷⁴² (aOR range: 1.98-2.75; 95% Cl: 1.22-6.36)⁶⁴² (table 1-2). 36 2 5 3

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Page 11 of 35 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 stu | ıdies | | | | | | | | 1426 | | |
| 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) | on 18 M | | 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 _{phylPV} : 2.53 (1.76–3.63) | aOR∰ari⊧v: 3.53 (2.50–5.00) 20 20 20 20 20 20 20 20 20 20 20 | 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 ano/humiPV: 2.46 (1.37-4.42) cOR no/fear IPV: 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 _{emolPV} : 4.11 (1.23-13.73) | ided from h | 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) | from http://bmjopen.bmj | 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) | j.com | | 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 (0.88–2.22) aOR (0.88–2.22) aOR (0.88–2.22) aOR (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) | 2024 by guest | anylPV: [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 _{phylPV} : 1.50 (1.30–1.70) | aOR _{epolPV} : 4.60 (4.10–5.10) rotected by copyright. | anylPV: [8%] | Good |
| | | | | | For peer revi | ew only · | - http://bmjopen.bmj.co | m/site/about/guidelines.xhti | | 1 | |

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|--|--------------------------|---------------------|------|---|------------------------|--------------------------|------------|--|--|---------------------------------|---------------------------------|---|---------------|
| 2 | | | | | | | | (n=1); Maternal physical health(n=1) | | 021-0 | | | |
| 3 4 5 6 7 | 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) | 6/bmjopen-2021-051426 on 18 May | | anyIPV: 35.7% | Good |
| 8 9 | 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) | lay 2 | | | Good |
| 10 11 12 13 14 15 | 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) | 2022. Downlog | | anyIPV: 35.8% [10.4%] | Good |
| 14 15 | Wikman A, 2019 | Sweden | 2466 | [≥18] | - | 6w, 6m | ≥12 | Unadjusted | cOR _{anyIPV} : 3.6 (2.40–5.50) ^b | 6m P | _v : 3.70 (2.10–6.30) | anyIPV: 4.1% | Poor |
| 16 17 18 19 20 | Woolhou se 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) | from http://bmjopen.bn | | anyIPV: 16.6% | Good |
| 20 21 | 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) | mjope | | anylPV: 11.3% [25%] | Fair |
| 22 | Cross-sec | tional studie | s | | | | | | | , ž | | | |
| <u>_</u> | | | | | | | | | | br | | | |
| 2 3 24 25 26 27 28 | 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) | <u>,</u> | | anyIPV: [74%] | Poor |
| 23 24 25 26 27 28 29 30 31 32 | | | 505 | - [Cat.: 18- 25,25- 30,30- 34,>35] | Antenatal | 14d-6m 6-16w | ≥13 ≥12 | Child-related (n=1); Economic factors (n=2); Maternal mental health (n=3); Partner-related | aOR _{anyIPV} : 1.49 (0.49-4.59) aOR _{anyIPV} : 2.34 (1.12-4.87) aOR _{emoIPV} : 3.79 (1.93-7.45) | ij.com/ on April 20, 2024 by gu | | anyIPV: [74%] phy: 2.6 % emo: 3.7% sex: 1.2% anyIPV: 3,3% | Poor |
| 23 24 25 26 27 28 30 31 32 33 34 35 36 37 38 39 40 | P, 2019 Ahmad | of Iran | | [Cat.: 18- 25,25- 30,30- | | | | Child-related (n=1); Economic factors (n=2); Maternal mental health (n=3); Partner-related (n=1); Pregnancy- related (n=1) Economic factors (n=3); Family-related (n=1); Maternal sociodemographic (n=1); Partner-related (n=1); | aOR _{anylPV} : 2.34 (1.12-4.87) | <u>,</u> | | phy: 2.6 % emo: 3.7% sex: 1.2% | |

Page 13 of 35 Table 2. Overview of cross-sectional and cohort studies on postpartum depression among IPV victims set in Lew- and Lowermiddle-income Countries

| Author, year | Country | Study size | Mean age [range, cat.] | Time of exposure | Measureme nt 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 stu | ıdies | | | | | • | | | 1426 | ••• | |
| Budhathok N, 2012 | i 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) | on 18 | 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.anylPV} : 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) | 22. Downloads | 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 _{emolPV.mild} : 2.28 (1.35–3.86) aOR _{emolPV.mod} : 3.15 (1.17–8.51) aOR _{emolPV.ser} : 3.16 (0.83-12.03) | phyIPV: 8% emoIPV: 25.4% sexIPV: 9.5% | Good |
| Tho Tran N, 2019 Cross-sec | 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) | ttp://bmjopen.bmj.com/ | anyIPV: 35.3% emoIPV: 32.3% phyIPV: 3.5% sexIPV: 9.8% | Good |
| Cross-sec | tional studies | | | | | | | | on A | | |
| 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) | April 20, 20 | 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) | 2024 by guest. F | 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) | Protected by copyright. | [anyIPV: 59.8%] | Good |
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|--------------------------------------|---------------------|------------|------|-------------------------|--|-----------|--------------------|--|---|---|---|---------------|
| 1 2 3 4 5 6 7 8 | Islam Md J, 2017 | Bangladesh | 426 | [14-18, 19- 24, >25] | Pregestation al, 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 _{phylPV} : 4.01 (2.07–7.76) aOR _{emolPV} : 1.61 (0.62–4.17) aOR _{sexIPV} : 1.00 (0.49–2.03) | 6/bmjopen-2021-051426 on 18 May | anyIPV _{pre} : 14.3% [anyIPV _{pre} : 57.4%] IPV _{AN} : 11.3% [anyIPV _{AN} : 79%] IPV _{PP} : 9,2% [anyIPV _{PP} : 71.8%] | Good |
| 9 10 11 12 13 | 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); | 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) | 2022. Dov | phyIPV: 70% phyIPV _{AN} : 18% phyIPV _{PP} : 52% sexIPV _{pp} : 65% emoIPV: 84% | Good |
| -0- | | - 1 000 | 101/ | | urgh Postnatal de ering is shown in t | epressior | n Scale, emo IPV = | emotional IPV, phyIPV = phys | ical IPV, sexIPV = sexual IPV, PP = 1 | pos∰a d_ f= | artum, PPD = postpartum depression. | |
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| 10 261 | High-income and upper-middle countries (HMIC) |
| $\frac{11}{12}262$ | Figure 3 and 4 illustrates the association of IPV and PPD across HMIC and LMIC with outcomes |
| 13 263 14 | reported as aOR (n=26/33). Among the HMIC studies (n=23), the prevalence of "IPV overall" |
| 15 264 | varied across studies, and so did the association within the different types of IPV. The prevalence of |
| 16 17 265 | emotional IPV ranged from 1.7%-28.1% ^{43 47} among women reporting emotional IPV within the last |
| ¹⁸ 266 19 | year, whilst physical IPV had a prevalence range of 1.8%-37.8% ^{17 33} . |
| 20 267 | The majority of HMIC studies found a significant association between IPV and PPD, which is |
| 21 22 268 | clarified in figure 3 were almost 90% of the cohort studies ($n=7/8$) showed a significant association |
| ²³ 24 269 | between "any IPV" and PPD with an aOR ranging from 1.18-6.87 (95% CI: 1.09-11.78). For |
| ²⁵ 270 26 | physical IPV, all three studies found a significant association with an aOR ranging from 1.5-3.94 |
| 27 271 | (95% CI: 1.30-6.36). Among the cross-sectional studies, most studies found an association between |
| 28 29 272 | IPV and PPD; 75% (n=3/4) found a significant association for "any IPV" (aOR range: 4.61-4.30; |
| ³⁰ 273 | 95% CI: 1.06-8.70) whilst the only studies reporting "physical IPV" and "emotional IPV", both |
| 32 274 33 | found a significant result. |
| 34 275 | |
| 35 36 276 | Low- and lower-middle-income countries (LMIC) |
| ³⁷ 38277 | Figure 4 illustrates the results from LMIC countries that report aOR with the majority being cross- |
| ³⁹ 278 40 | sectional studies (n=5/8). Overall, 75% (n=6/8) found a significant association across both study |
| 41 279 | designs. The aOR for "any IPV" ranged from 2.51-5.92 (95% CI: 1.67-14.40), whilst it for |
| 42 43 280 | "physical IPV" ranged from 2.75-4.1(95% CI: 1.19-7.76). |
| ⁴⁴ 281 45 | |
| 46 | |
| 47 282 48 | DISCUSSION |
| 49 <u>283</u> 50 | A total of 33 studies were included in this systematic review of which 13 were cross-sectional and |
| 51 284 | 20 were cohort studies. Of the cross-sectional studies, eight were set in HMIC and five in LMIC |
| ⁵² 53 285 | and of the cohort studies 15 were set in HMIC whilst 5 were set in LMIC. The studies had |
| ⁵⁴ 286 55 | considerable heterogeneity in terms of reported IPV exposure with varying cut-off scores ranging |
| 56 287 57 | from 10-13 on the EPDS tool. The main findings, the association between "any IPV" and PPD |
| 58 288 | ranged from aOR 1.18 to 6.87, with the association between specific types of IPV and PPD ranging |
| 59 60 | |

¢

3 4 289 from aOR 1.50 to 5.93 for physical violence, aOR 1.58 to 4.60 for emotional violence, and aOR 5 1.98 to 2.75 for sexual violence. These results are in accordance with previous systematic reviews 6 290 7 by Halim et al., Bacchus et al., Beydoun et al. and Necho et al^{5 22 23 58}. 291 8 9 , 10²⁹² The quality of the studies included in the present review was generally assessed to be good and if ¹¹ 293 studies were assessed as "poor quality" it was mostly due to missing adjustment of 12 13 294 confounders. Overall, a total of 48 different confounders were controlled for with most of the 14 15¹⁴15²⁹⁵ studies controlling for maternal sociodemographic characteristics,²³. Surprisingly, only half of the $^{16}_{17}296$ studies controlled for history of depression, though it is a well-known risk factor for developing 18 297 PPD⁵⁸. None of the studies adjusted for risk factors such as poor postpartum sleep and vitamin D 19 20 298 deficiency, which is reported as risk factors in a systematic review from 2020. In addition, studies 21 22 299 from both HICs and LMICs have shown an association between unintended pregnancy and ²³₂₄ 300 postpartum depression with risk estimates of 2.0 and 2.5, respectively^{59 60}. Further, research has 25 301 shown that emotional violence has an influence on fertility as to decreased control of fertility, 26 27 302 abortion and non-planned pregnancy⁶¹. ²⁸ 29 303 Generally, there were no major differences in the association between HMICs and LMICs, though ³⁰ 304 more cohort studies set in HMICs found an association between emotional IPV and PPD compared 31 32 305 to LMICs. According to our current knowledge, this review is the first of its kind which divides the 33 ₃₄ 306 results into HMIC and LMIC countries. The authors decided to do so because of the great cultural ³⁵₃₆ 307 and economic differences that exist between HMIC and LMIC countries, in an attempt to make the 37 308 results more homogeneous. 38 39 309 40 41 310 When focusing on the present review, a strong association between any IPV and PPD was found. 42 43 311 This finding is in line with a previous systematic review and meta-analysis that found exposure to

44 312 any IPV increased the risk of PPD by 1.5 to 2.0 times²². Research examining the pathways between 45 46 313 IPV and PPD is sparse. Traditionally, PPD is believed to be largely caused by hormonal and other 47 48 314 physiological changes associated with pregnancy and childbirth⁶². Additionally, it is recognized that 49 315 50 PPD is also associated with various psychological, socioeconomic, and cultural factors⁶³⁻⁶⁶. It is 51 316 further acknowledged that stressful events like IPV exposure can cause an imbalance between 52 53 317 environmental demands and individual resources which may lead to decreased resistance, increased ⁵⁴ 318 susceptibility to mental health problems and consequently the onset of depression⁶⁷. 56 3 1 9 Not only is IPV a major stressor and a traumatic event that can lead to depression, but it is also 57 58 320 known that IPV affects the victim's trust in others, fear, coping styles and levels of isolation which 59 60

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| 4 321 | additionally may increase the risk of depression ⁶⁸ . In addition, people who suffer from depression |
| 5 ³²¹ 6 322 | are known to have symptoms like irritability, loss of energy and enjoyment, sensitivity to criticism |
| 7 8 323 | and generally pessimism, which may seem burdensome or unreasonable for the spouses ⁶⁹ . Thus, |
| 9 10 324 | there may be a bi-directional association between IPV and depression. Hence not only is IPV |
| 11 325 | associated with an increased risk of subsequent symptoms of depression but also depression |
| 12 ³²⁵ 13 326 | symptoms may be associated with an increased risk of subsequent IPV ⁵³ . |
| 14 15 327 | |
| $\frac{16}{17}$ 328 | When looking at the specific types of IPV, we found that physical IPV was significantly associated |
| 18 329 | with PPD. We also found an association, between emotional IPV and PPD, although less |
| 19 20 330 | pronounced. This weaker association may reflect reporting bias since emotional IPV is more |
| 21 22 331 | difficult to measure than physical IPV. Women who are exposed to emotional IPV may not |
| $\frac{23}{24}332$ | perceive themselves as victims of abuse. From their perspectives, acts such as shouting or |
| 25 333 | threatening behaviours are often considered a result of a "hot temper". However, women who are |
| 26 27 334 | living in a relationship where she is being shouted at, threatened or humiliated may lose their sense |
| ²⁸ 29 335 | of self-esteem and independence and thus be at increased risk of developing depression ⁶ . Finally, a |
| ³⁰ 336 31 | strong association between sexual IPV and PPD was found. Some investigators have noted that |
| 32 337 | pregnant women with a history of sexual abuse may re-experience memories of their abuse during |
| 33 34 338 | procedures of routine pregnancy care ⁷⁰⁷¹ as the reactivation of memories of sexual abuse may |
| ³⁵ 339 36 339 | trigger the development of antepartum and postpartum depression ⁷² . |
| 37 340 | |
| 38 39 341 | Identification of IPV victims is crucial in the fight against IPV. When focusing on pregnant women, |
| 40 41 342 | antenatal care provides a window of opportunity for identifying women exposed to IPV. The |
| ⁴² 343 | effectiveness of IPV screening has been evaluated in a Cochrane review from 2015 where screening |
| 44 3 4 4 | was compared with standard care. The screening was associated with 4.5-fold odds for |
| 45 46 345 | identification of pregnant women exposed to IPV73. IPV screening should ideally go hand in hand |
| 47 48346 | with harm reduction interventions like counselling e.g. in sessions on video or telephone to improve |
| 49 347 50 | empowerment, reduce isolation and start safety planning. These interventions may affect both IPV |
| 51 348 | and PPD. However, if IPV and depression are intertwined in a vicious cycle as described above, |
| 52 53 349 | these mutually reinforcing effects could undermine the success of video or telephone-based IPV |
| $\frac{54}{55}350$ | interventions. Thus, combined interventions involving a multi-component approach which both |
| 56 351 | address the spouse and includes cognitive-behavioural therapy may be more effective in |
| 57 58 352 | interrupting the cycle of IPV and depression ⁷⁴ . |
| 59 60 | |

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3 4 353 5 6 354 A strength of this review is that it is based on an extensive systematic search of five online 7 8 355 databases. Further, we applied the PRISMA guidelines to direct the review, thus a uniform and 9 , 10³⁵⁶ transparent approach were used to synthesize the latest evidence of IPV exposure and PPD. In 11 357 12 addition, we conducted an appropriate quality assessment of all included studies using NOS. 13 3 5 8 However, a limitation of NOS is that the scale has to be adapted to specific research designs, which 14 14 15 359 can lead to the possibility of low agreement between quality assessors²⁶. To cover the field of $^{16}_{17}360$ interest in a comprehensive manner, we included both cross-sectional and cohort studies from 18 361 LMICs and HMICs. This approach may have resulted in heterogeneity across studies and thus 19 limited our ability for more in-depth analysis. 20 362 21 22 363 To create a stringent and more homogenized overview, we decided to narrow the inclusion criteria ²³ 364 to only studies using EPDS with a cut-off ≥ 10 and outcome reported as RRs or ORs. The pre-²⁵ 365 26 defined cut-off threshold of ≥ 10 was chosen to support the global orientation in the review that 27 366 address PPD across many countries in both HMIC and LMIC and taking the wide range of different 28 29 367 validated cut-offs into consideration. Other studies have suggested the following thermology ³⁰ 31 368 'possible minor depression' and 'possible major depression' at cut-off ≥ 10 and ≥ 13 respectively. ³² 369 This terminology must be kept in mind but will not be used throughout the manuscript where the 34 3 7 0 diagnosis in many cases also could be classified as "signs of postpartum depression". Like every 35 ₃₆ 371 other measurement tool, EDPS has its strength and limitations. With a cut-off at 10, some women ³⁷ 38 372 may screen false positive. To account for this, we reviewed the studies to consider whether a cut-off ³⁹ 373 40 at 13 would change the association. But even after excluding studies with cut-off \geq 13 the majority 41 374 of studies still showed an association between IPV and PPD, except only four LMIC studies would 42 43 375 be left in the review. 44 45 376 Another limitation of this review is that due to the heterogeneity of the included studies, we were 46 377 47 not able to perform a metanalysis. However, we presented aOR from the studies in a forest plot and 48 3 7 8 ordered them according to quality. This approach helps illustrate the association between IPV 49 50 379 exposure and PPD while considering the quality of the studies. Another factor that adds to the ⁵¹ 380 heterogeneity across studies, is the variance in reported IPV exposure. Variation in measurement 53 381 and reporting is an acknowledged problem within women's and newborn health and has led to 54 55 382 initiatives that aim to establish Core Outcome Sets (COS). As a result of this initiative, a 56 57 383 standardized set of outcome measures has been developed within, e.g. pre-eclampsia⁷⁵. To guide 58 59 60

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| 4 5 | 384 | future IPV research there is likewise a need for harmonizing IPV outcome measures and establish a |
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| 6 7 | 385 | core outcome set for IPV reporting, which has also been suggested elsewhere ⁷⁶ . |
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9) 10³⁸⁷ CONCLUSION

11 388 12 This systematic review contributes to the existing literature on IPV and adverse health outcome by 13 389 summarizing current knowledge on the association between IPV and PPD. We found evidence of an 14 15 390 association between IPV exposure and PPD across all study designs and settings, thus we suggest 16 17 391 that large multi-national longitudinal studies where targeted and effective interventions are 18 392 prioritized. This may help address the problem of IPV and improve women's health and also allow 19 20 393 for future meta-analyses. Further, we recommend well-defined outcome measures and the 21 22 394 establishment of core outcome sets to better estimate the association between IPV and associated ²³ 395 24 outcomes.

27 397 Contributions

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29 3 98 LSBA, VR and DSL conceptualised the study and wrote the protocol. LSBA, SN and DSL included 31 399 the studies. LSBA did the data extraction and analysed the data and ANK verified it. KA and LBSA ³² 33 400 made the quality assessment. CW made the forest plot. LBSA and VR drafted the manuscript and ³⁴ 401 35 DSL, AKN, KA and SN critically revised it. All authors approved the final version of the 36 4 0 2 manuscript.

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48 49</sub>409 Conflict of Interest

⁵⁰ 410 No conflicts of interest to declare. 51

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⁵³ 412 Acknowledgements 54

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| $^{4}_{5}$ 415 | Appendix, supplementary | | | | | |
| 6 416 | Appendix I: PRISMA checklist | | | | | |
| 7 8 417 | Appendix II: Search strate | egy | | | | |
| 9 10 418 | | | | | | |
| $10^{11} 419$ | Data Availability Stateme | sat | | | | |
| 12 | 2 | | | | | |
| 13 420 14 | No additional data availab | ble. | | | | |
| 15 421 | | | | | | |
| 16 422 | Abbreviations: | | | | | |
| ¹⁷ 423 | AAS | Abuse Assessment Score | | | | |
| 19 424 | AN | Antenatal | | | | |
| 20 425 | aOR | Adjusted Odds Ratio | | | | |
| ²¹ 426 | aRR | Adjusted Relative Risk | | | | |
| 22_{23}^{22} 427 | CI | Confidence Interval | | | | |
| 24 428 | EPDS | Edinburgh Postnatal depression Scale | | | | |
| ²⁵ 429 | GNI | Gross National Income | | | | |
| $\frac{26}{27}$ 430 | HMIC | High and upper-Middle-Income countries | | | | |
| 28 431 | IPV | Intimate Partner Violence | | | | |
| ²⁹ 432 | LMIC | Low- and lower-Middle-Income Countries | | | | |
| $30 \\ 31 \\ 433$ | NOS | Newcastle-Ottawa scale | | | | |
| 31 ⁴³³ 32 434 | OR | Odds Ratio | | | | |
| 33 435 | PP | Postpartum | | | | |
| $34 \\ 35 \\ 436$ | PPD | Postpartum depression | | | | |
| | | Relative Risk | | | | |
| 36 437 37 438 | RR | | | | | |
| | SCID | Structured Clinical Interview for DSM-IV | | | | |
| ³⁸ 439 | WHO | World Health Organization | | | | |
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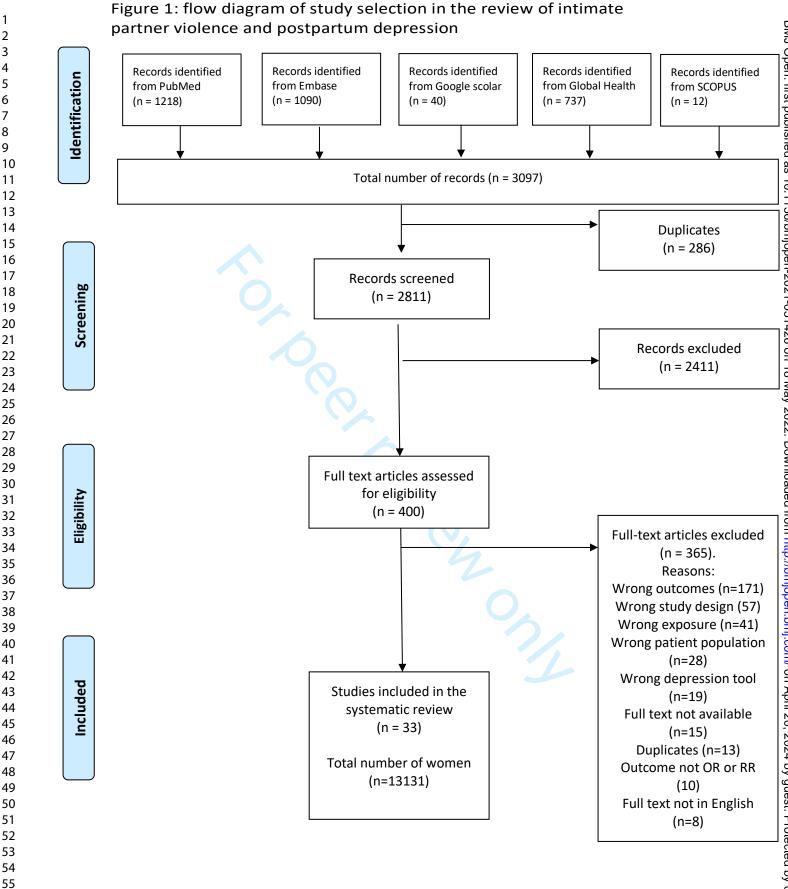
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| 17 18 690 | Figures and tables: |
| ¹⁹ 691 20 | Figure 1: Flow diagram of study selection in the review of intimate partner violence and postpartum |
| 20 21 692 | depression. |
| 22 23 693 | Figure 2: Quality assessment of cohort studies according to country economic status and stars |
| ²⁴ 25 694 | awarded for each item of the Newcastle-Ottawa Scale. |
| ²⁶ 695 27 | Figure 3: Results of IPV and the association with PPD from the studies set in HMIC, presented in a |
| 28 696 | forest plot ordered according to descending quality. |
| 29 30 697 | Figure 4: Results of IPV and the association with PPD from the studies set in LMIC, presented in a |
| ³¹ 698 32 | forest plot ordered according to descending quality. |
| 33 699 34 | Table 1: Overview of cross-sectional and cohort studies on postpartum depression among IPV |
| 35 700 | victims set in Upper-middle and High-income countries. |
| ³⁶ 37 701 | Table 2: Overview of cross-sectional and cohort studies on postpartum depression among IPV |
| ³⁸ 702 39 | victims set in Low and Lower-middle-income countries. |
| 40 703 | Table 3: Confounders adjusted for in the studies (n=33) clustered within the following domains. |
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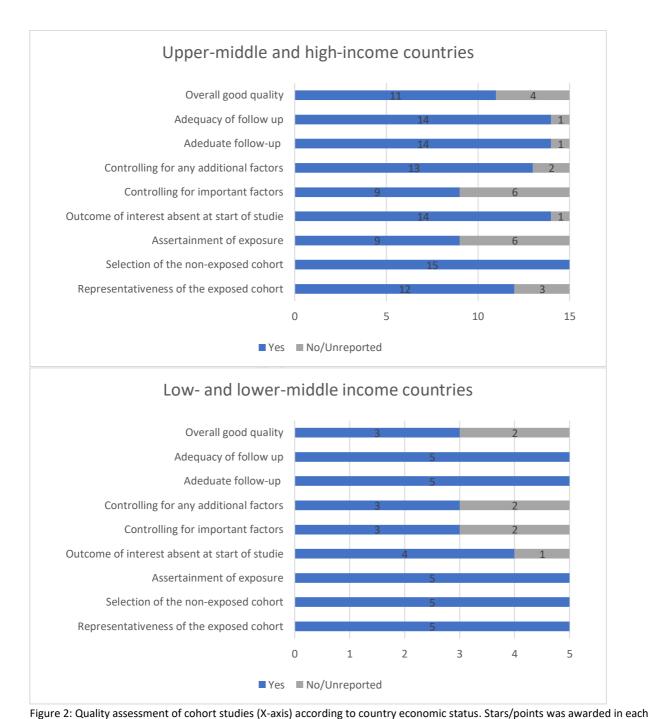
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From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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category of the Newcastle-Ottawa Scale (Y-axis). When awarded 7 stars/points or more the article was entitled 'yes'

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| Outcome/Author Year | | | aOR (95%CI) | Study quality se | |
|--------------------------------|------|----------|---------------------------|------------------|---------|
| Cohort studies | | | | and | categor |
| Any violence | | | | | |
| Adynski H | 2019 | | 1.18(1.12,1.25) | 8 | Goo |
| Ludermir A.B. | 2010 | | 1.76(1.05,2.93) | 8 | Good |
| Shwartz N | 2019 | | 1.58(1.07,2.33) | 7 | Good |
| Velonis AJ | 2017 | | 2.06(1.21,3.53) | 7 | Goo |
| Tsai AC | 2016 | | 1.26(1.13,1.40) | 7 | Good |
| Malta L.A. | 2012 | | 1.66(0.95,2.90) | 7 | Goo |
| Flach C. | 2011 | - | 1.29(1.02,1.63) | 7 | Goo |
| Zhang, Y | 2011 | | → 6.87(4.01,11.78) | 6 | Fair |
| Physical violence | | | | | |
| Ogbo FA. | 2018 | | 1.50(1.30,1.70) | 8 | Goo |
| Chaves K. | 2019 | | 2.53(1.76,3.63) | 7 | Goo |
| Woolhouse H | 2011 | | 3.94(2.44,6.36) | 7 | Goo |
| Emotional violence | | | | | |
| Escribá-Agüir V | 2013 | | →4.11(1.23,13.73) | 7 | Goo |
| Cross sectional studies | | | | | |
| Any violence | | | | | |
| Ahmad N. A | 2018 | | 2.34(1.12,4.87) | 8 | Good |
| Urquia ML | 2011 | | →4.30(2.10,8.70) | 7 | Good |
| Beydoun H.A., | 2010 | | 1.61(1.06,2.45) | 6 | Fair |
| Afshari P | 2019 | | 1.49(0.49,4.59) | 4 | Poor |
| Physical violence | | | | | |
| Gao W | 2010 | | 2.34(1.52,3.60) | 7 | Goo |
| Emotional violence | | | | | |
| Tiwari A | 2007 | | 1.84(1.12,3.02) | 5 | Fair |
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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.

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| Outcome/Author Cohort studies | Year | | | | | | | aOR <mark>(</mark> 95%Cl) | Study quality score and categories | |
|----------------------------------|------|------------|---|---|---|---|---------------|---------------------------|---------------------------------------|------|
| Any violence | | | | | | | | | | |
| Rogathi JJ. | 2017 | - | | | | | | 2.51(1.67,3.76) | 8 | Good |
| Physical violence | | | | | | | | | | |
| Tho Tran N | 2019 | - | | | | | | 2.75(1.19,6.35) | 8 | Good |
| Tho Tran N | 2018 | - - | | | | | | 0.64(0.30,1.35) | 8 | Good |
| Cross sectional studies | | | | | | | | | | |
| Any violence | | | | | | | | | | |
| Abebe A | 2019 | | | _ | | | | 3.16(1.76,5.67) | 7 | Good |
| Adamu A.F. | 2018 | | | - | | | | 3.10(1.60,5.90) | 6 | Fair |
| Abadiga M | 2019 | - | - | | | _ | \rightarrow | 5.92(2.44,14.40) | 6 | Fair |
| Physical violence | | | | | | | | | | |
| Islam Md | 2017 | 1 | _ | | | | | 4.10(2.07,7.76) | 7 | Good |
| Emotional violence | | | | | | | | | | |
| Kabir Z.N | 2014 | | | | | | | 1.05(0.90,1.22) | 7 | Good |
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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

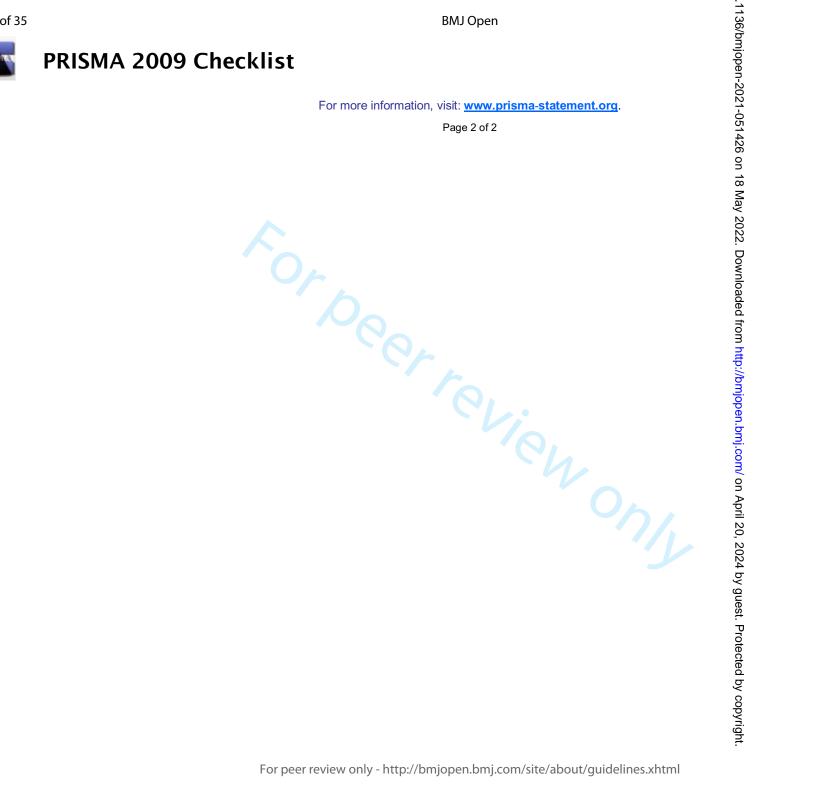
| Page 31 of 35 | | BMJ Open | |
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| PRISMA 2 | 009 | BMJ Open 36, bmj open 28, bmj open 28, bmj open 20, bmj o | |
| Section/topic | # | Checklist item | Reported on page # |
| TITLE | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| | | Aay X | |
| 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 |
| | <u>+</u> | | |
| 6 Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 3-4 |
| 6 Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, in rventions, comparisons, outcomes, and study design (PICOS). | 4 |
| | | | |
| 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. | 4 116- 119 |
| 4 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 |
| 9 Search 0 | 8 | Present full electronic search strategy for at least one database, including any limits used, sich 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 |
| 4 Data collection process 5 | 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 |
| 6 Data items 8 | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 5 |
| 9 Risk of bias in individual 0 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, I 130- 131 |



| | | BMJ Open 33 | Page 32 of 3 |
|-------------------------------|----------|--|--------------------|
| PRISMA 20 | 009 | BMJ Open 36/bmj Checklist 20 | |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., l ²) for each meta-analysis. | 6-7, l173- 195 |
| | | Page 1 of 2 | |
| 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 I 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 I 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-regr | |
| DISCUSSION | <u> </u> | | |
| 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., in complete 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 | | by | |
| 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. 45 doi:10.1371/journal.pmed1000097 For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml





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| #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 Mai 2020

Appendix: search strategy

| Global | health, Ebseohost. Searchea on the 10° 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 |

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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 ("mother") OR TITLE-ABS-KAY ("postnatal depression") 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

((((((()()))) OR "intimate partner violence"[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 "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" [MeSH Subheading]) OR "economization" [All Fields]) OR "economize" [All Fields]) OR

((((((("abusable"[All Fields] OR "abuse s"[All Fields]) OR "abused"[All Fields]) OR "abuser"[All

"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

("isolation"[All Fields] AND "purification"[All Fields])) OR "isolation and purification"[All Fields]) OR

(("violence"[All Fields] AND "against"[All Fields]) AND "women"[All Fields])) OR "violence against

((((((("isolate"[All Fields] OR "isolate s"[All Fields]) OR "isolated"[All Fields]) OR "isolates"[All

"isolation"[All Fields]) OR "isolations"[All Fields])) OR (("violence against women"[Journal] OR

Fields]) OR "isolating"[All Fields]) OR "isolation and purification"[MeSH Subheading]) OR

"economics"[All Fields]) OR "economic"[All Fields]) OR "economically"[All Fields]) OR

Fields]) OR "abuser s"[All Fields]) OR "abusers"[All Fields]) OR "abuses"[All Fields]) OR

"economized"[All Fields]) OR "economizes"[All Fields]) OR "economizing"[All Fields]) AND

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women"[All Fields]))

(((("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]) OR "depression s"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR ("depressive"[All Fields]) OR "depression s"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR ("depressive"[All Fields]) OR "depressive"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR ("depressive"[All Fields]) OR "depressive"[All Fields]) OR "depressive disorder"[MeSH Terms]) OR "depressive"[All Fields]) OR "depressive"[All Fields]) OR "depressive disorder"[All Fields]) OR "depressive"[All Fields]) OR "depressive"[All Fields]) OR "depressive disorder"[All Fields]) OR "depressive"[All Fields]) OR "depressive"[All Fields]) OR "depressive]"[All Fields]) OR "depressive]"[All Fields]) OR "depressive"[All Fields]) OR "depressive]"[All Fields]) OR "depressive][All Fields]) OR

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