**Prevalence of Postpartum Anxiety and Depression Among Postpartum Mothers: A Study at Postnatal Clinics in Enugu and Delta States, Nigeria**

**ABSTRACT**

**Introduction:** Postpartum depression and anxiety are critical maternal mental health issues, especially in low- and middle-income countries like Nigeria, where mental health services are limited. These conditions can harm both mothers and their children and are often undiagnosed and untreated. Regional data is needed to guide targeted interventions.

**Aim:** The study aimed to determine the prevalence of postpartum depression and anxiety among mothers attending postnatal clinics in Enugu and Delta States, Nigeria.

**Methods:** A descriptive cross-sectional study was conducted among 399 postpartum mothers at four healthcare facilities in Enugu and Delta States. Participants were selected through multistage sampling. Data were gathered using a semi-structured questionnaire that included the Edinburgh Postnatal Depression Scale (EPDS) and Generalised Anxiety Disorder-7 (GAD-7). SPSS version 26 was used for analysis, with chi-square tests applied to explore associations.

**Results:** Postpartum depression was found in 34.6% of respondents, and anxiety in 31.1%. Depression was more prevalent among women aged 26–35, with low income, secondary education, unplanned pregnancies, poor support, or prior mental illness. Anxiety was linked to previous mental illness, poor marital support, and recent stress. Significant associations included education, income, and marital relationship with depression; and history of mental illness, emotional support, and stress with anxiety.,

**Conclusion:** There is a moderately high prevalence of postpartum depression and anxiety in the study areas. Integrating mental health screening and support into routine postnatal care, along with training for healthcare providers, is essential. Further longitudinal studies are recommended to inform long-term maternal mental health strategies in Nigeria.

**Keywords:** Postpartum Depression**,** Anxiety Disorders, Maternal Mental Health, Nigeria, Prevalence Study

**INTRODUCTION**

Postpartum anxiety and depression are two of the most common mental health disorders affecting mothers in the months following childbirth. These conditions can have significant impacts on the well-being of the mother, child, and family as a whole. With the increasing recognition of maternal mental health, research into postpartum psychiatric disorders has gained momentum, revealing their prevalence and their effects on maternal functioning, child development, and family dynamics.1 The negative relationship that anxiety and depression during pregnancy can have for both mother and baby, due to the increase in the hormone cortisol, has been demonstrated. In addition, anxiety processes in pregnant and postpartum mothers lead to increased smoking and alcohol consumption, which in turn will have a clear impact on the foetus and on breastfeeding infants (Jimènez-Barragan et al., 2024).

Globally, the prevalence of PPD is estimated at 17.22% (95% CI: 16.00–18.51).2 In Africa, a meta-analysis by Dadi et al.3 reported a pooled PPD prevalence of 17.8% (95% CI: 13.9–21.7%), with significant regional variations. Sub-Saharan African countries exhibited a lower prevalence of 13.49% (95% CI: 11.35–15.63), whereas non-Sub-Saharan countries, particularly Egypt, reported a markedly higher prevalence of 44.05% (95% CI: 33.77–54.33).3 Economic status also influences prevalence, with low-income African countries showing a higher PPD prevalence of 19.94% (95% CI: 15.36–24.52) compared to middle-income countries at 12.35% (95% CI: 10.13–14.57).4 In Nigeria, prevalence rates vary due to socio-cultural influences and healthcare accessibility. For example, a study conducted in Lagos reported a PPD prevalence of 22.9% among postpartum women.5 Pregnant women with multiple mental health problems may also increase the number of unscheduled antenatal care visits, emergency health care visits, and even suicide and infanticide. Therefore, it is essential to generate evidence on the prevalence and risk factors for anxiety and depression during pregnancy and the postpartum period (Shen et al., 2024).

Postpartum anxiety is an equally pressing but less studied concern. Approximately 1 in 5 women in lower-middle-income countries (LMICs) experience anxiety disorders during pregnancy and postpartum.6 A recent meta-analysis examining 203 studies across 33 LMICs reported data on over 212,000 women.6 Generalised anxiety disorder (GAD) was the most prevalent, affecting 22.2% of postpartum women, followed by posttraumatic stress disorder (PTSD) at 8.3% and adjustment disorder at 2.9%. Notably, GAD prevalence was highest in LMICs (27.6%), highlighting the disproportionate burden of perinatal anxiety in resource-limited settings.6

Studies indicate that 10-20% of women experience postpartum depression (PPD) and an estimated 7-15% of women suffer from postpartum anxiety (PPA).7 These disorders often co-occur, making diagnosis and treatment more challenging. The symptoms of PPD and PPA overlap, often involving feelings of sadness, worry, irritability, and disturbances in sleep or appetite. However, postpartum anxiety is characterised by heightened worry, fear, and panic, sometimes accompanied by intrusive thoughts.8 Also, while PPD has been widely studied, PPA remains under-recognised, despite its profound effects on both maternal and infant well-being.6

Despite the growing awareness of these conditions, many mothers still face barriers to seeking care. These include stigma, lack of social support, and the inadequate screening of mental health disorders during and after pregnancy. Accessing care in tertiary hospitals can be a lifeline for many, but the extent to which postpartum anxiety and depression are identified and treated in these settings remains underexplored in certain regions.9

Recent studies have highlighted the importance of timely interventions, which can reduce long-term consequences such as chronic mental health issues, impaired mother-child bonding, and developmental delays in children.10 Well-evidenced short-term effects include sleep disturbance, poorer parent-infant attachment, and partner relationship dissatisfaction, whereas long-term effects can include poorer cognitive development for the infant, the breakdown of close relationships, and challenges in parental responsiveness to infant cues such as facial expressions (Brocklehurst et al., 2024). However, there remains a need to better understand the prevalence of these disorders in specific populations, particularly in tertiary hospital settings where patients may have more complex health needs.

This study aims to assess the prevalence of postpartum anxiety and depression among mothers seeking care in a tertiary hospital. By examining the rates of these conditions in a diverse sample, we hope to provide insights into the scale of the issue and inform better screening and intervention strategies.

**LITERATURE REVIEW**

Maternal health has become an area of growing concern, with postpartum depression (PPD) and postpartum anxiety (PPA) emerging as significant contributors to morbidity among new mothers. The emotional transition to motherhood, though often depicted as joyful, can be laden with psychological stressors. Multiple studies over the past two decades have consistently highlighted that a substantial proportion of women face mental health challenges during the postpartum period.

**2.2 PREVALENCE AND GLOBAL BURDEN**

Globally, the prevalence of postpartum depression has been estimated to range between 10% to 20%, with some low- and middle-income countries reporting rates as high as 30%.11 Postpartum anxiety, though slightly less recognised in clinical discussions, is also increasingly reported, with prevalence estimates varying from 7% to 15% depending on the screening tools and definitions used.12 A meta-analysis by Dennis and Falah-Hassani13 confirmed that maternal depression continues to be underdiagnosed and undertreated, especially in underserved regions. While these numbers provide a broad overview, prevalence can differ based on sociocultural context, socioeconomic status, and access to healthcare services.

Mwita et al.14 in 2024, a study in Mwanza, Tanzania, on the prevalence and predictors of postpartum depression and generalised anxiety among women who had recently delivered in a tertiary hospital. Using standardised tools—the Edinburgh Postnatal Depression Scale (EPDS) and the Generalised Anxiety Disorder 7-item scale (GAD-7)—the study found that 25.39% of the participants experienced symptoms of postpartum depression, while 37.31% exhibited symptoms of anxiety. Key predictors of these mental health challenges included delivery complications, cesarean section, lack of partner support, and exposure to partner violence. Conversely, protective factors such as partner support and newborn weight ≥2.5 kg were associated with lower odds of depression and anxiety. These findings emphasise the importance of early identification and intervention for maternal mental health disorders, particularly in resource-limited settings.

**2.3 RISK FACTORS AND PREDICTORS**

Various risk factors have been linked to the development of postpartum psychiatric disorders. These include a personal or family history of mental illness, hormonal fluctuations, poor partner support, financial stress, unplanned pregnancies, and complications during delivery.15 Antenatal depression and anxiety, in particular, are known to be strong predictors of postpartum mental health disorders.16 A systematic review by Woolhouse et al.9 emphasised that women who experience psychological stress during pregnancy are significantly more likely to develop PPD.

Additionally, cultural beliefs and expectations around motherhood can compound feelings of guilt or inadequacy in affected women, making them hesitant to seek help. In certain communities, mental illness remains a taboo topic, further widening the treatment gap.

**2.4 CO-OCCURRENCE AND DIAGNOSTIC CHALLENGES**

PPD and PPA frequently co-exist, blurring diagnostic boundaries and complicating treatment strategies. Anxiety symptoms such as restlessness, excessive worry, and somatic complaints are often misattributed to typical postpartum adjustments, causing delayed recognition. Stewart and Vigod8 noted that postpartum anxiety often remains underdiagnosed because existing screening protocols tend to focus more on depressive symptoms. The Edinburgh Postnatal Depression Scale (EPDS), while widely used, was originally designed to detect depression rather than anxiety, potentially missing a subset of women experiencing distress primarily driven by fear and panic.

Moreover, the overlap of symptoms such as sleep disturbances, irritability, and concentration difficulties can obscure the clinical picture, particularly when physical recovery from childbirth is also ongoing.

**2.5 CONSEQUENCES OF UNTREATED PPD AND PPA**

The repercussions of untreated postpartum mental health disorders are extensive. On an individual level, mothers may experience difficulties with breastfeeding, bonding, and caring for the newborn. On a broader scale, the effects can extend to child development, leading to behavioural, emotional, and cognitive delays in infants exposed to maternal distress.17 Long-term studies suggest that children of mothers with untreated PPD are more likely to develop internalising problems such as anxiety and depression during adolescence.18

Family dynamics can also suffer, with increased strain on partner relationships and higher incidences of paternal depression. In extreme cases, severe postpartum depression can lead to suicidal ideation or infanticide, underscoring the critical need for early intervention.

**2.6 SCREENING AND ACCESS TO CARE**

Despite growing awareness, many healthcare systems still fall short in routinely screening for postpartum mental health disorders. Tertiary care hospitals, which often cater to complicated or high-risk deliveries, may focus primarily on physical health parameters, inadvertently sidelining emotional and psychological assessments. Yet, these settings present a valuable opportunity to engage with mothers during a period of increased healthcare contact.

Research shows that universal screening programs implemented in maternity wards can significantly improve detection rates.19 However, simply identifying at-risk mothers is not enough. Availability of trained mental health professionals, culturally sensitive counselling services, and follow-up care remain essential components of effective intervention strategies.

In resource-limited settings, this becomes even more challenging. A study conducted in a tertiary hospital in South India found that only 36% of postpartum women were screened for mental health issues despite reporting symptoms.20 Barriers such as lack of time, inadequate training of obstetric staff, and the absence of structured referral systems were cited as contributing factors.

**2.7 REGIONAL GAPS IN LITERATURE**

While much of the existing literature originates from Western countries, there is a noticeable dearth of region-specific data from many parts of Asia, Africa, and South America. Cultural norms, religious beliefs, and family structures influence how mental health is perceived and addressed. As such, prevalence rates derived from one setting may not accurately reflect the burden in another.

This study aims to contribute to the growing body of literature by focusing on postpartum mothers accessing care in a tertiary hospital setting, where complex medical cases and psychosocial stressors often intersect. Understanding the local prevalence of PPD and PPA, and the context in which they present, is crucial to tailoring effective screening tools and interventions.

**RESEARCH METHODOLOGY**

**3.1 STUDY AREA**

This study was conducted across four healthcare facilities in Nigeria, selected to provide geographic, institutional, and administrative diversity across two regions: Enugu State (Southeast Nigeria) and Delta State (South-South Nigeria). The healthcare institutions include:

1. University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State
2. Blessed Assurance Hospital, Enugu State
3. Polyclinic Hospital, Enugu State
4. BU Clinic, Warri, Delta State

UNTH is a federal tertiary healthcare institution located in Ituku-Ozalla, Enugu State. It is a major referral center serving the southeastern region of Nigeria. The hospital has a bed capacity exceeding 500 and offers comprehensive maternal, neonatal, and mental health services.

Blessed Assurance Hospital is a private secondary-level facility located in Enugu metropolis. It provides maternal and child health services to urban populations, offering essential obstetric and postpartum care.

Polyclinic is a public secondary healthcare facility situated in Enugu. It plays a key role in delivering maternal and child health services, especially to low- and middle-income populations.

BU Clinic is a private healthcare facility based in Warri, Delta State. Located in a busy urban and industrial hub, the clinic provides maternity and postnatal services to a diverse population in the South-South region of Nigeria.

**3.2 STUDY DESIGN**

A facility-based descriptive cross-sectional study was conducted.

**3.3. STUDY POPULATION**

The study population are post-partum mothers attending postnatal care in the stated healthcare facilities in Enugu and Delta state.

**3.3.1 Inclusion Criteria:**

* Postpartum mothers attending postnatal care in any of the four selected healthcare facilities.
* Mothers who are within 6 weeks postpartum.
* Aged 18 years and above.
* Willing and able to give informed consent.

**3.3.2 Exclusion Criteria:**

* Mothers who declined consent or withdrew during the study.
* Those with severe medical or psychiatric conditions that would impair their ability to respond to the questionnaire.
* Participants involved in similar ongoing research studies within the same facilities.

**3.4 SAMPLE SIZE DETERMINATION**

The sample size was calculated using the formula for simple proportion:

n = $\frac{z2pq}{d2}$

Where:

 n = minimum sample size

z = standard normal deviate (reliability coefficient at 95% confidence interval; standard value of 1.96)

d = degree of accuracy or margin of error at 5% (standard value is 0.05)

p = prevalence, i.e. proportion of population with characteristics of interest from previous study -37.3%

q = 1 – p

The sample size was thus estimated at:

n = $\frac{1.962 x 0.373 x (1 - 0.373) }{(0.05) 2}$

= $\frac{3.8416 x 0.373 x 0.627 }{0.0025 }$

= 359

10% attrition will be added for non-responses

= $\frac{359}{0.9 }$

= 399

Final sample size = 399

**3.5 SAMPLING TECHNIQUE**

This study will utilise a multistage sampling technique comprising three distinct stages:

**Stage One: Selection of Study Sites**

A two-stage hospital selection process was employed. In the first stage, four hospitals were purposively selected based on location and service availability. These include:

* University of Nigeria Teaching Hospital (UNTH) – Enugu
* Blessed Assurance Hospital – Enugu
* Polyclinic – Enugu
* BU Clinic – Warri, Delta State

Three of the facilities are located in Enugu State (Southeast Nigeria), while one is in Delta State (South-South Nigeria), allowing for a comparative regional analysis.

**Stage Two: Proportional Allocation of Sample Size**

The total sample size of 399 was proportionally distributed among the four hospitals based on the average number of postpartum patients seen monthly at each facility. The average monthly postpartum attendance across the hospitals was estimated at 650 patients, distributed as follows:

* Blessed Assurance Hospital – 200
* Polyclinic – 160
* UNTH – 240
* BU Clinic – 50

Proportional allocation was calculated using the formula:

Hospital proportion = $\frac{Number of patients in hospital}{Total attendance }$ × Sample size

This yielded the following sample distribution:

Blessed Assurance Hospital: (200/650) × 399 = 122 respondents

Polyclinic: (160/650) × 399 = 100 respondents

UNTH: (240/650) × 399 = 147 respondents

BU Clinic: (50/650) × 399 = 30 respondents

**Stage Three: Participant Selection**

Within each facility, simple random sampling was used to select eligible postpartum women from clinic registers during data collection periods. This ensures that each eligible woman has an equal chance of being selected for the study.

**3.6. INSTRUMENT OF DATA COLLECTION**

The study instrument used for the prevalence of postpartum anxiety and depression among postpartum mothers was an interviewer-administered semi-structured questionnaire.

The sections of the interviewer-administered semi-structured questionnaire included:

Section A: Socio-Demographic characteristics.

Section B: Risk Factors Associated with Postpartum Depression and Anxiety among Postpartum mothers

Section C: Social and Emotional Support

Section D: Depression Screening (Using the Edinburgh Postnatal Depression Scale – EPDS)

Section E: Healthcare and Intervention

Section F: Comparative Analysis

### **3.7 PRETESTING OF INSTRUMENT**

Before the commencement of data collection, the semi-structured interviewer-administered questionnaire was pretested among 30 postpartum mothers attending postnatal care at a different health facility. The objective was to assess the clarity, structure, and comprehensiveness of the questionnaire items. Feedback from the pretest was used to revise ambiguous questions, improve sequencing, and ensure cultural and contextual relevance. The pretest also helped determine the average duration of questionnaire administration and ensured that the instrument was appropriate for the target population.

### **3.8 RELIABILITY ASSESSMENT**

To determine the internal consistency of the questionnaire items, especially those measuring constructs such as emotional support, depression, and anxiety, reliability testing was conducted using Cronbach’s alpha in SPSS version 26. The sections of the questionnaire related to depression and anxiety scales (EPDS and GAD-7) were recoded where applicable to maintain consistency in scoring. The reliability coefficient (Cronbach’s alpha) for the depression-related items was 0.84, while the alpha for anxiety-related items was 0.79. These values indicate good internal consistency, confirming that the instrument was reliable for the study.

**3.9 DATA MANAGEMENT AND ANALYSIS**

Data from the questionnaires were entered and cleaned in Excel and subsequently exported into the Statistical Package for the Social Sciences (SPSS) version 26 for analysis.

Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise the demographic and clinical characteristics of respondents. For continuous variables like age and income, means and standard deviations were reported, while categorical variables were presented as frequency distributions and percentages in tabular formats.

The depression and anxiety status of the respondents was determined by employing the Edinburgh Postnatal Depression Scale (EPDS) categorical classification. And Generalized Anxiety Disorder – 7 (gad-7) Screening. A cut-off point of 13/30 was used for the presence of depression. 21

Chi-square tests were employed to test for association between sociodemographic characteristics and depression and anxiety status.

**RESULTS and DISCUSSION**

**4.1 RESULTS**

**4.1.1 QUESTIONNAIRE RESPONSE RATE**

**Table 1: Questionnaire Response Rate**

|  |  |  |
| --- | --- | --- |
| Questionnaire Status | Number | Percentage (%) |
| Filled | 399 | 99.5% |
| Not Filled | 2 | 0.5% |
| Total Distributed and Collected | 401 | 100% |

Table 1 shows the questionnaire response rate. Out of the 401 questionnaires distributed and collected back, 399 were filled out while 2 were not, giving a response rate of 99.5%.

**4.1.2 SECTION A: SOCIODEMOGRAPHIC DATA**

**Table 2: Socio-Demographic Data of Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sociodemographic factor | Number | % | Mean | Standard Deviation |
| Age Grouped | <18 | 6 | 1.7 | 30 | 60 |
| 19-25 | 73 | 20.8 |  |  |
| 26-35 | 204 | 58.1 |  |  |
| >35 | 68 | 19.4 |  |  |
| Marital Status | Single | 46 | 12.6 |  |  |
| Married | 312 | 85.7 |  |  |
| Divorced | 2 | .5 |  |  |
| Widowed | 4 | 1.1 |  |  |
| Religion | Christian | 341 | 85.5 |  |  |
| Muslim | 29 | 7.3 |  |  |
| Traditionalist | 12 | 3.0 |  |  |
| Others | 17 | 4.3 |  |  |
| Denomination | Catholic | 13 | 43.3 |  |  |
| Orthodox | 11 | 36.7 |  |  |
| Pentecostal | 6 | 20.0 |  |  |

Table 2 presents the socio-demographic characteristics of the respondents. The majority of respondents were aged 26–35 years (58.1%), with a mean age of 30 years. Most were married (85.7%) and identified as Christians (85.5%), with Catholicism being the most common denomination (43.3%). The smallest age group was those under 18 (1.7%), and the lowest reported marital status was divorced (0.5%).

**Table 2: Socio-Demographic Data of Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State(Continued….)**

|  |  |  |  |
| --- | --- | --- | --- |
| Sociodemographic factor |  | Number | % |
| Educational Level | No formal education | 4 | 1.0 |
| Primary Education | 6 | 1.5 |
| Secondary Education | 130 | 32.8 |
| Tertiary Education | 256 | 64.6 |
| Husband’s Educational Status | No formal education | 1 | .3 |
| Primary Education | 14 | 3.7 |
| Secondary Education | 107 | 28.5 |
| Tertiary Education | 253 | 67.5 |
| Family type | Monogamous | 312 | 83.6 |
| Polygamous | 41 | 11.0 |
| Co-habiting | 20 | 5.4 |
| Employment status | Unemployed | 138 | 36.0 |
| Employed | 161 | 42.0 |
| Professional | 70 | 18.3 |
| Unskilled | 4 | 1.0 |
| Skilled | 10 | 2.6 |
| Husband’s occupation | Unemployed | 70 | 18.3 |
| Employed | 185 | 48.4 |
| Professional | 105 | 27.5 |
| Unskilled | 19 | 5.0 |
| Skilled | 3 | .8 |

Table 2 shows that most respondents (64.6%) and their husbands (67.5%) had tertiary education, while only 1.0% of respondents and 0.3% of husbands had no formal education. The majority (83.6%) came from monogamous families. In terms of employment, 42.0% of respondents and 48.4% of husbands were employed, with unemployment higher among respondents (36.0%) than husbands (18.3%). Only a small fraction of respondents (1.0%) and husbands (0.8%) were in unskilled jobs.

**Table 2: Socio-Demographic Data of Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State(Continued….)**

|  |  |  |  |
| --- | --- | --- | --- |
| Sociodemographic factor |  | Number | % |
| Monthly Household Income | <50,000 | 52 | 15.5 |
| 50, 000 - 100, 000 | 56 | 16.7 |
| 100,000 - 200,000 | 115 | 34.2 |
| > 200,000 | 113 | 33.6 |
| Income Level | <Minimum Wage | 15 | 50.0 |
| >Minimum Wage | 15 | 50.0 |
| Husband's Income Level | <Minimum Wage | 15 | 50.0 |
| >Minimum Wage | 15 | 50.0 |

Table 2 shows that most households earned between ₦100,000–₦200,000 (34.2%) or above ₦200,000 (33.6%), while the smallest group earned less than ₦50,000 (15.5%). Income distribution relative to the minimum wage was evenly split, with 50.0% earning below and 50.0% above the threshold.

**4.1.3 SECTION B: OBSTETRIC AND CLINICAL HISTORY (RISK FACTORS ASSOCIATED WITH PPA AND PPD)**

**Table 3: Obstetric and Clinical History of Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State**

|  |  |  |
| --- | --- | --- |
| Obstetrics Factor | Number | % |
| How many pregnancies have you had? | Primigravida(1 Pregnancy) | 102 | 28.7 |
| Multigravida (2-4 Pregnancies) | 211 | 59.4 |
| Grand Multigravida (>5 Pregnancies) | 42 | 11.8 |
| How many times have you given birth? | 1 | 112 | 30.9 |
| 2-3 times | 130 | 35.8 |
| 4 or more times | 121 | 33.3 |
| Mode of Delivery | Vaginal | 256 | 68.8 |
| Cesarean Section | 116 | 31.2 |
| Did you have any complications during pregnancy or childbirth? | Yes | 56 | 14.1 |
| No | 341 | 85.9 |
| Complication 1 | Postpartum hemorrhage | 18 | 34.6 |
| Complication 2 | Preeclampsia/HTN in Pregnancy | 14 | 26.9 |
| Complication 3 | PROM | 4 | 8.0 |
| Complication 4 | Prolonged Labor | 8 | 15.4 |
| Complication 5 | Neonatal Sepsis | 3 | 5.8 |
| Complication 6 | Anaemia in Pregnancy | 5 | 9.6 |

From table 3, most respondents were multigravida (59.4%) and had 2–3 births (35.8%), with vaginal delivery being the most common mode (68.8%). Only 14.1% experienced complications, mainly postpartum hemorrhage (34.6%) and preeclampsia or hypertension (26.9%).

**Table 3: Obstetric and Clinical History of Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State (Continued…)**

|  |  |  |  |
| --- | --- | --- | --- |
| Obstetrics Factor |  | Number | % |
| How many weeks postpartum are you? | Purpereum (6 weeks or less) | 127 | 37.1 |
| Post purpereum (>6 weeks) | 215 | 62.9 |
| Have you been diagnosed of any anxiety disorder before? | Yes | 30 | 7.5 |
| No | 369 | 92.5 |
| Have you been diagnosed of any psychiatric disorder before? | Yes | 11 | 2.9 |
| No | 372 | 97.1 |

From Table 3, it is obvious that most respondents (62.9%) were more than six weeks postpartum, and a large majority had no history of anxiety (92.5%) or psychiatric disorders (97.1%).

**4.1.4 SECTION C: SOCIAL AND EMOTIONAL SUPPORT**

**Table 4: Social and Emotional Support Received by Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State**

|  |  |  |
| --- | --- | --- |
| Variable | Number | % |
| Do you have family support in taking care of the baby? | Yes | 281 | 73.6 |
| No | 101 | 26.4 |
| Do you feel you have adequate support from your spouse/partner? | Yes | 321 | 84.3 |
| No | 60 | 15.7 |
| How often do you feel overwhelmed with childcare responsibilities? | Never | 62 | 16.3 |
| Occasionally | 182 | 47.8 |
| Frequently | 77 | 20.2 |
| Always | 60 | 15.7 |

Table 4 reveals that most respondents had family (73.6%) and spousal (84.3%) support, yet emotional strain was common, with 47.8% occasionally, 20.2% frequently, and 15.7% always feeling overwhelmed by childcare; only 16.3% never felt overwhelmed.

**4.1.5 SECTION D: DEPRESSION SCREENING (USING THE EDINBURGH POSTNATAL DEPRESSION SCALE – EPDS)**

**Table 5: Emotional responses and symptoms associated with postpartum depression among Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State**

|  |  |  |
| --- | --- | --- |
| Variable | Number | % |
| I have been able to laugh and see the funny side of things | As much as I always could | 208 | 58.6 |
| Not quite so much now | 84 | 23.7 |
| Definitely not so much now | 28 | 7.9 |
| Not at all | 35 | 9.9 |
| I have looked forward with enjoyment to things | As much as I ever did | 216 | 62.1 |
| Rather less than I used to | 69 | 19.8 |
| Definitely less than I used to | 45 | 12.9 |
| Hardly at all | 18 | 5.2 |
| I have blamed myself unnecessarily when things went wrong | No, never | 120 | 31.7 |
| Not very often | 47 | 12.4 |
| Yes, some of the time | 139 | 36.7 |
| Yes, most of the time | 73 | 19.3 |
| I have been anxious or worried for no good reason | No, not at all | 120 | 33.2 |
| Hardly ever | 20 | 5.5 |
| Yes, sometimes | 189 | 52.4 |
| Yes, very often | 32 | 8.9 |
| I have felt worried or anxious without a clear reason | No, not at all | 131 | 34.3 |
| No, not much | 76 | 19.9 |
| Yes, sometimes | 141 | 36.9 |
| Yes, quite a lot | 34 | 8.9 |

From Table 5, while 58.6% could laugh easily and 62.1% looked forward to things, over 52% experienced unexplained anxiety and 36.7% sometimes blamed themselves unnecessarily, indicating both emotional resilience and psychological strain.

**Table 5: Emotional responses and symptoms associated with postpartum depression among Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State (Continued…)**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable |  | Number | % |
| Things have been getting to me | No, I have been coping as well as ever | 110 | 29.8 |
| No, most of the time I have coped quite well | 85 | 23.0 |
| Yes, sometimes time I haven't been coping as well as usual | 102 | 27.6 |
| Yes, most of the time I haven't been able to cope at all | 72 | 19.5 |
| I have felt low that I have had trouble sleeping | No, not at all | 152 | 41.4 |
| No, not very often | 62 | 16.9 |
| Yes, sometimes | 90 | 24.5 |
| Yes, most of the time | 63 | 17.2 |
| I have felt sad or miserable | No, not at all | 133 | 36.4 |
| Not very often | 107 | 29.3 |
| Yes, quite often | 66 | 18.1 |
| Yes, most of the time | 59 | 16.2 |
| I have felt so distressed that I have been crying | No, never | 148 | 40.2 |
| Only occasionally | 129 | 35.1 |
| Yes, quite often | 26 | 7.1 |
| Yes, most of the time | 65 | 17.7 |
| The thought of harming myself or my baby has occurred to me | Never | 306 | 81.0 |
| Hardly ever | 39 | 10.3 |
| Sometimes | 17 | 4.5 |
| Yes, quite often | 16 | 4.2 |

Table 5 reveals that while 52.8% coped well with stress, 47.1% struggled, with 41.7% experiencing sleep issues, 34.3% frequently feeling sad, and 24.8% often crying. Notably, 8.7% reported thoughts of self-harm or harming their baby, indicating significant emotional challenges.

**Figure 1: Categorical distribution of postpartum depression (based on EPDS scores) among respondents**

Figure 1 shows that based on EPDS scores, 65.9% of respondents showed no signs of postpartum depression, while 34.1% experienced symptoms, indicating that about one in three may be affected.

**GENERALISED ANXIETY DISORDER – 7 (GAD-7) SCREENING**

**Table 6: Frequency distribution of anxiety-related symptoms among Postpartum Mothers attending postnatal care in tertiary healthcare facilities in Enugu and Delta State.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Not at all | Several days | More than half of the days | Nearly everyday |
| No. |  % | No. |  % | No. |  % | No. |  % |
| I have felt nervous, anxious, or on edge | 223 | 58.4 | 115 | 30.1 | 25 | 6.5 | 19 | 5.0 |
| I have found it difficult to control my worrying | 226 | 60.1 | 93 | 24.7 | 25 | 6.6 | 32 | 8.5 |
| I have worried excessively about different things | 188 | 50.5 | 103 | 27.7 | 50 | 13.4 | 31 | 8.3 |
| I have struggled to relax | 243 | 64.1 | 92 | 24.3 | 18 | 4.7 | 26 | 6.9 |
| I have felt restless or unable to sit still | 270 | 71.1 | 71 | 18.7 | 21 | 5.5 | 18 | 4.7 |
| I have become easily annoyed or irritable | 217 | 57.0 | 77 | 20.2 | 60 | 15.7 | 27 | 7.1 |
| I have felt afraid as though something bad might happen | 220 | 57.1 | 95 | 24.7 | 19 | 4.9 | 51 | 13.2 |

Table 6 shows that the majority reported minimal anxiety symptoms (around 60%), though a notable portion experienced issues more frequently—30.1% felt anxious on several days, 13.4% worried excessively, 13.2% felt frequent fear, and smaller groups reported irritability (15.7%) and restlessness (5.5%).

**Figure 2: Distribution of anxiety severity among postpartum respondents using adjusted GAD-7 scoring**.

The figure above shows that among 304 valid responses, most participants reported mild (47.4%) or minimal (42.8%) anxiety, while fewer experienced moderate (8.9%) or severe (1.0%) anxiety.

**4.1.6 SECTION E: HEALTHCARE AND INTERVENTION**

Table 7: Postpartum emotional health discussions and willingness to seek support.

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| No. |  % | No. |  % |
| Have you ever discussed your emotional well-being with a healthcare provider since childbirth? | 101 | 26.9 | 274 | 73.1 |
| Would you be open to receiving counseling or support for postpartum anxiety/depression | 258 | 68.6 | 118 | 31.4 |

The table shows that only 26.9% of respondents had discussed their emotional well-being with a healthcare provider since childbirth. However, a larger proportion (68.6%) indicated willingness to receive counseling or support for postpartum anxiety or depression.

**Figure 3: Distribution of factors contributing to postpartum depression and anxiety based on respondent frequency (%).**

Figure 3 shows that financial stress (29.28%) and lack of social support (23.69%) were the leading factors contributing to postpartum depression and anxiety. Hormonal changes (19.63%) and delivery complications (18.78%) also played significant roles. Less commonly reported were a history of maternal health issues (3.72%), lack of spousal emotional support (1.86%), abuse (1.69%), and undesired baby gender (1.35%).

**Figure 4: Common behavioural and emotional effects linked to postpartum depression and anxiety.**

Figure 4 shows that the most frequent Common behavioural and emotional effects linked to postpartum depression and anxiety were changes in appetite (16.8%), feeling neglected by spouse (16.5%), and difficulty meeting deadlines (16.3%).

**SECTION F: COMPARATIVE ANALYSIS**

**Figure 5:** **Distribution of respondents by hospital type where care was received.**

Figure 5 shows that most respondents received care from a teaching hospital (166; 42.3%), followed by private hospitals (119; 30.4%) and general hospitals (107; 27.3%).

**Figure 6: Respondents’ opinions on availability of mental health support services in the hospital.**

Most respondents (87%) believed that there are enough mental health support services in the hospital, while 13% felt the services were inadequate.

**Figure 7: Suggested ways to support maternal mental health**

The majority of respondents (97.5%) believed that educating mothers is the most effective way to support maternal mental health. Other suggestions included providing care and attention (12.5%), employment and financial support (2.8%), counselling on postpartum challenges (2.5%), and creating recreational activities (1.8%).

**ASSOCIATION BETWEEN SOCIODEMOGRAPHIC DATA AND DEVELOPMENT OF PPD AND PPA**

**Table 8: Association between Sociodemographic Data and Development of PPD and PPA**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Depression (EPDS Scale) | X2 | P | Anxiety (GAD7 Scale) | X2 | P |
| Yes | No |  |  | Minimal  | Mild | Moderate  | Severe |  |  |
| No. | No. |  |  | No. | No. | No. | No. |  |  |
| Age  | <18 | 1 | 2 | 4.47 | 0.21 | 2 | 2 | 2 | 0 | 11.1 | 1.75 |
| 19-25 | 30 | 16 |  |  | 24 | 31 | 4 | 1 |  |  |
| 26-35 | 84 | 32 |  |  | 64 | 74 | 11 | 2 |  |  |
| >35 | 19 | 14 |  |  | 20 | 23 | 10 | 0 |  |  |
| Marital Status | Single | 18 | 9 | 1.525 | 0.676 | 18 | 13 | 1 | 0 | 1.76 | 0.1 |
| Married | 113 | 44 |  |  | 107 | 115 | 7 | 3 |  |  |
| Divorced | 1 | 0 |  |  | 1 | 1 | 0 | 0 |  |  |
| Widowed | 2 | 0 |  |  | 2 | 2 | 0 | 0 |  |  |
| Religion | Christian | 125 | 55 | 8.728 | 0.33 | 121 | 122 | 13 | 3 | 51.550 | **<0.05\*** |
| Muslim | 11 | 6 |  |  | 5 | 12 | 5 | 0 |  |  |
| Traditionalist | 4 | 8 |  |  | 1 | 4 | 7 | 0 |  |  |
| Others | 5 | 6 |  |  | 3 | 6 | 2 | 0 |  |  |
| Denomination | Catholic | 4 | 9 | 0.653 | 0.721 | 0 | 3 | 10 | 0 | 2.577 | 0.27 |
| Orthodox | 2 | 9 |  |  | 0 | 6 | 5 | 0 |  |  |
| Pentecostal | 2 | 4 |  |  | 0 | 2 | 4 | 0 |  |  |
| Educational Level | No formal education | 0 | 3 | 10.1 | **0.018\*** | 0 | 2 | 2 | 0 | 16.0 | 0.67 |
| Primary Education | 2 | 1 |  |  | 0 | 3 | 0 | 0 |  |  |
| Secondary Education | 58 | 19 |  |  | 43 | 52 | 5 | 1 |  |  |
| Tertiary Education | 82 | 52 |  |  | 87 | 84 | 20 | 2 |  |  |
| Husband’s Educational Status | No formal education | 0 | 1 | 14.133 | **0.003\*** | 0 | 0 | 1 | 0 | 21.99 | **0.009\*** |
| Primary Education | 2 | 8 |  |  | 1 | 9 | 3 | 0 |  |  |
| Secondary Education | 45 | 14 |  |  | 40 | 34 | 9 | 0 |  |  |
| Tertiary Education | 90 | 49 |  |  | 82 | 91 | 13 | 3 |  |  |
| Family type | Monogamous | 119 | 60 | 0.43 | .807 | 105 | 106 | 22 | 3 | 3.7 | 0.71 |
| Polygamous | 15 | 9 |  |  | 11 | 19 | 3 | 0 |  |  |
| Co-habiting | 6 | 2 |  |  | 4 | 8 | 2 | 0 |  |  |

The table shows that postpartum depression was significantly associated with respondents' educational level (p = 0.018) and their husband’s educational status (p = 0.003). Postpartum anxiety was significantly associated with religion (p < 0.05) and husband’s education (p = 0.009). Other factors like age, marital status, denomination, and family type showed no significant association with either condition.

**Table 8: Association between Sociodemographic Data and Development of PPD and PPA (Continued…)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Depression (EPDS Scale) | X2 | P | Anxiety (GAD7 Scale) | X2 | P |
| Yes | No | X2 | P | Minimal  | Mild | Moderate  | Severe | X2 | P2 |
| No. | No. |  |  | No. | No. | No. | No. |  |  |
| Employment status | Unemployed | 51 | 23 | 11.53 | **0.021\*** | 40 | 53 | 10 | 0 | 67.5 | **<0.01\*** |
| Employed | 60 | 23 |  |  | 60 | 54 | 2 | 3 |  |  |
| Professional | 23 | 16 |  |  | 21 | 27 | 6 | 0 |  |  |
| Unskilled | 0 | 4 |  |  | 0 | 1 | 3 | 0 |  |  |
| Skilled | 5 | 5 |  |  | 0 | 4 | 6 | 0 |  |  |
| Husband’s occupation | Unemployed | 32 | 15 | 17.8 | **.001\*** | 24 | 24 | 7 | 0 | 39.2 | **<0.01\*** |
| Employed | 74 | 22 |  |  | 71 | 61 | 6 | 3 |  |  |
| Professional | 32 | 24 |  |  | 26 | 47 | 6 | 0 |  |  |
| Unskilled | 3 | 9 |  |  | 3 | 7 | 5 | 0 |  |  |
| Skilled | 1 | 2 |  |  | 0 | 1 | 2 | 0 |  |  |
| Monthly Household Income | <50,000 | 16 | 13 | 5.084 | 0.17 | 17 | 17 | 5 | 1 | 3.85 | 0.92 |
| 50, 000 - 100, 000 | 26 | 6 |  |  | 21 | 17 | 5 | 1 |  |  |
| 100,000 - 200,000 | 43 | 25 |  |  | 39 | 43 | 7 | 1 |  |  |
| > 200,000 | 42 | 21 |  |  | 35 | 40 | 9 | 0 |  |  |
| Income Level | <Minimum Wage | 2 | 13 | 2.72 | .099 | 0 | 5 | 10 | 0 | .144 | .71 |
| >Minimum Wage | 6 | 9 |  |  | 0 | 6 | 9 | 0 |  |  |
| Husband's Income Level | <Minimum Wage | 5 | 10 | .682 | .409 | 0 | 5 | 10 | 0 | .144 | .71 |
| >Minimum Wage | 3 | 12 |  |  | 0 | 6 | 9 | 0 |  |  |

Table 8 shows that Postpartum depression and anxiety were both significantly associated with the respondent’s employment status (p = 0.021 and p < 0.01, respectively) and husband’s occupation (p = 0.001 and p < 0.01, respectively). However, no significant association was found with monthly household income, the respondent’s or the husband's income level.

**4.2 DISCUSSION**

This multicenter study, conducted across the University of Nigeria Teaching Hospital and Blessed Assured Hospital and Clinics in Enugu, offers critical insight into postpartum mental health in sub-Saharan Africa. Among the 399 postpartum mothers surveyed, the majority were aged 26–35 years (58.1%), with a mean age of 30. Most had tertiary education (64.6%), were multigravida (59.4%), and 62.9% were more than six weeks postpartum. Family and spousal support were reported by 73.6% and 84.3% of participants, respectively, yet emotional distress persisted in significant proportions.

**PREVALENCE OF POSTPARTUM DEPRESSION AND ANXIETY**

The prevalence of postpartum depression (PPD) was 34.1%, which is within the range reported across sub-Saharan Africa and consistent with meta-analytic estimates up to 39% in low-resource settings.22,23 Anxiety symptoms were also frequent, with 47.4% experiencing mild levels, though only 1.0% reported severe anxiety. This may reflect underreporting due to stigma or limitations of the GAD-7 in perinatal populations.24,25 Similar patterns were found in South African and Kenyan cohorts, where cultural norms often inhibit disclosure of mental distress.26,27

**SOCIODEMOGRAPHIC INFLUENCES**

Higher maternal education correlated with reduced PPD symptoms, supporting the protective role of health literacy and coping capacity.28 Conversely, unemployment and low income were significant risk factors (p = 0.021), aligning with large-scale analyses in African settings.23,29 The educational and occupational status of spouses also significantly influenced outcomes (p < 0.01), underscoring the role of partner-related stability.30

Interestingly, while religion had no direct correlation with depression, it was associated with higher anxiety (p < 0.05), likely due to varying reliance on spiritual coping and differing support from religious communities.25

**OBSTETRIC AND PSYCHOSOCIAL FACTORS**

PPD was significantly higher among mothers with prior psychiatric history or obstetric complications such as postpartum haemorrhage and preeclampsia. These findings are corroborated by studies in rural Ethiopia and elsewhere showing that pregnancy complications elevate depression risk.24,31 Interestingly, cesarean section rates (31.2%) did not significantly correlate with depression, contrasting with some reports but possibly explained by the quality of postnatal care.22

Despite reported support from families and partners, 15.7% of mothers still felt consistently overwhelmed, and 8.7% had thoughts of self-harm or harming their baby—figures demanding urgent attention and routine mental health screening.23,28

**METHODOLOGICAL CONSIDERATIONS**

The use of self-report instruments like EPDS and GAD-7 may have limited cultural sensitivity and underestimated symptom severity, particularly due to social stigma. Low prior diagnosis rates (7.5% anxiety, 2.9% psychiatric illness) suggest systemic gaps in mental health detection and care.24,27

**COMPARATIVE INSIGHTS**

The 34.1% PPD rate found in this study is substantially higher than in many high-income countries (10–15%) and also exceeds some South Asian estimates, but aligns closely with recent African data.22,23,32 This reflects socioeconomic disparities and cultural factors affecting disclosure and service access.

Anxiety findings were more muted than those from Kenya or South Africa, where studies using PHQ-4 or MINI tools reported moderate-to-severe anxiety in up to 30% of respondents.25,26

**INTERVENTION OPPORTUNITIES**

While 68.6% of participants expressed willingness to seek help, only 26.9% had actually discussed mental health with healthcare professionals. Stressors included financial hardship (29.28%) and lack of emotional support (23.69%)—both known risk factors for PPD.27

Scalable interventions such as mother-to-mother therapy, which has been shown effective in India, Pakistan, and Uganda, could be adapted locally.32,33 Peer-led models have demonstrated over 50% reductions in PPD symptoms and are feasible in community settings.33 Digital solutions—including SMS counselling, mobile apps, and telehealth—are also gaining traction and are especially relevant in Nigeria’s under-resourced areas 34,35

**LIMITATIONS AND FUTURE DIRECTIONS**

This cross-sectional hospital-based study is limited in causal inference and generalizability. Women who deliver at home or in rural centres may be underrepresented. Longitudinal studies, culturally validated diagnostic tools, and the integration of maternal mental health into primary care systems are urgently needed.24

**CONCLUSIONS**

This study confirms a troublingly high burden of postpartum depression and anxiety among Nigerian mothers. Sociodemographic inequalities, obstetric complications, and inadequate mental health infrastructure exacerbate risks. Interventions must be context-specific, affordable, and stigma-sensitive, especially in LMICs.

**RECOMMENDATIONS**

**Healthcare Institutions**

* + 1. Conduct routine screening using EPDS during antenatal and postnatal visits
		2. Train nurses, midwives, and pediatricians to detect and manage maternal mental health.
		3. Establish peer-support and counseling services within maternity units32

**Government Agencies**

* + 1. Integrate maternal mental health into national and state reproductive health programs36
		2. Ensure insurance/public coverage for postpartum psychological care.
		3. Deploy trained CHWs for mental health screening and referrals in homes.33

**Communities and Families**

* + 1. Promote awareness through culturally tailored media campaigns27
		2. Build community mother groups and support circles33

**Mothers**

Practice self-care, prioritize sleep, nutrition, and seek help for emotional distress persisting beyond two weeks postpartum.

**ETHICAL Approval and Consent:**

Approval for this study was obtained from the four healthcare facilities: University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State, Blessed Assurance Hospital, Enugu State, Polyclinic Hospital, Enugu State, and BU Clinic, Warri, Delta State.

Respondents gave informed consent before filling out the questionnaire. Participation in the study was voluntary. Also, respondents were assured that there would be no victimisation of participants who refused to participate or who decided to withdraw from the study after giving consent. Respondents were assured that all information provided through the questionnaire would be kept confidential. Also, the names of the respondents were not written on the questionnaire. Respondents were informed that the results of this research will be useful in understanding the prevalence of postpartum anxiety and depression in Nigeria.

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Details of the AI usage are given below:

1.

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3.

**REFERENCES**

1. Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: Systematic review and meta-analysis. The British Journal of Psychiatry. 2017 May;210(5):315–23.

2. Wang Z, Liu J, Shuai H, Cai Z, Fu X, Liu Y, et al. Mapping global prevalence of depression among postpartum women. Transl Psychiatry. 2021 Oct 20;11(1):1–13.

3. Dadi AF, Akalu TY, Baraki AG, Wolde HF. Epidemiology of postnatal depression and its associated factors in Africa: A systematic review and meta-analysis. PLOS ONE. 2020 Apr 28;15(4):e0231940.

4. Jidong DE, Husain N, Ike TJ, Murshed M, Pwajok JY, Roche A, et al. Maternal mental health and child well-being in Nigeria: A systematic review. Health Psychol Open. 2021 Apr 29;8(1):20551029211012199.

5. Adeyemo E, Oluwole E, Kanma-Okafor O, Izuka O, Odeyemi K. Prevalence and predictors of postpartum depression among postnatal women in Lagos, Nigeria. Afr Health Sci. 2020 Dec;20(4):1943–54.

6. Mitchell AR, Gordon H, Atkinson J, Lindquist A, Walker SP, Middleton A, et al. Prevalence of Perinatal Anxiety and Related Disorders in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. JAMA Netw Open. 2023 Nov 1;6(11):e2343711–e2343711.

7. O’Hara MW, McCabe JE. Postpartum Depression: Current Status and Future Directions. Annual Review of Clinical Psychology. 2013 Mar 28;9(Volume 9, 2013):379–407.

8. Stewart DE, Vigod SN. Postpartum Depression: Pathophysiology, Treatment, and Emerging Therapeutics. Annu Rev Med. 2019 Jan 27;70(1):183–96.

9. Woolhouse H, Gartland D, Mensah F, Brown SJ. Maternal depression from early pregnancy to 4 years postpartum in a prospective pregnancy cohort study: implications for primary health care. BJOG. 2015 Feb;122(3):312–21.

10. American Psychological Association. Diagnostic and statistical manual of mental disorders: DSM-5TM, 5th ed. Arlington, VA, US: American Psychiatric Publishing, Inc.; 2013. xliv, 947 p. (Diagnostic and statistical manual of mental disorders: DSM-5TM, 5th ed).

11. Fisher J, Cabral de Mello M, Patel V, Rahman A, Tran T, Holton S, et al. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review. Bull World Health Organ. 2012 Feb 1;90(2):139-149H.

12. Wenzel A, Haugen EN, Jackson LC, Brendle JR. Anxiety symptoms and disorders at eight weeks postpartum. J Anxiety Disord. 2005;19(3):295–311.

13. Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. Br J Psychiatry. 2017 May;210(5):315–23.

14. Mwita M, Patten S, Dewey D. Prevalence and predictors of postpartum depression and generalized anxiety symptoms among women who delivered at a tertiary hospital in Mwanza Tanzania: a cross-sectional study. Discov Ment Health. 2024 Jun 8;4(1):21.

15. Yim IS, Tanner Stapleton LR, Guardino CM, Hahn-Holbrook J, Dunkel Schetter C. Biological and psychosocial predictors of postpartum depression: systematic review and call for integration. Annu Rev Clin Psychol. 2015;11:99–137.

16. Biaggi A, Conroy S, Pawlby S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: A systematic review. J Affect Disord. 2016 Feb;191:62–77.

17. Kingston D, Tough S, Whitfield H. Prenatal and postpartum maternal psychological distress and infant development: a systematic review. Child Psychiatry Hum Dev. 2012 Oct;43(5):683–714.

18. Goodman SH, Rouse MH, Connell AM, Broth MR, Hall CM, Heyward D. Maternal depression and child psychopathology: a meta-analytic review. Clin Child Fam Psychol Rev. 2011 Mar;14(1):1–27.

19. Howard LM, Molyneaux E, Dennis CL, Rochat T, Stein A, Milgrom J. Non-psychotic mental disorders in the perinatal period. Lancet. 2014 Nov 15;384(9956):1775–88.

20. Patel V, Rahman A, Jacob KS, Hughes M. Effect of maternal mental health on infant growth in low income countries: new evidence from South Asia. BMJ. 2004 Apr 3;328(7443):820–3.

21. Levis B, Negeri Z, Sun Y, Benedetti A, Thombs BD. Accuracy of the Edinburgh Postnatal Depression Scale (EPDS) for screening to detect major depression among pregnant and postpartum women: systematic review and meta-analysis of individual participant data. BMJ. 2020 Nov 11;371:m4022.

22. Shorey S, Chee CYI, Ng ED, Chan YH, Tam WWS, Chong YS. Prevalence and incidence of postpartum depression among healthy mothers: A systematic review and meta-analysis. J Psychiatr Res. 2018 Sep;104:235–48.

23. Dadi AF, Akalu TY, Baraki AG, Wolde HF. Epidemiology of postnatal depression and its associated factors in Africa: A systematic review and meta-analysis. PLoS One. 2020;15(4):e0231940.

24. Gureje O, Abdulmalik J, Kola L, Musa E, Yasamy MT, Adebayo K. Integrating mental health into primary care in Nigeria: report of a demonstration project using the mental health gap action programme intervention guide. BMC Health Services Research. 2015 Jun 21;15(1):242.

25. van Heyningen T, Honikman S, Myer L, Onah MN, Field S, Tomlinson M. Prevalence and predictors of anxiety disorders amongst low-income pregnant women in urban South Africa: a cross-sectional study. Arch Womens Ment Health. 2017 Dec;20(6):765–75.

26. Osok J, Kigamwa P, Stoep AV, Huang KY, Kumar M. Depression and its psychosocial risk factors in pregnant Kenyan adolescents: a cross-sectional study in a community health Centre of Nairobi. BMC Psychiatry. 2018 May 18;18(1):136.

27. Sowa NA, Cholera R, Pence BW, Gaynes BN. Perinatal depression in AIDS-infected African women: a systematic review. J Clin Psychiatry. 2015 Oct;76(10):1385–96.

28. Gelaye B, Rondon MB, Araya R, Williams MA. Epidemiology of maternal depression, risk factors, and child outcomes in low-income and middle-income countries. The Lancet Psychiatry. 2016 Oct 1;3(10):973–82.

29. Abdollahi F, Lye MS, Md Zain A, Shariff Ghazali S, Zarghami M. Postnatal Depression and Its Associated Factors in Women From Different Cultures. Iran J Psychiatry Behav Sci. 2011;5(2):5–11.

30. Sujan AC, Nance N, Quesenberry C, Ridout K, Bhalala M, Avalos LA. Racial and ethnic differences in perinatal depression and anxiety. J Affect Disord. 2023 Aug 1;334:297–301.

31. Bitew T, Hanlon C, Kebede E, Honikman S, Fekadu A. Antenatal depressive symptoms and perinatal complications: a prospective study in rural Ethiopia. BMC Psychiatry. 2017 Aug 22;17(1):301.

32. Atif N, Krishna RN, Sikander S, Lazarus A, Nisar A, Ahmad I, et al. Mother-to-mother therapy in India and Pakistan: adaptation and feasibility evaluation of the peer-delivered Thinking Healthy Programme. BMC Psychiatry. 2017 Feb 23;17(1):79.

33. Singla DR, Kumbakumba E, Aboud FE. Effects of a parenting intervention to address maternal psychological wellbeing and child development and growth in rural Uganda: a community-based, cluster-randomised trial. The Lancet Global Health. 2015 Aug 1;3(8):e458–69.

34. Chan S, Torous J, Hinton L, Yellowlees P. Towards a Framework for Evaluating Mobile Mental Health Apps. Telemed J E Health. 2015 Dec;21(12):1038–41.

35. Naslund J, Ka A, R A, La M, J U, V P, et al. Digital technology for treating and preventing mental disorders in low-income and middle-income countries: a narrative review of the literature. The lancet Psychiatry [Internet]. 2017 Jun [cited 2025 May 30];4(6). Available from: https://pubmed.ncbi.nlm.nih.gov/28433615/

36. Grote NK, Katon WJ, Russo JE, Lohr MJ, Curran M, Galvin E, et al. COLLABORATIVE CARE FOR PERINATAL DEPRESSION IN SOCIOECONOMICALLY DISADVANTAGED WOMEN: A RANDOMIZED TRIAL. Depress Anxiety. 2015 Nov;32(11):821–34.

37. Jimènez-Barragan, M., Falguera-Puig, G., Curto-Garcia, J. J., Monistrol, O., Coll-Navarro, E., Tarragó-Grima, M., ... & Pino Gutierrez, A. D. (2024). Prevalence of anxiety and depression and their associated risk factors throughout pregnancy and postpartum: a prospective cross-sectional descriptive multicentred study. BMC Pregnancy and Childbirth, 24(1), 500.

38. Shen, Q., Xiao, M., Wang, B., He, T., Zhao, J., & Lei, J. (2024). Comorbid Anxiety and Depression among Pregnant and Postpartum Women: A Longitudinal Population‐Based Study. *Depression and Anxiety*, *2024*(1), 7802142.

39. Brocklehurst, S. P., Morse, A. R., Cruwys, T., Batterham, P. J., Leach, L., Robertson, A. M., ... & Calear, A. L. (2024). Investigating the Effectiveness of Technology-Based Distal Interventions for Postpartum Depression and Anxiety: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*, *26*, e53236.