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Sleep disturbance among pregnant women: an umbrella review, 2025

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Systematic Review

Keywords: Sleep disturbance, Poor sleep quality, Insomnia, Restless leg syndrome, Obstructive sleep apnea, Umbrella review

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Abstract

Sleep disturbances are groups of conditions that affect the normal sleep patterns and is one of the highly prevalent problems among pregnant women. This umbrella review aimed to synthesize systematic review and meta-analysis evidence on sleep disturbance among pregnant women and identify gaps in the existing evidence. This umbrella review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines. We searched systematic reviews electronically in CINAHL, EMBASE, MEDLINE, PsycINFO, PubMed, Cochrane Library, Scopus, Web of Science and Google Scholar between February 10 and February 30, 2025 and included 12 reviews. Statistical pooling was done and publication bias was assessed using a funnel plot and Egger's regression test. The pooled prevalence estimates were computed under the random-effects model. Stata version 17.0 was used for analysis. We included 12 systematic reviews and meta-analyses, and the pooled prevalence of sleep disturbance during pregnancy was 38.86% [CI:38.84-39.88] with the heterogeneity index (I^2=99.99%, P < 0.001). The forest plot for poor sleep quality was 52.91% [CI: 48.14, 57.67], obstructive sleep apnea 15.99% [CI: 14.05,17.93], insomnia 40.29% [CI: 36.17,44.40], and restless leg syndrome was 21.77% [CI: 19.94, 23.59]. This review concludes that many pregnant women aren't sleeping well, and poor sleep quality, insomnia, restless leg syndrome, and obstructive sleep apnea are the biggest problems. We really need to start checking on sleep during prenatal appointments and doing more studies on how to make things better.

Keywords: Sleep disturbance, Poor sleep quality, Insomnia, Restless leg syndrome, Obstructive sleep apnea, Umbrella review.

Introduction

Sleep is a vital process required by the brain for proper functioning and maintaining overall health, and it is essential for coping with stress, preventing fatigue, conserving energy, restoring the mind and body, and enhancing quality of life. It occupies 1/3 of human life, (1, 2). For pregnant women it is important to nourish their infants so that they develop well and can improve the energy they need for the labor and delivery process (3).

Sleep disturbances are groups of conditions that affect the normal sleep patterns which manifest as difficulty falling asleep, staying asleep or experiencing non-restorative sleep (4). It is one of highly prevalent problems among pregnant women (5-7). The problem worsens as pregnancy progresses, with the greatest increase in risk observed in the second and third trimester (8). The most common sleep disturbances among these individuals include obstructive sleep apnea (OSA), insomnia, restless leg syndrome (RLS), narcolepsy (9), poor sleep quality (PSQ) and excessive day time sleepiness (EDS) (10).

The pathophysiology of sleep disturbances during pregnancy involves a complex interplay of hormonal and physiological changes. Progesterone has sedative effects, promoting sleepiness during the day but potentially causing nocturnal sleep fragmentation while estrogen can affect sleep by reducing rapid eye movement (REM) (11). The growing uterus can cause back pain, joint discomfort, and bladder pressure, leading to frequent awakenings, while gastro esophageal reflux disease (GERD) and changes in respiratory rate and breathing patterns also contribute to sleep disruptions during pregnancy (7, 12).

Pregnancy-related sleep disturbances can have serious adverse outcomes on both the mother and the baby, including increased cesarean delivery rates, preterm birth, neonatal intensive care unit (NICU) admission, neonatal resuscitation, lower 5 minutes infant Apgar score, intrauterine growth restriction, and pregnancy induced hypertension (13). It increases the risk of the development of gestational diabetes mellitus, pre-natal depression, abnormal length of labor, elevated perception of pain and discomfort during labor, higher levels of pro-inflammatory serum cytokines and large for gestational age (3, 14-16). Sleep disturbances during pregnancy increased the risk of the development of postpartum depression (PPD), anxiety and psychosis (17, 18). Sleep disturbances during pregnancy also lead to adverse offspring outcomes, including poorer sleep, higher body mass index, increased physical health conditions, impaired global development, more behavioral problems, and compromised brain structure and function (19).

Various factors are associated with sleep disturbances during pregnancy including, being overweight, hemoglobin level and presence gestational diabetes mellitus (GDM), increased maternal age (20), third-trimester pregnancy, multi-gravidity, unplanned pregnancy, having depression, stress and anxiety symptoms during pregnancy , poor sleep hygiene (6).

Although several reviews have been conducted regarding sleep disturbance and its adverse outcomes among pregnant women, no summary of these reviews has been provided. This umbrella review therefore aimed to synthesize systematic review and meta-analysis evidence on sleep disturbance and its adverse outcomes among pregnant women to map and identify gaps in the existing evidence base.

This umbrella review will provide a high-level synthesis of existing evidence on sleep disturbances during pregnancy, enabling healthcare providers to understand the full scope of the impact of sleep disturbances on maternal-fetal health outcomes. By consolidating the evidence, this umbrella review will also help policy makers, leaders and healthcare professionals in developing and implementing targeted interventions by identifying effective strategies which will enhance the overall maternal and fetal health outcomes. Furthermore, umbrella review will guide researchers in designing future studies that address unanswered questions or explore new avenues related to sleep disturbances during pregnancy.

Methods

Overview of Umbrella Review

An umbrella review, or otherwise known as a systematic review of systematic reviews, is a synthesis that includes only other systematic reviews, these being the highest forms of evidence. The approach is aimed at producing a single comprehensive source of evidence, and in

recent years has witnessed a growing number of times in which policymakers have used it, and those formulating intervention modalities, clinical guidelines and evaluating health care interventions (21, 22). The objective of this umbrella review is to assess the global prevalence of sleep disturbance among pregnant women. This umbrella review was conducted using the methodology outlined in the umbrella review of systematic review and meta-analysis (SRMA) studies using Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA-2015) (23) and the Meta-analysis of Observational Studies guideline (MOOSE) (24).

Search strategy and source of information

This umbrella review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines (23). We searched evidence-based systematic reviews of non-interventional studies electronically in CINAHL, EMBASE, MEDLINE, PsycINFO, PubMed, Cochrane Library, Scopus, Web of science and Google Scholar between February 10 and February 30, 2025 under PECO questions. Population: pregnant women; Exposure: sleep disturbance; Comparative: pregnant women without sleep disturbance and Outcome: the magnitude of sleep disturbance during pregnancy.

Systematic reviews conducted on the four sleep disturbances, namely poor sleep quality, insomnia, obstructive sleep apnea (OSA), and restless leg syndrome (RLS) were included. The principal outcome of this umbrella review is to assess the global burden of sleep disturbance during pregnancy. In this review, the systematic evaluation of included systematic reviews and meta-analysis studies concerning the sleep disturbance in pregnant women has been conducted. We checked into the PROSPERO database (https://www.crd.york.ac.uk/prospero/) to determine whether there are any recently published, completed or ongoing projects about the subject in a bid to prevent any further unnecessary duplication. The findings established that there were no ongoing or published articles in the area of this topic. Consequently, this umbrella review was not registered in the PROSPERO databases.

All relevant terms were searched interchangeably with either the Boolean operator “AND” or “OR” as indicated, and where two independent reviewers (YDM and HA) were involved who reached a consensus on every occasion without disagreements.

The search term used in PubMed were: ((Sleep disturbance[Text Word]) OR (Sleep difficulties[Text Word])) OR (Sleep disorders[Text Word])) OR (Sleep deprivation[Text Word])) OR (Sleep problem[Text Word])) OR (Sleep disorder[Text Word])) OR (Sleep Initiation and Maintenance Disorders[MeSH Terms])) OR (Sleep Wake Disorders[MeSH Terms])) OR (Insomnia[MeSH Terms])) OR (Sleep Deprivation[MeSH Terms])) OR (Sleep Apnea, Obstructive[MeSH Terms])) OR (Sleep Disorders[MeSH Terms])) OR (Parasomnia[MeSH

Terms])) OR (Restless legs syndrome[MeSH Terms])) OR (Dyssomnias[MeSH Terms])) OR (Poor sleep[MeSH Terms])) AND (Pregnant Women[Text Word])) OR (Pregnant woman[Text Word])) OR (Pregnancy[MeSH Terms])) OR (woman, pregnant[MeSH Terms])) OR (pregnant women[MeSH Terms])) AND (review, systematic[MeSH Terms])) OR (meata-analysis[MeSH Terms])) OR (Systematic review and meta-analysis[MeSH Terms]))

Inclusion Criteria

This umbrella review incorporates (1) all systematic reviews and meta-analysis studies (SRMAS) conducted on sleep disturbance among pregnant women (PSQ, insomnia, OSA, and RLS), (2) has at least one primary objective aimed to investigate on the prevalence of sleep disturbance during pregnancy, (3) has at least 2 defined literature search strategies to appraise the included studies with a relevant tool, (4) has a standard approach in pooling studies followed with the provision of summary estimates, (5) all non-interventional SRMAS conducted on the above four sleep disturbances with a clear quality assessment were included.

Exclusion Criteria

The studies that were excluded from this umbrella review were those do not report on either of the above-mentioned 4 sleep disturbances, not systematic review and/or meta-analysis, if they included primary studies on high-risk populations (obese, overweight, with depression and hypertensive), written in language other than English, included narrative reviews, editorials, and correspondence, and studies with poor methodological quality.

Search Outcomes

The first search retrieved 348 articles plus 2 articles through hand searching from the references of included reviews. However, through title screening, abstract, and full-text review, the final article count shortlisted for this review has been greatly reduced. In the original collection, 45 duplicates were eliminated, and 261 articles were excluded after title and abstract review, bringing down the count to 44. Full-text review of these 44 articles yielded an exclusion of 32 articles, and 12 reviews that met the inclusion criteria for this umbrella review remained.

Data extraction

All reviews that matched the selection criteria were imported to an EndNote database. After the removal of duplicates, the titles and abstracts were evaluated for eligibility before full-text assessment. Full-text reviews that met the inclusion criteria were checked for quality thereafter.

Data extraction from the included studies was done using tabulation and Excel. The information extracted from each study were: (1) Identification details (surname of first author with year of publication), (2) objectives of the reviews, (3) population, (4) search strategies, (5) number of primary studies included, (6) prevalence of outcome of the interest (type of sleep disturbances), (7) total number of samples included, (8) publications bias assessment methods, and (9) quality assessment methods with scores (AMSTAR 2).

Quality and Bias Assessment

The quality and risk of bias of studies have been assessed and reported using the assessment of multiple systematic reviews (AMSTAR 2) checklist score. The AMSTAR 2 checklist has sixteen indicators against which an overall score is derived and assessed as high quality, moderate, low and critically low quality (25). According to the AMSTAR 2 checklist, a systematic review is considered high quality if it has no or only one non-critical weakness, moderate if it has multiple non-critical weaknesses but no critical flaws, low if it has one critical flaw, and critically low if it has more than one critical flaw. This assessment evaluates all 16 items on the checklist, with specific weight given to the seven critical domains compared to the nine non-critical domains.

Among the included 12 SRMAS, we found 2 high quality, 5 moderate quality and 5 low qualities based on overall AMSTAR 2 results. We did not find a critically low AMSTAR 2 score. Three authors (YDM, HA, and AAM) assessed the quality of methodology, sample selection, sample size, comparability, and statistical analysis of each study. In cases of disagreement (10%), a fourth author (AG) was involved, and the discussion led to a resolution of the disagreement completely. After analysis of the 12 reviews was completed, a data display matrix was created and is summarized.

Strategy for Data Synthesis

Synthesis of data has been undertaken independently for each incorporated sleep disturbance. Statistical pooling (Meta-analysis) was done to quantify the burden of sleep disturbances during pregnancy. The check for any possible publication bias was done using a funnel plot and Egger's regression test. The decision regarding what meta-analysis model to use depends upon the evaluation of heterogeneity between the studies, which is assessed by Higgins's I^2- Statistics. According to Higgins et al., $I^2 < 49\%$, 50–75, and $> 75\%$, represent low, moderate, and high levels of heterogeneity respectively (26); therefore, we would have attempted to pool using fixed-effects models if heterogeneity had

been < 50%. However, there was high heterogeneity between studies. Thus, the pooled prevalence estimates were computed under the random-effects model, which accommodates both within and between-study variations. Stata version 17.0 was used for analysis.

Outcome Measures

1. Insomnia/Insomnia symptoms- it is difficulty falling or staying a sleep.

2. Obstructive Sleep Apnea: it is among interrupted breathing during sleep characterized by repetitive upper airway obstruction and significant reductions in airflow during sleep, which results in intermittent hypoxia and sleep fragmentation and snoring or loud snoring, choking, or gasping for air during sleep (possible sleep apnea) and waking up with a dry mouth, sore throat, or headache.

3. Restless Legs Syndrome: it is sleep-related movement disorders.

4. Poor sleep quality: it includes difficulty falling asleep, frequent nighttime awakenings, excessive daytime sleepiness, sleeping less than the recommended 7–9 hours, short sleep duration and long sleep duration.

Result

Literature Search Findings

We identified 350 reviews related to sleep disturbance among pregnant women. After duplicates removed, title and abstract review, a comprehensive full text review was done, finally 12 studies remained. The remaining 12 studies collectively consist of 290 primary studies and 126,125,016 participants on sleep disturbances among pregnant women were included after assessing quality **(figure 1).**

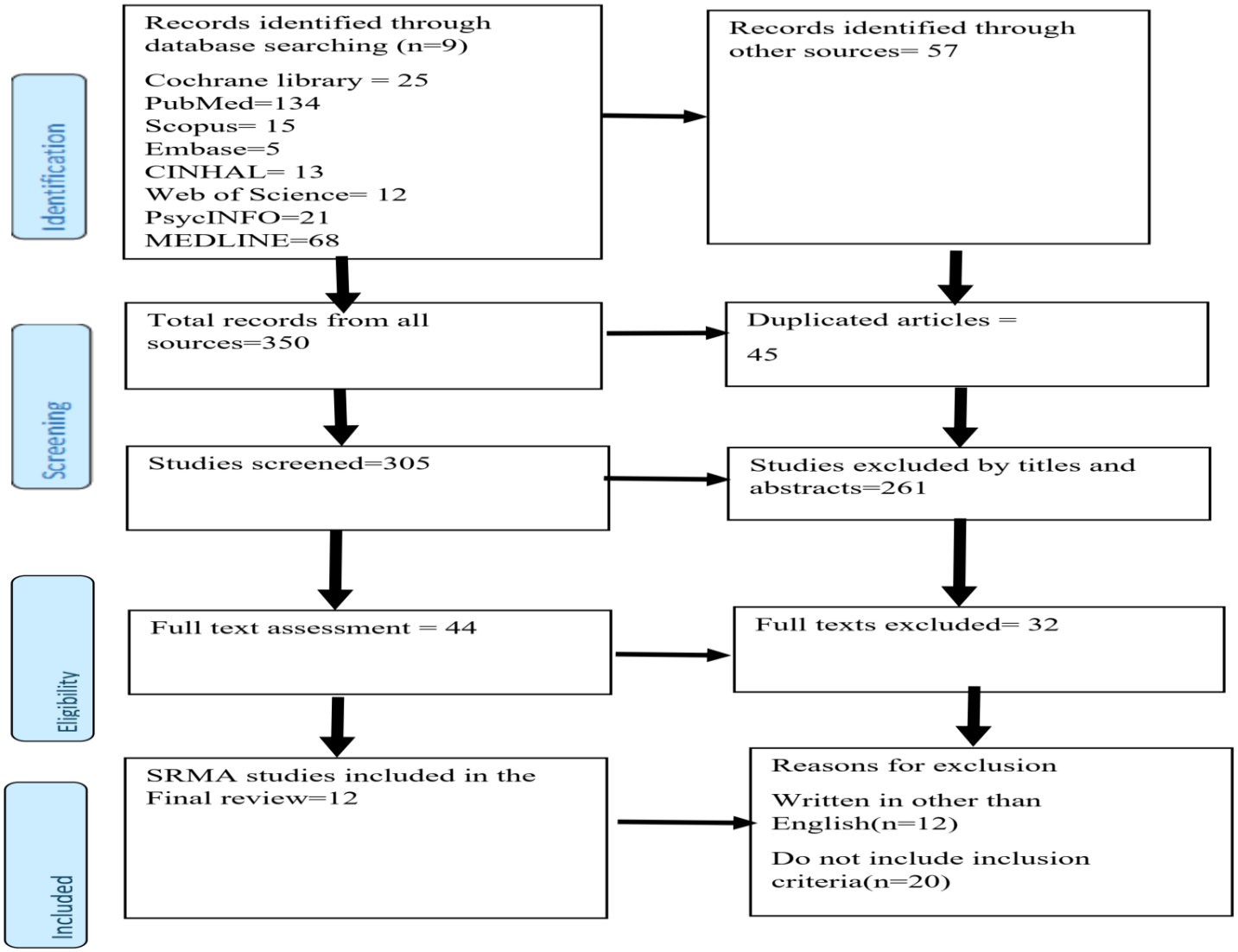


Figure 1: PRISMA-2020 flow diagram of SRMA included in sleep disturbance among pregnant women,2025

Prevalence of sleep disturbances during pregnancy

Characteristics of the Included Systematic Reviews and Meta-Analysis

As shown in Table 1 below, all incorporated reviews published from 9 June 2017 (27) to 15 January 2024 (6). The number of primary studies in each included review ranges from 6 (with 2483 study participants) (6) to 63 (with 67,671,110 study participants) (28). Six SRMA assessed the prevalence of PSQ, two assessed OSA, two assessed insomnia, and the last 2 SRMA conducted on RLS. The prevalence of sleep disturbance in pregnancy ranges from 15% (OSA) to 60.05% (PSQ). PubMed/MEDLINE and Google Scholar were the most cited databases for searching primary studies. The predominant quality assessment tool used was the Newcastle-Ottawa Scale (NOS).

Table 1: Characteristics if the included systematic review and Meeta-analysis on sleep disturbance among pregnant women, 2025.

Authors (Years)	Objectives	Search Strategies	Study Popn.	No of studies	Sample Size	Prevalence (%)	Quality assessment	AMST-AR 2 score
1. (29)	To evaluate the overall prevalence of OSA during pregnancy based on objective assessments and evaluate the relationship between OSA and pregnancy-related outcomes	PubMed, CINAHL, Embase, and PsycINFO, to identify studies conducted from inception to January 2018. Also searched bibliographies of included studies to identify additional eligible studies	Pregnant women	33	58,314, 428	15% (OSA)	Funnel plot and Begg's test	Low
2. (30)	To provide comprehensive	Searched from PubMed, Google Scholar, and African	Px women	6	4155	55% (PSQ)	Newcastle-Ottawa	High

	evidence on the prevalence and associated factors of PSQ and suicidal ideation among pregnant women during COVID- 19 in Ethiopia	Journals Online from the occurrence of the COVID-19 pandemic to February 2023					Scale (NOS)	
3. (28)	To examine whether maternal SDB in pregnancy is a risk factor for abnormal offspring growth	PubMed, Cochrane Library, Embase, CINAHL, and Web of Science, with terms related to SDB in pregnancy and fetal growth outcome	Px women	63	67,671, 110	16.98% (OSA)	Newcastle-Ottawa Scale (NOS)	Modera te
4. (31)	To establish an estimate of the prevalence of insomnia symptoms during pregnancy and to investigate theoretically and empirically established moderators	Electronic searches of Medline/PubMed, PsycINFO and Web of Science for papers published from inception up to June 2020	Px women	24	15,564	38.2% (Insomnia)	Funnel plot and eggers test	Modera te
5. (32)	To provide a full profile of the prevalence of RLS during pregnancy	PubMed, Medline, EMBASE, and Web of Science databases was	Px Women	27	51,717	21% (RLS)	Funnel plot and Begg's test	Low

		performed to identify studies that were published up to April 2017						
6. (6)	To determine the pooled prevalence of sleep disturbance and its associated factors among Ethiopian pregnant women	A systematic search of in PubMed, Scopus, Web of science, and Google Scholar using relevant searching key terms.	Px Women	6	2483	50.43% (PSQ)	The Newcastle-Ottawa scale	Low
7. (33)	To compare the prevalence of PSQ in different trimesters	Electronic data base search was done from PubMed, Hinari, Medline and Google Scholar.	Px women	38	28,043	60.05% (PSQ)	Funnel plot and Begg's test	Modera te
8. (27)	To determine the average PSQI score and prevalence rate of PSQ, to determine the magnitude of change in PSQI scores over the course of gestation and to investigate potential moderators of sleep	Electronic searches of Medline/PubMed, PsycINFO, and Web of Science since inception to September 2015	Px Women	24	11,002	45.7% (PSQ)	Funnel plot	Modera te

	quality during pregnancy							
9. (34)	To systematically review the overall prevalence of insomnia in the third trimester of pregnancy	Searching of SID, MagIran, IranDoc, Scopus, Embase, Web of Science, PubMed, Science Direct and Google Scholar databases without time until December 2020	Px women (11-40 years old)	10	8798	42.4% (Insomnia)	Funnel plot and Begg's test	Low
10. (35)	To assess the pooled prevalence of PSQ and associated factors among pregnant women in Ethiopia	PubMed, Cochrane Library, Google Scholar, and African Journal Online) were performed covering articles indexed before January 20, 2023	Px women	7	2689	52.3% (PSQ)	Newcastle–Ottawa Scale	High
11. (36)	To examine the prevalence PSQ in perinatal and postpartum women and investigate its associated moderators	PubMed, EMBASE, PsycINFO, Web of Science, CNKI, Wangfang	Px women	42	12,592	54.2% (PSQ)	Parker's quality tool for epidemiological studies, Funnel plot and Begg's test	Moderate

12. (37)	To determine the total prevalence of RLS in the third TM of pregnancy	SID, MagIran, IranDoc, Scopus, Embase, Web of Science (ISI), PubMed, Science Direct, and Google Scholar	Px Women (25–39 years)	10	2431	22.9% (95% CI: 14.7–33.8%) (RLS)	Egger's test	Low

Methodological quality of the included SRMA studies

The quality and risk of bias of studies have been assessed and reported using the assessment of multiple systematic reviews (AMSTAR 2) checklist score. We found 2 reviews have high quality, 5 have moderate quality, 5 have low quality, and none have critically low quality based on overall AMSTAR 2 results (Table 2).

Table 2: Quality assessment of the included systematic reviews and meta-analysis, 2025

SRMA'S author's name	Q1	Q 2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q11 3	Q14	Q15	Q16	Overall
1. (29)	No	N o	Ye s	Yes	Ye s	Ye s	Yes	No	Parti al Yes	N o	Yes	Yes	Yes	Yes	Yes	Yes	Low
2. (30)	No	Y es	Ye s	Yes	Ye s	Ye s	Yes	Ye s	Parti al Yes	Ye s	Yes	Yes	Yes	Yes	Yes	Yes	High
3. (28)	No	Y es	Ye s	Part ial Yes	Ye s	Ye s	Yes	Par tial yes	Yes	N o	Yes	No	Yes	Yes	Yes	Yes	Modera te
4. (31)	N O	Y es	Ye s	Part ial yes	Ye s	Ye s	Yes	Ye s	Yes	N o	Yes	Yes	Yes	Yes	Yes	Yes	Modera te
5. (32)	No	N o	Ye s	Part ial yes	Ye s	Ye s	Yes	Par tial yes	Parti al yes	N o	Yes	Yes	Yes	Yes	Yes	Yes	Low
6. (6)	No	N o	Ye s	Part ial Yes	Ye s	Ye s	Yes	Ye s	Parti al yes	Ye s	Yes	Yes	Yes	Yes	Yes	Yes	Low

7. (33)	NO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
8. (27)	No	Yes	Yes	Partial yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Moderate
9. (34)	No	No	Yes	Partial yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
10. (35)	No	Yes	Yes	Partial yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
11. (36)	No	Yes	Yes	Partial Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Moderate
12. (37)	No	No	Yes	Partial yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low

Meta Analysis/pooling

The pooled prevalence of sleep disturbance during pregnancy was 38.86% [CI:38.84-39.88], with the heterogeneity index (I^2=99.99%, P < 0.001) showing substantial heterogeneity between reviews (I^2 > 75 %). Therefore, we have used the random effect model to resolve the issue of heterogeneity among the included reviews **(Figure 2**).

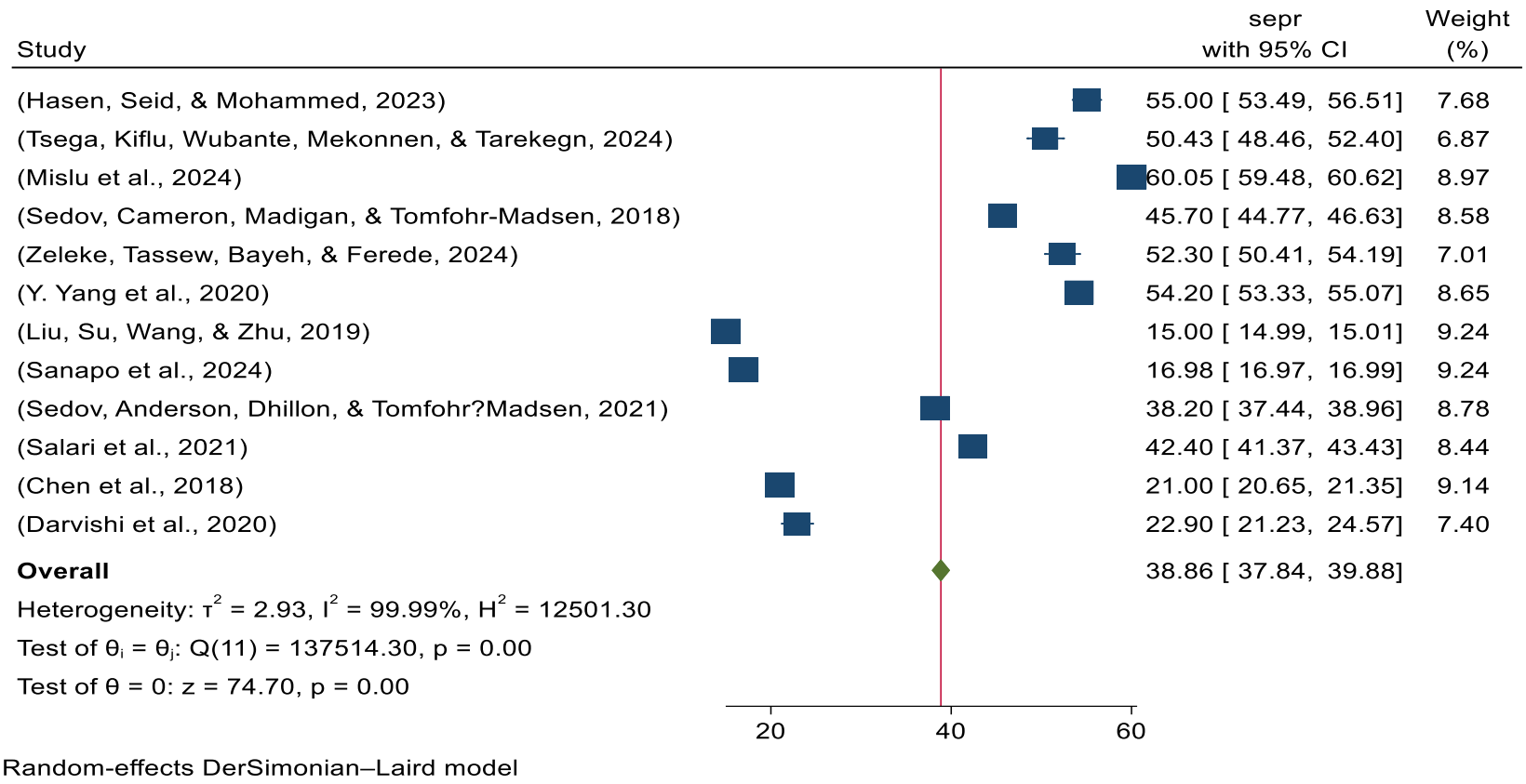


Figure 2: Forest plot showing the prevalence of sleep disturbances among pregnant women,2025

Heterogeneity: The heterogeneity of SRMA was cheked graphicall by Galbraith plot as shown below. It can be observed that most of the studies fell within the 95% confidence limits, thus indicative of a consistent positive effect. Some outliers were discerned, revealing the existence of substantial heterogeneity **(Figure 3).**

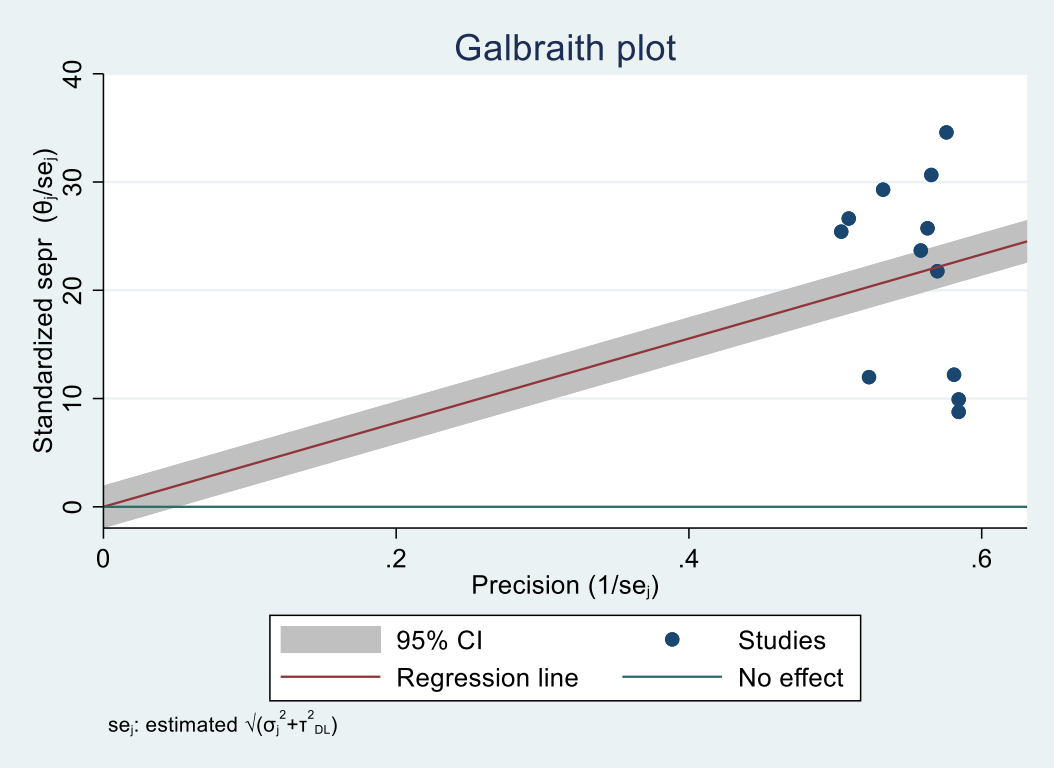


Figure 3: Heterogeneity of the included SRMA on sleep disturbance during pregnancy,2025

Publication bias: To check the publication bias we made funnel plot for graphical diagnostics of small study effects, test for small study effects by Regression-based Egger test and non-parametric rim and fill analysis. The small study effect was identified and Regression-based Egger test was significant. The funnel plot is presented below **(figure 4).**

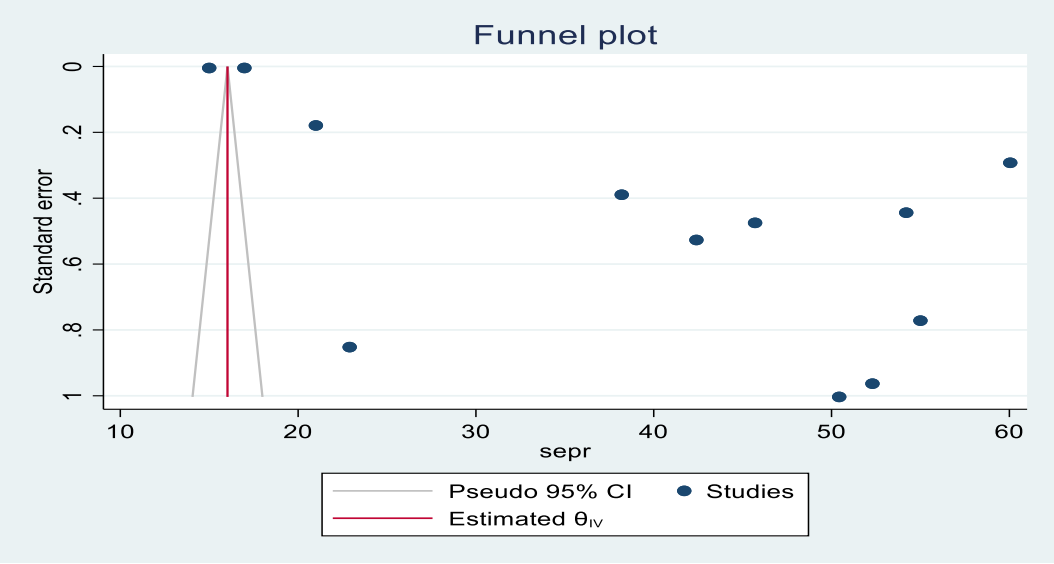


Figure 4: Funnel plot by small study effects of sleep disturbance among pregnant women, 2025

Statistical pooling by type of prevalence/ Sensitivity analysis

Since we identified substantial heterogeneity and publication bias, we made sensitivity analysis for PSQ, OSA, Insomnia and RLS.

Forest plot analysis for Poor Sleep Quality

The following figure indicates the sensitivity analysis/forest plot for PSQ is 52.91[48.14, 57.67] **(figure 5).**

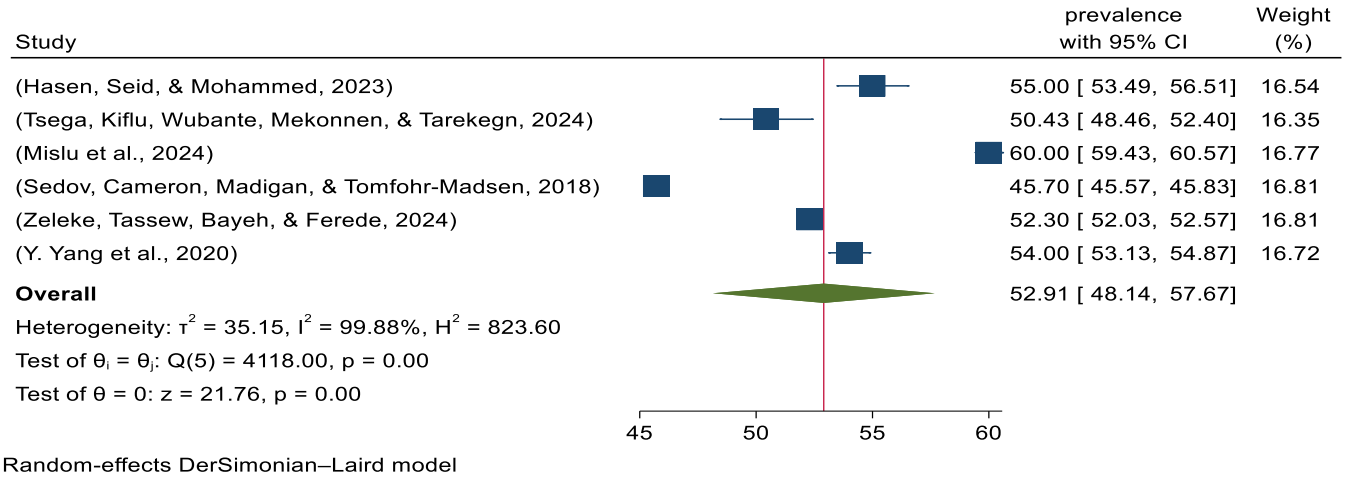


Figure 5: Forest plot for poor sleep quality among pregnant women,2025

Funnel plot of prevalence of Poor sleep quality among pregnant women (Fig. 6)

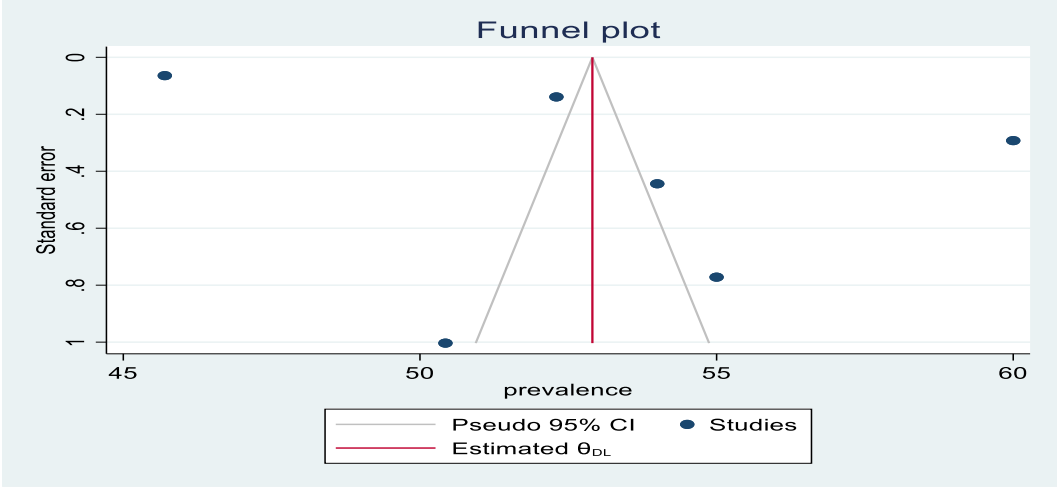


Figure 6: Funnel plot of prevalence of Poor sleep quality among pregnant women,2025

Forest plot analysis for obstructive sleep apnea is 15.99 [14.05,17.93] (figure 7)

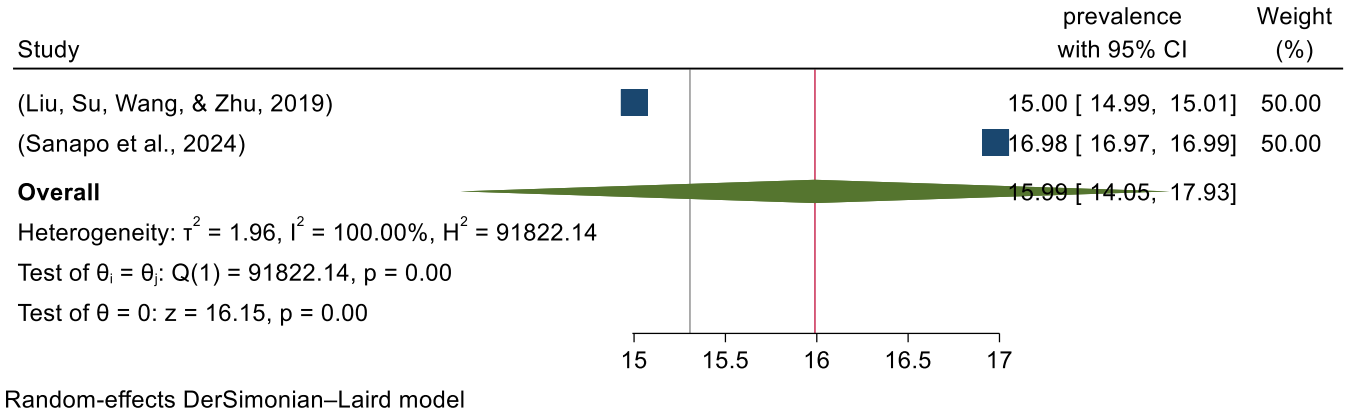


Figure 7: Forest plot for prevalence of OSA among pregnant women,2025

Funnel plot for OSA among pregnant women (Fig. 8)

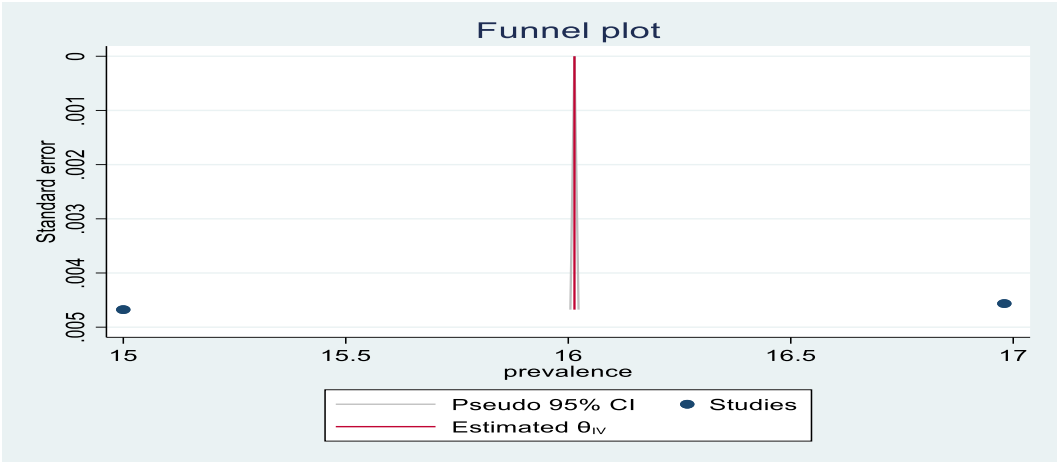


Figure 8: Funnel plot for OSA among pregnant women, 2025

Forest plot analysis for Insomnia is 40.29 [36.17,44.40] (fig 9)

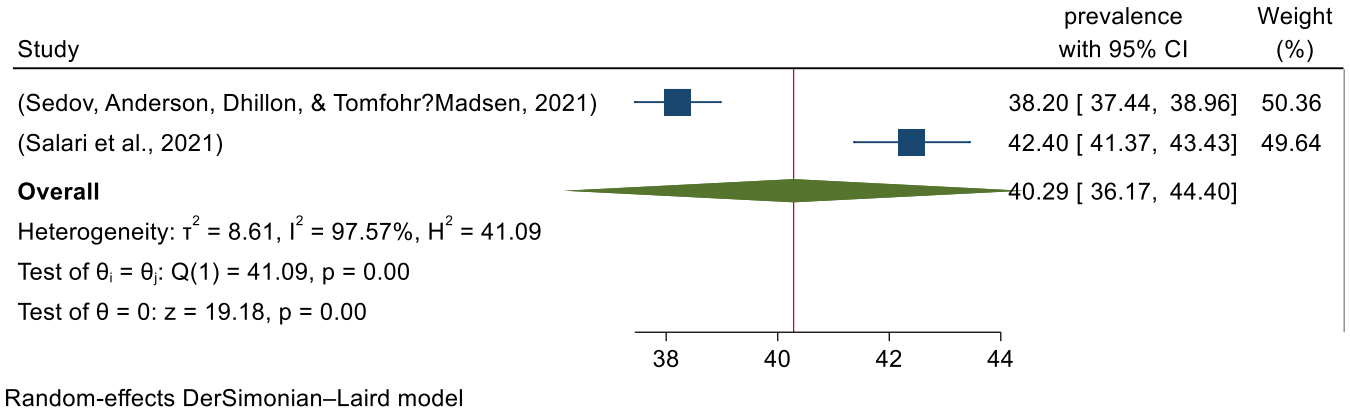


Figure 9: Forest plot for Insomnia among pregnant women,2025

Funnel plot of insomnia among pregnant women (Fig. 10)

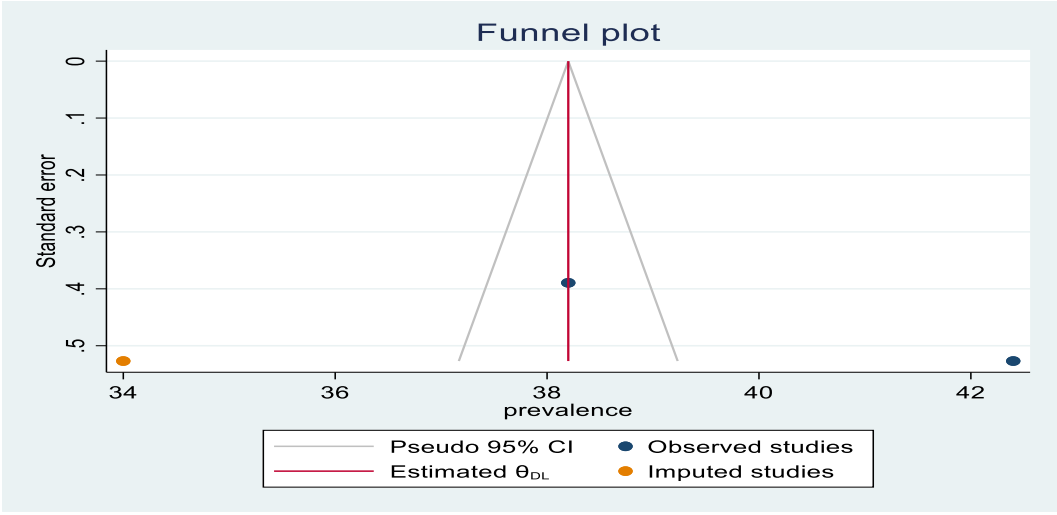


Figure 10: Funnel plot of insomnia among pregnant women, 2025

Forest plot analysis for RLS is 21.77[19.94,23.59] (fig 11)

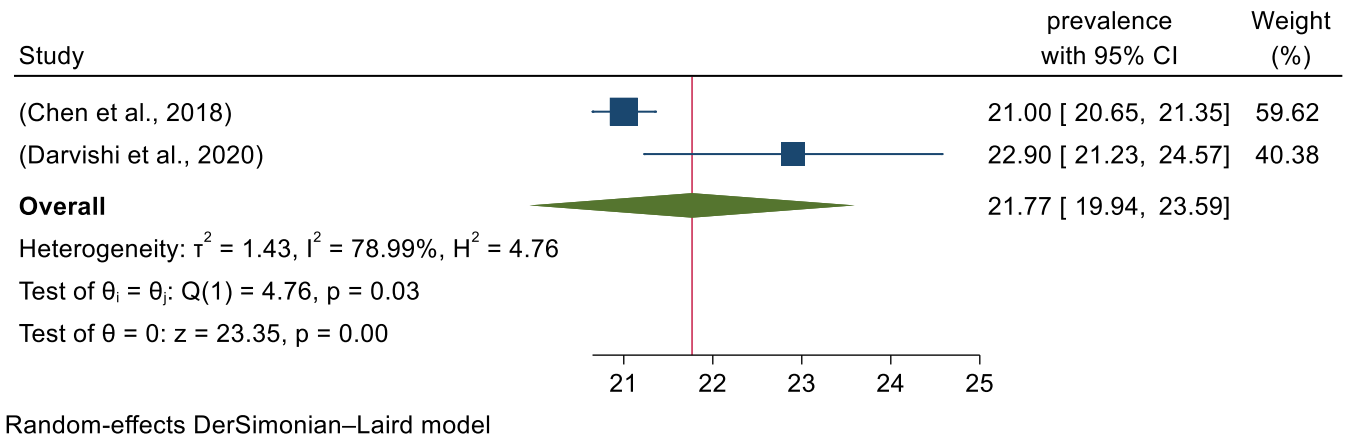


Figure 11: Forest plot for RLS among pregnant women,2025

Funnel plot for RLS among pregnant women (Fig. 12)

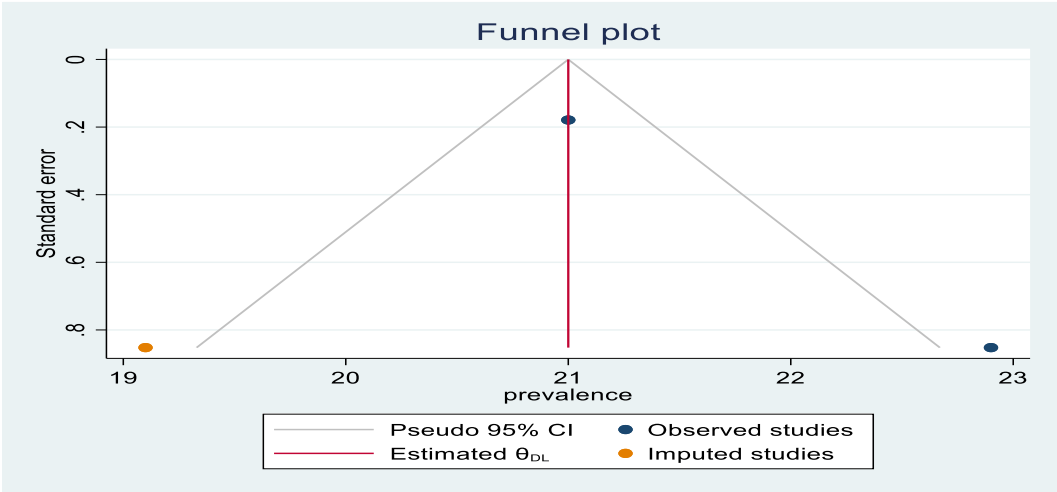


Figure 12: Funnel plot for RLS among pregnant women, 2025

Discussion

The present umbrella review provides an overview of the collected data from twelve SRMA that included 290 primary studies and more than 126 million patients from across the world, thus evaluating the scale and types of sleep disturbances in expectant mothers. The average prevalence of sleep disturbance in pregnancy was 38.86%, or in other words, almost 40% of pregnant women are affected by serious changes in their sleep pattern. This fact highlights the huge burden of sleep issues in pregnancy, which could impact not only women health but also obstetrics and fetal development.

Prevalence of Sleep Disturbance in Pregnancy

The pooled prevalence from this umbrella review is in agreement with earlier findings that marked pregnancy as a critical period for sleep disturbances owing to the changes in physiology, hormones, and psychological status Sedov et al., 2018 and Lu et al., 2021 (14, 27). Nonetheless, besides the types of sleep disturbances' hierarchy, the current review shows changes in the severity of sleep disturbances: PSQ (45–60%) (6, 27, 30, 33, 35, 36), insomnia (38–42%) (31, 34), RLS (21–23%) (32, 37), and OSA (15–17%)(28, 29). These discrepancies reflect not only differences in the criteria used for diagnosis, but also factors specific to the population, such as the distribution of trimesters, cultural sleeping practices, and the presence of other medical conditions.

The overwhelming predominance of PSQ as indicated in the current review is in line with the results of Sedov et al. (31) and Tsega et al (6), which implies that PSQ is the most frequent sleep-related complaint during pregnancy. On the other hand, the prevalence of OSA is lower and is thus consistent with studies done by (29) and (28), where OSA was often underreported because of the relatively low use of objective polysomnography. This trend indicates that there may be a need for more extensive screenings in and for greater integration of diagnostics in antenatal care services.

Source of Heterogeneity

Studies revealed exceptionally high heterogeneity ($I^2 = 99.9\%$), which was a result of differing methodological approaches, varied populations, different tools for measurement, and specifics of the regions. Almost all the reviews included in this review utilized subjective assessment tools like the PSQI, which is a potential source of reporting bias. In addition, the inclusion of various geographical areas ranging from high-

income to low-income was probably the main factor for the observed variability. Characteristics such as differing socioeconomic status, healthcare availability, and cultural attitudes towards sleep may have affected both the prevalence rates and the reporting behaviors.

Maternal and Fetal Implications

Pregnancy is accompanied by sleep problems and their adverse effects on the mother and the fetus are becoming more apparent. The reviews included in the current analysis and past studies have provided evidence for a number of negative maternal consequences associated with maternal sleep problems including gestational diabetes, hypertensive disorders, prolonged labor, cesarean section, and postpartum depression (3, 13-16). Not only that, poor maternal sleep has also been implicated in fetal effects such as low Apgar scores, preterm birth, and intrauterine growth restriction as per Nevarez-Brewster (19). The results point out the fact that sleeping disturbances, which are commonly experienced by pregnant women, could be detected and managed as part of the routine antenatal care, especially in the second and third trimesters when the incidence is very high.

Quality and Methodological Rigor

AMSTAR-2 assessment rated two reviews as excellent, five reviews as good, and five others as poor, with none being rated as critically low. The main methodological flaws pointed out were the absence of protocol registration, the limited search for gray literature, and poor reporting of the studies excluded from the review. Regardless of the weaknesses, the concordance of the findings among the different reviews adds to the trust in the pooled estimates observed. Subsequent systematic reviews should strictly follow the PRISMA 2020 and AMSTAR-2 guidelines in order to improve transparency and reproducibility.

Strengths and Limitations

One of the strongest points of this umbrella review is that it compiled the highest level of evidence (SRMA) in a comprehensive way, hence giving a global view of the extent of sleep disturbances in pregnant women. The review has aggregated a considerable sample size, a variegated geographical representation, and covered a wide range of sleep disorders. On the downside, a few limitations must be considered. The main drawback was the high heterogeneity and publication bias which had a negative effect on the precision of the pooled estimates. Most of the reviews depended on self-reported methods, and only a few applied objective methods like polysomnography. Moreover, the review did not break down the analysis done by trimester, region, or diagnostic method which could have further enlightened the sources of variability.

Implication for Practice, Policy and Research

Sleep can be disturbed during pregnancy, no matter where the women live. So, checking how well someone's sleeping ought to be a normal part of pregnancy checkups. Doctors and nurses should get training to notice sleep trouble and help out with things that don't involve medicine. This could mean teaching good sleep tips, using special talk therapy for sleeplessness, or doing relaxing exercises. Policy makers should really see how crucial sleep is for expecting moms and make it part of the rules for pregnancy care all over. Future studies should keep track of moms over time to figure out how sleep issues actually cause bad results in pregnancy. These studies should use the same kinds of tests to get real numbers, not just opinions. Lots of studies should test how well things like exercise or changing habits help during pregnancy. Big reviews of past studies tried to include info from poorer areas, where these issues are common, but people haven't looked into them as much.

Conclusion

This review conclude that loads of pregnant women aren't sleeping well, and things like PSQ, Insomnia, RLS, and OSA are the biggest problems. Because of all this, we really need to start checking on sleep during prenatal appointments and doing more study on how to make things better. If pregnant women can sleep better, they and their babies will probably be a lot healthier.

Recommendations

Policy: Start using sleep tests in prenatal checkups.

Healthcare providers: Give advice on getting better sleep without drugs.

Researchers: Do longitudinal and interventional studies with real sleep numbers to see what works.

Global Health: Make sleep a top thing in caring for moms, mainly in poorer countries.

Abbreviations

CI: confidence interval; PRISM: preferred reporting items for systematic review and meta-analysis; NOS: Newcastle-Ottawa Scale; SRMA: Systematic review and meta-analysis; PSQ: poor sleep quality; RLS: restless leg syndrome; OSA: obstructive sleep apnea; PSQI: Pittsburgh Sleep Quality Index

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

Data supporting the findings of the analysis presented in this review can be submitted upon request to the corresponding author.

Competing interests

The competing interests that could have been declared by the author(s) concerning the research, authorship, and/or publication of this article are none.

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Authors' Contribution

YDM, AAM, GTM, MGF, and HA conceptualized and designed the study, analyzed the data, interpreted the data, and drafted and finalized the manuscript. YDM, AAM, HA, AG, MG, AAE and TDK: supervised the study, analyzed and interpreted the data, and edited and finalized the manuscript. YDM, GG, AAA, AL, AAA, MDB and MS collected, interpreted, supervised the data and finalized the manuscript. All the authors read and approved the final manuscript.

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