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Systematic review and meta-analysis of postpartum depression and its associated factors among women before and after the COVID-19 pandemic in Uganda

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ABSTRACT

Objective This meta-analysis aimed to estimate the national prevalence of postpartum depression (PPD) in Uganda and identify predictors in both pre-COVID-19 and post-COVID-19 eras.

Design Used a systematic review and meta-analysis methodology.

Data sources Reviewed papers were sourced from Medline/PubMed, PsycINFO, CINAHL/EBSCOhost, Google Scholar, ScienceDirect and African Journals Online.

Eligibility criteria for selected studies The review encompassed observational studies published on PPD in Uganda from 1 January 2000 to 30 November 2023.

Results 11 studies (involving 7564 participants) published from 1 January 2000 to 30 November 2023 were reviewed. The pooled prevalence of PPD in Uganda was 29% (95% CI 21% to 37%, I^2=98.32%). Subgroup analysis indicated a similar prevalence before (29%, 95% CI 20% to 39%) and during (28%, 95% CI 22% to 32%) the COVID-19 period. Special groups exhibited a higher prevalence (32%, 95% CI 16% to 47%) than general postpartum women (28%, 95% CI 19% to 37%). Factors associated with PPD included poor social support (OR 1.19, 95% CI 1.17 to 1.22, I^2=96.8%), maternal illness (OR 1.22, 95% CI 1.19 to 1.26, I^2=96.9%), poor socioeconomic status (OR 1.43, 95% CI 1.40 to 1.46, I^2=99.5%) and undergoing caesarean section (OR 1.15, 95% CI 1.12 to 1.17, I^2=80.6%). Surprisingly, there was a marginal decrease in PPD during the COVID-19 period. Subgroup analysis highlighted a higher prevalence among mothers with HIV.

Conclusion This study underscores the significant prevalence of PPD in Uganda, with sociodemographic factors increasing risk. Despite a slight decrease during the COVID-19 period, the importance of prioritising maternal mental health is emphasised, considering sociodemographic factors and pandemic challenges, to improve maternal and child health outcomes and overall well-being.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The inclusion of diverse data sources enhances the comprehensiveness of the review.
⇒ The study covers a significant period, providing a broad perspective on postpartum depression trends in Uganda.
⇒ The study's reliance on published literature may introduce publication bias.
⇒ Findings may not be universally applicable as they pertain specifically to Uganda.
⇒ Substantial heterogeneity (I^2 values) in some analyses suggests variability among studies.

BACKGROUND

Postpartum depression (PPD) is a significant public health concern affecting mothers worldwide, exerting adverse effects on both maternal well-being and infant development.[1] It is estimated that 10%–15% of women worldwide experience PPD.[2] High-income countries exhibit a lower prevalence of PPD in comparison low-income and middle-income countries (LMICs). Considering the scarcity of resources, unique cultural practices and the comparatively higher number of pregnancies and births LMICs,[3] the elevated prevalence of PPD would pose significant challenges. Additionally, the healthcare infrastructure and accessibility in LMICs differ from high-income countries, influencing how PPD is recognised, diagnosed and treated.[4] PPD, being the most common psychiatric illness, constitutes a major public concern that is three times more prevalent in women during the postnatal period than in other phases of their lives.[5] The emergence of the COVID-19 pandemic has added a layer of complexity to the already challenging postpartum period.[6] The pandemic has led to unprecedented changes in healthcare delivery and economic conditions, potentially exacerbating the risk factors associated with PPD.[7]

PPD stands as a significant contributor to morbidity and mortality among mothers, exerting profound effects on the physical and social well-being of mothers, newborn infants, families and communities.[8 9] This non-psychotic mood disorder emerges within the initial 6 weeks after childbirth, posing substantial challenges. PPD hampers a mother's capacity to meet her child's needs, and in severe cases,[10] it elevates the risk of postpartum psychosis, suicide and, although rarely, infanticide.[11] This disabling condition manifests through severe mood fluctuations, diminished interest, sleep disturbances, persistent feelings of sadness, excessive crying, fatigue, appetite loss, coping difficulties with daily tasks and contemplation of self-harm or harm to the baby.[11] Various studies indicate that predictors of PPD encompass factors such as age, health issues during pregnancy, food insecurity during the COVID-19 pandemic and a lack of social support.[12] Notably, in LMICs, PPD tends to be under-recognised and inadequately treated,[4] highlighting the need for increased attention and intervention in addressing this critical public health concern.

Recent studies on the effects of the COVID-19 pandemic on PPD have yielded conflicting results. Some systematic reviews and meta-analyses indicate that the prevalence of PPD remained stable or even decreased during and after the pandemic[13 14] while others suggest an increased prevalence.[15] For example, in China, two systematic reviews reported PPD prevalence of 22%[16] and 17%[14] during the COVID-19 pandemic. A meta-analysis conducted by Hessami *et al*, examining the impact of the pandemic on women's depression during pregnancy and the postpartum period, found no significant influence on the diagnosis of depressive symptoms.[17] In contrast, another meta-analysis exploring the relationship between PPD and the COVID-19 pandemic, comparing data from before and after the pandemic, revealed a higher prevalence of PPD associated with the epidemic.[18] It is noteworthy that few systematic reviews have directly compared the effects of the COVID-19 pandemic on PPD among women, and there is a lack of such reviews in the context of LMICs including Uganda.

In Uganda, concerns regarding the prevalence of PPD have arisen, impacting the health and quality of life of postpartum women.[19] However, the prevalence of PPD in Uganda has not been comprehensively explored, and existing studies often lack representativeness. The primary purpose of this systematic review and meta-analysis is to scrutinise and consolidate existing research on PPD and its associated factors in Uganda. The specific focus is on the pre-COVID-19 and post-COVID-19 pandemic periods, considering the country's unique sociocultural context, healthcare system[20 21] and economic conditions.[22] Factors associated with PPD in Uganda may be unique due to cultural norms, societal expectations and socioeconomic conditions. Understanding and synthesising PPD in the Ugandan context have broader implications for patient outcomes and service delivery. This knowledge could inform the development of culturally sensitive screening tools, intervention strategies and support networks. Improved awareness and recognition of PPD can lead to timely and effective interventions, ultimately enhancing the mental health and well-being of postpartum women in Uganda.

METHODS

This study constituted a systematic review that rigorously followed the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020.[23] Additionally, it was preregistered with the International Prospective Register for Systematic Reviews and Meta-analyses under the registration number CRD42023427941.

Eligibility criteria

The review examined observational studies that documented the prevalence of PPD in Uganda. The inclusion criteria comprised (1) primary studies reporting on PPD in Uganda; (2) publications from January 2000 to November 2023; (3) cross-sectional, case–control and cohort studies; (4) a postpartum period of up to 12 months; (5) all PPD scales and (6) publications in any language. Exclusion criteria encompassed (1) editorials; (2) letters to the editor or (3) commentaries. The outcomes of the screening process are depicted in figure 1.

Information sources and search method

The search strategy was developed in collaboration with the librarian (RI) for all databases subscribed to by Lira University Library, as well as the Research for Life databases. Multiple combinations of keywords, thesauri, Boolean operators and database filters were used. The research question was meticulously formulated following the Population, Context, Condition framework.[24] The population under consideration comprised postpartum women, the condition was PPD and the context was specifically focused on Uganda. Tailored search queries were generated for each database, including but not limited to Medline/PubMed, PsycINFO, CINAHL/EBSCOhost, Google Scholar, ScienceDirect and African Journals Online. In addition, reports from institutional repositories, along with scrutinising reference lists from included studies and related reviews, were examined to ensure a thorough coverage of relevant articles. The complete search strategy employed in PubMed is provided in online supplemental table 1.

Study selection and data collection process

All retrieved studies underwent exportation to the Rayyan screening software, where screening occurred at three distinct levels: titles, abstracts and full-text assessment. Two independent reviewers (RT, MM, AK and EK) conducted the screening process, resolving any disagreements through communication and dialogue with a third reviewer. The screening adhered to predefined inclusion and exclusion criteria. Data from the screened studies were extracted by

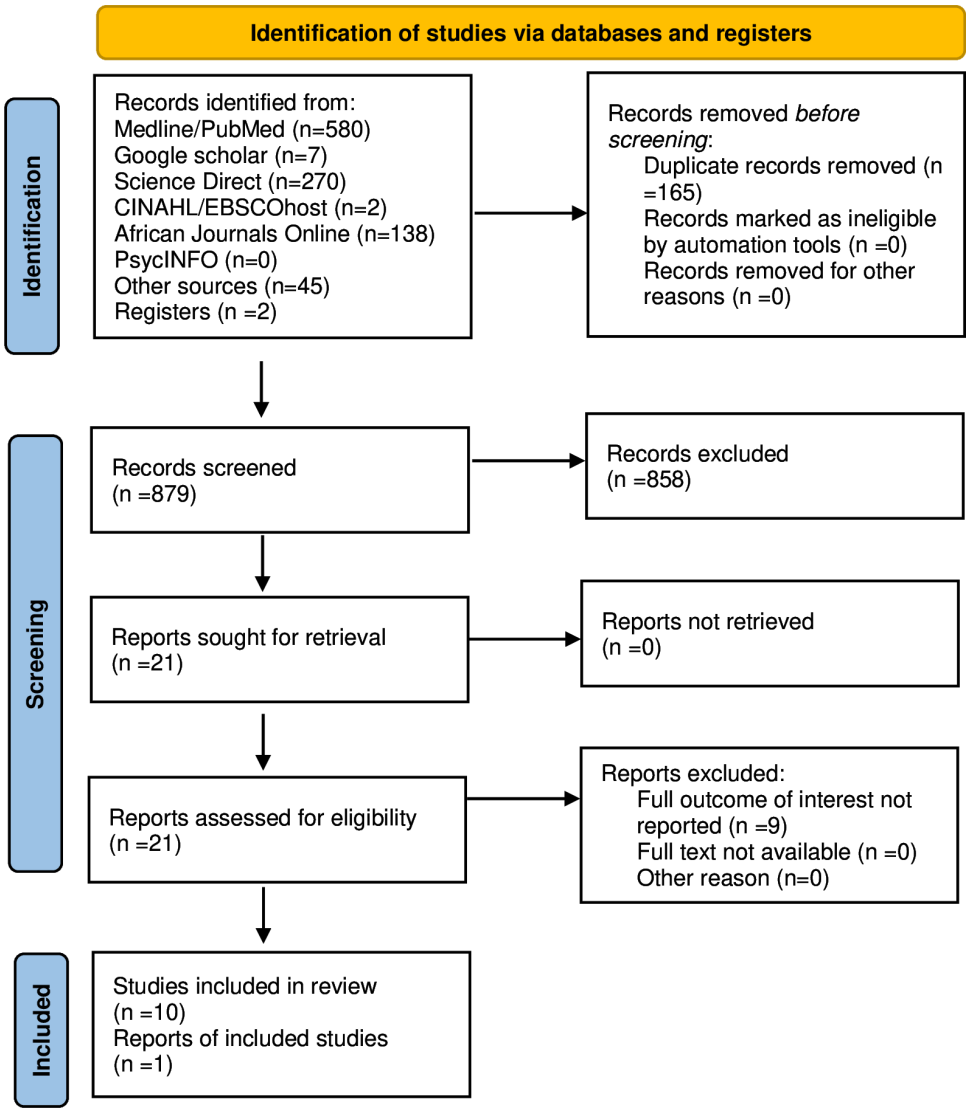

Figure 1 Study flow diagram.

two independent reviewers using an Excel spreadsheet. Any discrepancies were resolved through communication and group discussion. The tool underwent initial pretesting with five studies to ensure validity and reliability. Extracted data encompassed the first name of the primary author, year of publication, study title, country, study design, survey period, study participants, sample size, response rate, average age, reported level of PPD, depression scales used, reasons for PPD and study quality. Study quality was independently assessed by two reviewers using the star-based updated Newcastle-Ottawa scale (NOS) 21 (online supplemental table 2). This scale assigns star ratings, with a maximum of nine stars, indicating good quality for studies with at least six stars while those with fewer than six stars are deemed of poor quality. Cross-sectional and cohort studies were evaluated independently, and no study was excluded based on quality.

Statistical analysis

All analyses were conducted by using Stata V.17 (2021), a product of StataCorp. A meta-analysis, using the metan command, was employed to aggregate the prevalence data of PPD among women in Uganda. Before combining the estimates, a clinical assessment of heterogeneity was executed to determine the feasibility of the meta-analysis. Due to substantial observed heterogeneity (I^2=98.32%) across the included studies (11 in total), a random effects model using the residual maximum likelihood technique was applied using the formula: $fi(x)=\alpha i+\beta x+Zix$, where β is the average common effect, and Zi is a normal random variable with a mean of zero and SD σ.[25] Heterogeneity was quantified using the χ^2 (Cochran's) Q test with the heterogeneity index (I^2) (based on the Q statistic).[25] The I^2 is the sum of the squared deviations of each study's estimate from the overall estimate, weighted by the study's impact on the calculation of the overall estimate. The I^2 is calculated as $I^2=100(Q–df)/Q$, where df represents the df (for the χ^2 Q test), which are equal to the number of studies minus one.[25] The original data from the incorporated studies were used to compute the combined effect, presented as a proportion along with a corresponding

95% CI and depicted in a forest plot. In cases where at least two studies reported on a particular factor, an evaluation was conducted to ascertain its association with PPD, with results expressed as ORs and corresponding 95% CI. Potential publication bias was investigated through a visual examination of funnel plot asymmetry and by conducting Egger's test, where a p value less than 0.05 indicated potential publication bias. Furthermore, a leave-one-out sensitivity analysis was performed to evaluate the robustness of the results and identify studies that could distort the overall estimate, prompting their exclusion. Finally, a subgroup analysis was executed based on potential sources of study heterogeneity, encompassing factors such as region, COVID-19 period and study quality, among other identified characteristics.

Patient and public involvement

No patients or public were involved in this review.

RESULTS

Included studies

Between May and June 2023, a systematic search was conducted, spearheaded by three reviewers and guided by a librarian (RI). In total, 1044 records were retrieved from various databases. Following the removal of 165 duplicate files, the remaining 879 records underwent title and abstract screening, culminating in the identification of 21 articles. Subsequent full-text screening resulted in the inclusion of 10 peer-reviewed articles and 1 report. All excluded articles failed to report on the primary outcome of the main study. The findings are illustrated in figure 1.

Included study characteristics

Table 1 presents the results indicating that a total of eight articles were included in the systematic review and meta-analysis. Among these, none articles employed a cross-sectional design while two were cohort studies. Notably, only three studies collected data after the onset of the COVID-19 pandemic. The research population consisted of postpartum women, with eight studies conducted among the general postpartum population and three studies specifically focusing on postpartum women living with HIV and diabetes mellitus. The cumulative sample size across these studies was 7564, ranging from 167 to 1789. Importantly, one study was assessed as being of poor quality.

The pooled prevalence of PPD among women in Uganda

Figure 2 illustrates that the overall prevalence of PPD among women in Uganda was 29% (95% CI 21% to 37%, I^2=98.32%, p<0.001). Across the included studies, the prevalence of PPD varied, ranging from 6%[26] to 45%.[27]

Heterogeneity and publication bias

The study uncovered significant heterogeneity, as demonstrated by an I^2 value of 98.32% and a p value of less than 0.001. To address this heterogeneity, subgroup analysis was conducted based on potential causes of publication

Table 1 Characteristics of included studies

First author	Publication	COVID-19 period	Participants	Study design	Sample	Sampling	Most age (years)	Instrument	PPD (n)
Nakku[26]	2006	Before	Women	Cross-sectional	523	Consecutive	20–29	SRQ-25	32
Kakyo[43]	2012	Before	Women	Cross-sectional	202	Consecutive	21–25	EPDS	87
Nakimuli-Mpungu[27]	2013	Before	Women	Cross-sectional	2868	Not reported		SRQ-20	1297
Kaida[44]	2014	Before	Mothers LHIV	Cohort	447	Simple random	32	HSCL	173
Nampijja[45]	2019	Before	Women	Cross-sectional	300	Consecutive	17–44	PHQ	93
Arach[46]	2020	Before	Women	Cross-sectional	1789	Consecutive	20–34	EPDS	377
Kizito–Thesis[47]	2020	Before	Women	Cohort	167	Not reported	20–24	EPDS	58
Atuhaire[19]	2021	After	Women	Cross-sectional	292	Consecutive	20–34	DSM-V	79
Akongo[48]	2021	After	Women	Cross-sectional	377	Not reported		EPDS	61
Yeboa[49]	2023	Before	Mothers LHIV	Cross-sectional	290	Consecutive	25–34	PHQ	46
Atuhaire[50]	2023	After	Women with DM	Cross-sectional	309	Consecutive	25–34	MINI 7.0.2	125

DM, diabetes mellitus; DSM-V, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; EPDS, Edinburgh Postnatal Depression Scale; HSCL, Hopkins Symptom Checklist; LHIV, living with HIV; MINI, Mini-International Neuropsychiatric Interview; PHQ, Patient Health Questionnaire; PPD, postpartum depression; SRQ-25, Self-Reporting Questionnaire-25.

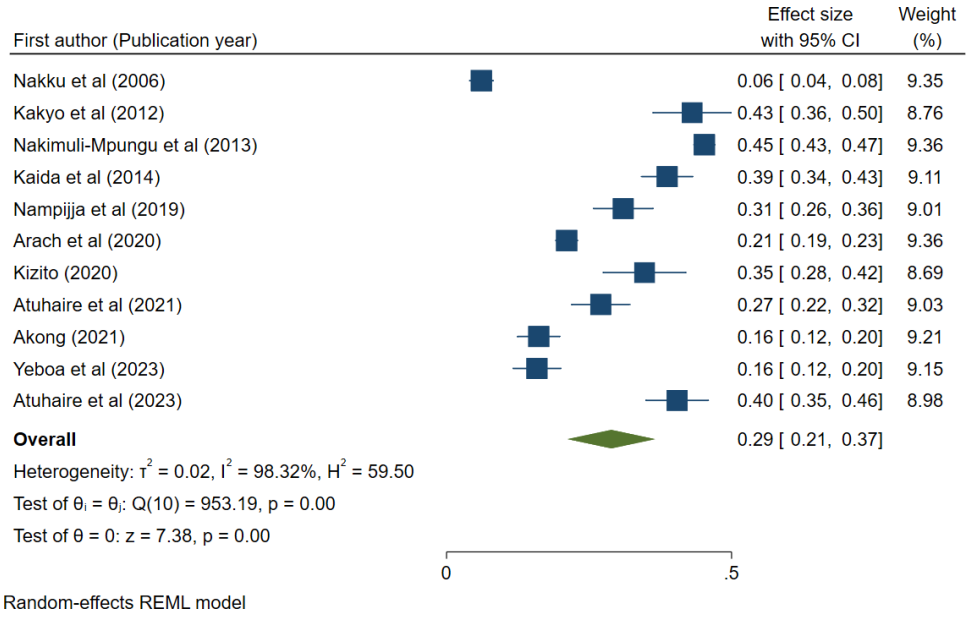

Figure 2 The pooled prevalence of PPD among women in Uganda. REML, residual maximum likelihood technique.

bias, including the period of COVID-19. A funnel plot (figure 3) was generated to visually assess potential publication bias, indicating the absence of such bias. Similarly, Egger's test, yielding a Z-score of 1.44 and a p value of 0.149, confirmed the absence of small study effects.

Subgroup analysis for PPD among women in Uganda

A subgroup analysis was conducted to examine the prevalence of PPD during different periods of the COVID-19 pandemic. As illustrated in figure 4, the prevalence of PPD among mothers before the COVID-19 pandemic stood at 29% (95% CI 20% to 39%), compared with 28% (95% CI 22% to 32%) during the COVID-19 period. Additionally, figure 5 reveals that women belonging to a special group (mothers living with HIV) exhibited a higher prevalence of PPD at 32% (95% CI 16% to 47%) compared with the general postpartum women, whose prevalence was 28% (95% CI 19% to 37%).

Sensitivity analysis

Leave one out sensitivity was conducted on the 11 studies to assess the effects of including each individual study on the overall estimate. Figure 6 indicates that the estimates of the individual studies were within the 95% CI of 21% to 37%.

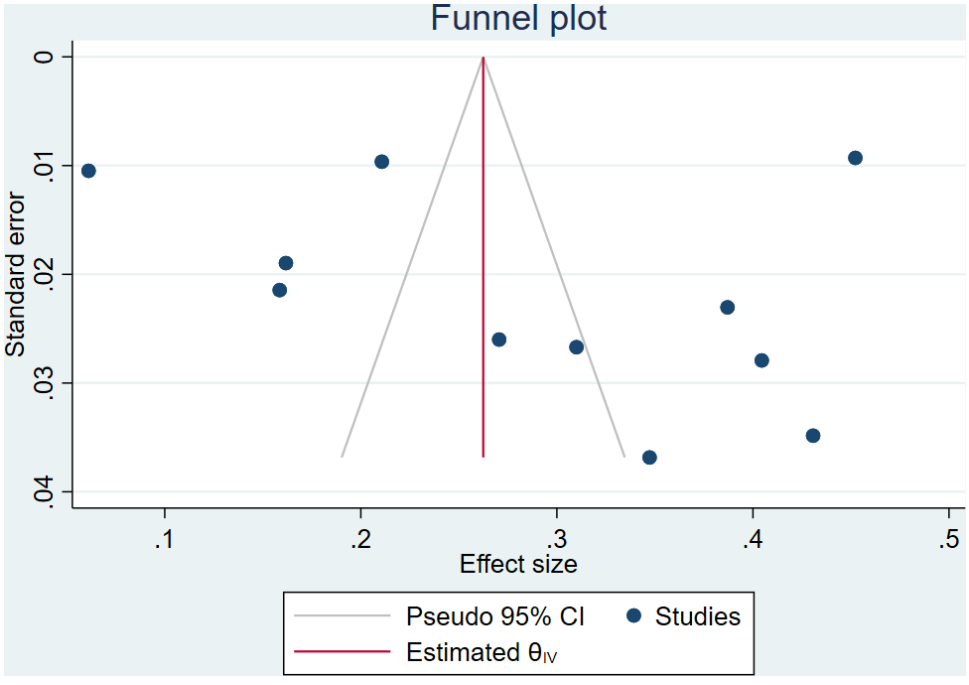

Figure 3 Funnel plot.

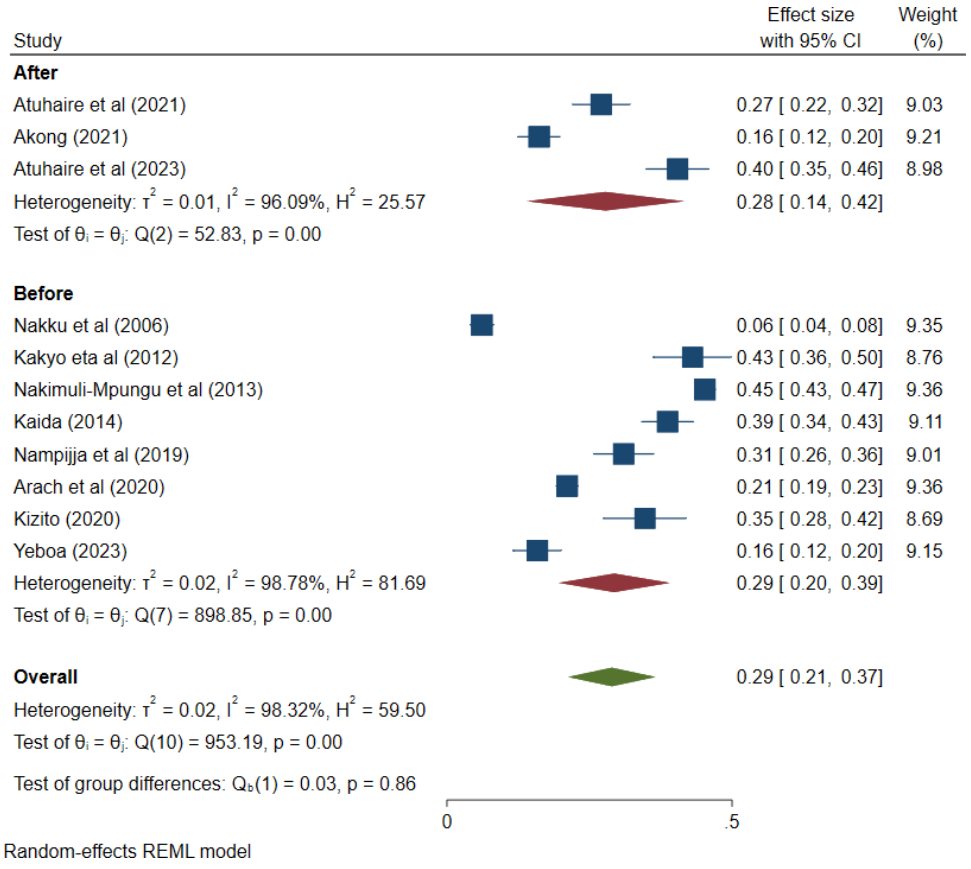

Figure 4 Subgroup analysis for PPD among women in Uganda. REML, residual maximum likelihood technique.

Reasons for PPD

Online supplemental table 3 illustrates that the identified reasons for PPD in Uganda encompass factors such as low perceived social support, the presence of chronic diseases, being single, undergoing a caesarean section, poor health of the child, the mother's chronic health condition and having low-income levels.

Factors associated with PPD among women in Uganda

Among the nine different factors documented in the included studies (online supplemental table 4), five factors exhibited an association with PPD among women in Uganda. Women who had poor social support (OR 1.19, 95% CI 1.17 to 1.22, I^2=96.8%), illness of mother (OR 1.22, 95% CI 1.19 to 1.26, I^2=96.9%), poor socioeconomic status (OR 1.43, 95% CI 1.40 to 1.46, I^2=99.5%) and undergoing caesarean section (OR 1.15, 95% CI 1.12 to 1.17, I^2=80.6%) were likely to experience PPD compared with their respective counterparts.

DISCUSSION

The current systematic review and meta-analysis aim to determine the pooled prevalence of PPD and its predictors in Uganda. Our review revealed that the pooled prevalence of PPD among Ugandan women was 29%. This finding aligns with the 28% observed in a systematic review based on 24 articles.[28] However, our findings are notably higher than the pooled PPD prevalence reported in high-income countries (10.9%),[29] China (12%)[30] and Iran (20%).[31] The disparities in findings may be attributed to variations in assessment instruments, cut-offs, sample sizes and geographical differences. Nevertheless, the elevated pooled PPD prevalence among women in Uganda may be linked to the scarcity of resources, unique cultural practices and the comparatively higher number of pregnancies and births.[3] Additionally, women who give birth in Uganda often stay for less than 48 hours after delivery, limiting the opportunity for medical staff to advise mothers on PPD symptoms and when to seek treatment. Furthermore, women in Uganda rarely visit health facilities for PPD examinations, resulting in a lack of identification and treatment for such mental health problems.[32] Despite these challenges, the findings of the present study underscore the importance of prioritising maternal PPD as part of broader efforts to enhance maternal and child health.

We have uncovered evidence indicating that various sociodemographic factors, such as poor social, illness of mother, support, poor socioeconomic status and undergoing caesarean section, are linked to postpartum PPD in women following childbirth. Despite the emergence of the COVID-19 pandemic, our findings suggest that the predictors of PPD remained largely unchanged. This stability of predictors may indicate that certain factors influencing PPD are relatively constant over time, regardless of the presence of a global health crisis. The

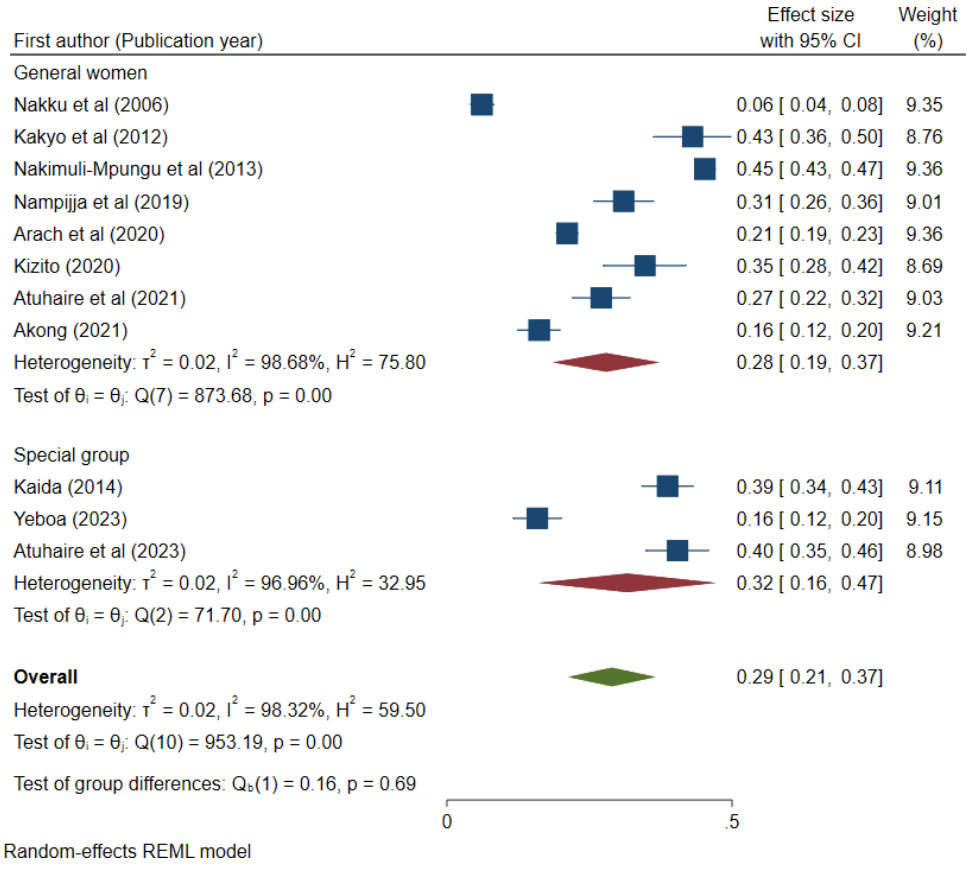

Figure 5 Prevalence of PPD among mothers living with HIV compared to general postpartum women. REML, residual maximum likelihood technique.

lack of differences before and after COVID-19 might also suggest that the pandemic did not introduce new predictors specific to PPD in this population. Our findings reveal that postnatal mothers lacking strong social support are more likely to report PPD compared with those with robust social support, a pattern consistent with studies demonstrating that positive social support serves as a protective factor for mothers facing distress.[33]

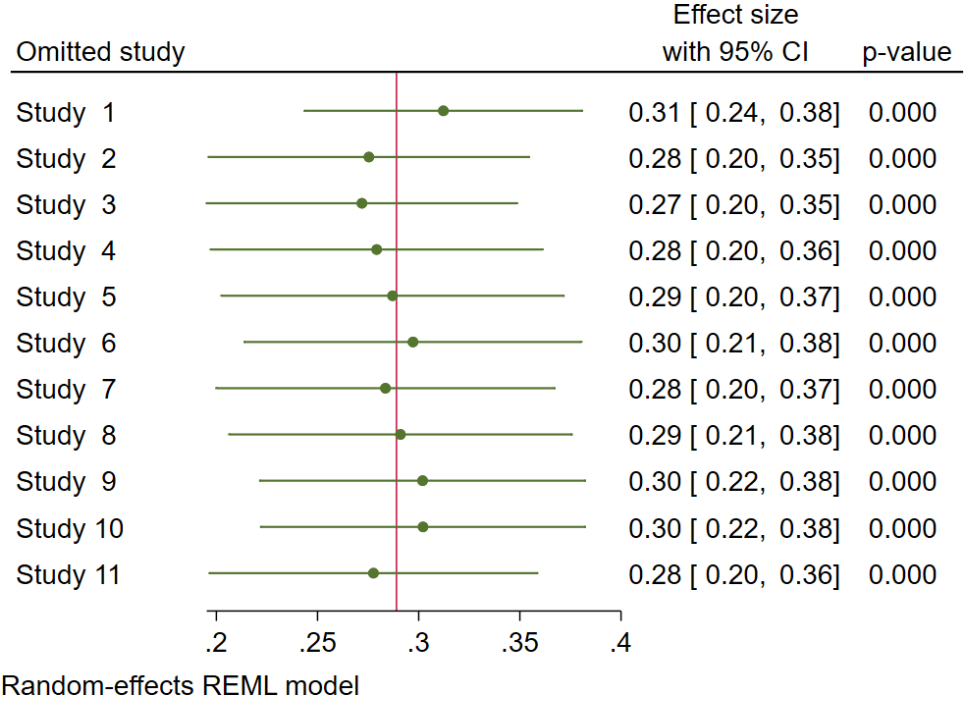

Figure 6 Sensitivity analysis. REML, residual maximum likelihood technique.

Supporting our findings, a meta-analysis indicates that postpartum women with low social support face an almost fivefold higher risk of developing PPD than those with high social support.[34] Additionally, our study establishes an association between undergoing a caesarean section and PPD in postpartum women. This finding aligns with other research that reports a higher risk of PPD in women who have undergone a C-section, as indicated by previous studies.[35 36] It is noteworthy, however, that contrary to our results, certain studies have reported no significant association between C-section and PPD.[37] Furthermore, our investigation reveals an association between poor socioeconomic status and PPD, consistent with similar studies on the subject.[38] Furthermore, medical factors, particularly the illness of the mother, have been identified as correlates of PPD in postpartum women. Consistent findings were reported in a previous systematic review and meta-analysis that explored the relationship between chronic diseases and PPD.[39] Similarly, meta-analyses addressing hypertension[40] and diabetes[41] demonstrated comparable associations with PPD. The fact that sociodemographic factors retained their significance before and after the pandemic underscores the continued importance of addressing fundamental issues related to social support, maternal health, socioeconomic status and childbirth experiences.

A subgroup analysis was conducted to examine the prevalence of PPD during different periods of the COVID-19 pandemic. The findings indicate that there is a marginal decrease in the prevalence of PPD during the COVID-19 period compared with before the pandemic. The prevalence of PPD among mothers before the COVID-19 pandemic was 29% compared with 28% during the COVID-19 period. This outcome aligns with other studies that have reported stable or decreased prevalence of PPD during and after the COVID-19 pandemic.[13 14] Interestingly, our results contradict the findings of a similar systematic review estimating PPD before and during COVID-19, which suggested a link between the COVID-19 epidemic crisis and an increase in PPD.[19] However, this inconsistency could be attributed to the limited number of studies included in the review that were conducted during the COVID-19 pandemic. Nevertheless, further investigation is needed to understand the specific factors influencing PPD during these distinct time frames in the Ugandan context.

Furthermore, the results reveal that women belonging to a specific group, namely mothers living with HIV, demonstrated a higher prevalence of PPD at 32% compared with the general postpartum population, whose prevalence was 28%. This outcome underscores the elevated prevalence of PPD among mothers living with HIV in Uganda, where HIV is a substantial public health concern. Consistent with our findings, women living with HIV typically encounter heightened rates of PPD, with prevalence surpassing 40% in settings characterised by high HIV prevalence.[42] The findings suggest the need to prioritise and address the mental health needs of mothers living with HIV. This higher prevalence may indicate the intricate interplay between stressors related to HIV, societal stigma and the inherent challenges of motherhood. Consequently, it is crucial to implement targeted interventions and support programmes for mothers in Uganda, particularly those confronting additional challenges such as living with HIV. By recognising and addressing the specific mental health needs of mothers in this special group, Uganda can make significant strides in promoting the overall well-being of its maternal population.

Conclusion

This result uncovers a significant prevalence of PPD in Uganda. Sociodemographic factors like insufficient social support and caesarean sections elevate PPD risks, aligning with prior research. Surprisingly, there is a marginal decrease in PPD during the COVID-19 period. Subgroup analysis emphasises heightened PPD prevalence among mothers with HIV. Overall, the result underscores the vital need to prioritise maternal mental health in Uganda, considering sociodemographic factors and unique pandemic challenges, crucial for improving maternal and child health outcomes and overall well-being.

Implications for policy and practice

Our systematic review and meta-analysis offers critical insights for shaping maternal mental health policies in Uganda and other LMICs. The identified prevalence rates and associated factors highlight the urgency of integrating mental health considerations into broader maternal healthcare policies. Policy-makers should prioritise the development and implementation of targeted policies that address the unique challenges and risk factors for PPD in these settings. Allocating resources for mental health awareness campaigns, training healthcare professionals and establishing screening programmes can significantly contribute to early detection and intervention.

Strengths and limitations

The incorporation of diverse data sources enhances the comprehensiveness of the review. Additionally, the study encompasses a substantial time frame, providing a comprehensive perspective on PPD trends in Uganda. The utilisation of a systematic review and meta-analysis approach offers a robust method for synthesising the available evidence. The application of the NOS contributes transparency and reliability to the findings. The subgroup analysis based on the pre-COVID-19 and post-COVID-19 era provides valuable insights into variations in PPD prevalence. However, it is imperative to acknowledge certain limitations when interpreting the results of this review. The study's reliance on published literature may introduce publication bias, potentially impacting the objectivity of the findings. Moreover, the generalisability of the findings is limited as they are based on few studies and specific to Uganda. The presence of substantial heterogeneity, as indicated by I^2 values in some

analyses, suggests variability among studies. While significant factors influencing PPD are identified, there may be other unexplored variables not considered in this study. Additionally, the observational study design precludes the establishment of causal relationships between the identified factors and PPD.

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