











Research Article

Prevalence and Associated Factors of Postpartum Depression Among Postpartum Mothers in Addis Ababa, Ethiopia

Saron Negasi Gidey^{1,*} , Fanuel Alemayehu Tefera² , Tsion Habtamu Ababiya³ ,
Fiyameta Abraham Fissehatsion¹ , Bemnet Gossaye Teka² ,
Rediet Tekle Zergaw¹ , Eden Bekele Urgecha¹ , Yosef Alemayehu Habtegiorgis⁴ ,
Zelalem Geletu Bate⁵ , Arsema Kinfemicheal Seifu⁶ 

¹School of Medicine, Mekelle University, Mekelle, Ethiopia

²School of Medicine, Addis Ababa University, Addis Ababa, Ethiopia

³Department of Internal Medicine, Wolaita Sodo University Comprehensive Specialized Hospital, Addis Ababa, Ethiopia

⁴Department of Radiology, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

⁵Department of Emergency and Critical Care, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

⁶School of Medicine, Hayat Medical College, Addis Ababa, Ethiopia

Abstract

Background: Postpartum depression (PPD) is a serious mental illness that affects behavior, physical health, and overall well-being, posing serious risks to the health of both mother and child. The World Health Organization reports that around 10% of women during pregnancy and 13% after childbirth globally suffer from mental health conditions, with depression being the most common. **Objective:** This study aimed to determine the prevalence and associated factors of postpartum depression among postpartum mothers in Addis Ababa, Ethiopia. **Methods:** An analytic cross-sectional study was conducted among 530 postpartum mothers from February to August 2022. Three sub-cities (Lideta, Cherkos, and Nifas Silk) were selected using a simple random sampling technique from the 10 sub-cities in Addis Ababa. Seven health centers were chosen by lottery method, and participants were selected through systematic random sampling. Binary logistic regression was employed for data analysis, and variables showing a p-value less than 0.05 were deemed statistically significant. **Results:** A total of 530 individuals took part in this study. Among them, postpartum depression was identified in 22.3% (118 participants). Several factors showed significant associations with postpartum depression, including maternal age between 19–24 years (OR = 0.51; 95% CI: 0.004, 0.73), lack of formal education (AOR = 10.65; 95% CI: 1.91, 59.51), secondary education level (AOR = 1.123; 95% CI: 0.020, 2.76), unemployment (AOR = 0.322; 95% CI: 0.121, 0.855), monthly income of 2001–6000 ETB (AOR = 1.002; 95% CI: 0.000, 2.015), and unplanned pregnancy (AOR = 9.96; 95% CI: 4.49, 17.29). **Conclusion:** The occurrence of depression among postpartum mothers is high, with significant associations found with age, education level, employment status, income, and pregnancy planning. Early screening and targeted interventions, particularly for high-risk groups such as older mothers, those with low education, and those with unplanned pregnancies, are essential to address this public health issue.

*Corresponding author: sa-ronnegasi773@gmail.com (Saron Negasi Gidey)

Received: 15 April 2025; **Accepted:** 3 May 2025; **Published:** 6 June 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

Keywords

Postpartum Depression, EPDS, Public Health Centers, Addis Ababa, Ethiopia

1. Background

Postpartum depression (PPD) is a debilitating mental health condition affecting mothers after childbirth, marked by prolonged sadness, loss of interest in daily activities, and emotional instability. Left untreated, PPD can disrupt maternal-infant bonding and impair child developmental milestones [1]. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), PPD is a form of major depression that begins within four weeks after delivery. The diagnosis is based not only on the timing of onset but also on the severity of depressive symptoms. PPD is linked to chemical, social, and psychological changes associated with childbirth and can be effectively treated with medication and counseling [1, 2]. The ICD-10 classifies postpartum depression as a pregnancy-related psychiatric disorder requiring both persistent mood disturbance for at least 14 days after delivery and the co-occurrence of multiple symptoms across cognitive (difficulty concentrating, indecisiveness), emotional (guilt, suicidal ideation), physical (sleep or appetite changes, low energy), and behavioral domains (psychomotor agitation or slowing) [3].

Mental Health disorders impact 450 million people globally, with depression ranking fourth for disability burden, with projections suggesting it would become second by 2020 [4]. Perinatal women face disproportionate risk (10% antenatal, 13% postnatal), doubling in resource-limited settings (15.5%/19.8%) [5, 6]. African data shows 15-25% PPD prevalence [7, 8], though countries like Ethiopia lack robust studies despite likely elevated rates [9].

In Ethiopia, mental health conditions make up a significant portion of the non-communicable disease burden, contributing approximately 11% overall. Conditions such as depression and schizophrenia are among the most impactful on individuals' daily functioning and well-being. National data suggests that about one in ten pregnant individuals and roughly 5% of those in the postnatal period experience undiagnosed depressive symptoms [10]. Research done in various regions of Ethiopia, like Gondar, Mizan Aman, and Addis Ababa, have reported PPD prevalence rates ranging from 22.4% to 33.8% [11-14]. Risk factors for PPD include young maternal age (18–23 years), unplanned pregnancy, partner abuse, unsatisfactory marital relationships, limited social support, a background of depressive episodes, and engagement in substance use [12, 15]. Additional predictors include infant death and current marital problems [12]. Women who are unmarried, have unplanned pregnancies, deliver without the presence of relatives, have a history of child health issues,

or have low income are also at higher risk [13].

While postpartum depression responds well to treatment, including interventions that community health workers can deliver, research gaps persist regarding how common PPD is and what causes it in developing nations like Ethiopia. A systematic review from 2016 [16] revealed how little we know about mental health during and after pregnancy across Africa, making it harder to create effective policies. The study emphasized how urgently we need better data to understand the true scope of this problem. Recognizing the growing burden of mental illness, the Ethiopian National Mental Health Strategy (2012/13-2015/16) emphasized it as a critical public health issue and a priority area for intervention [10].

Untreated PPD has significant negative consequences for both mothers and infants, including impaired maternal psychological health, reduced quality of life, and adverse effects on infant development, such as poor cognitive functioning, emotional maladjustment, and behavioral disorders [14, 17-20]. Maternal risks include weight problems, substance use, social relationship difficulties, breastfeeding challenges, and persistent depression [21-24]. Addressing the full range of mothers' needs requires more than just medical care [25]; This is particularly important as maternity leave periods become shorter, increasing the risk that mothers may not receive adequate education and health promotion guidance [26, 27]. Therefore, it is critical for healthcare providers to ensure structured follow-up after hospital discharge to continue supporting parents during this important life stage [26].

This study seeks to determine how common postpartum depression is and explore the factors linked to it among women visiting public health facilities in Addis Ababa, Ethiopia. The results are expected to offer important insights that can enhance awareness, guide policymakers, and strengthen interventions aimed at supporting pregnant women at increased risk of developing PPD.

2. Methods and Materials

2.1. Study Area

This study was conducted in Addis Ababa, a rapidly urbanizing city with a population of 5,006,000 as of 2021. This capital city holds 527 square kilometers of area in Ethiopia. The population density is estimated to be near 5,165 individuals per square kilometer. At the time of the 2007 Census,

the regions and the city administrations were further subdivided into 73 zones; 731 Woredas; 10 Sub-cities in Addis Ababa; and 14,850 rural and 1,478 urban kebeles [28]. In Addis Ababa alone, there are 96 health centers, 13 public hospitals, 28 private hospitals, and 882 clinics [29]. Health centers in Addis Ababa operate 24/7, accommodating up to 10 beds, and with a multidisciplinary staffing that includes midwives, clinical nurses, health officers, and a doctor. Maternal services include routine prenatal and postnatal care, skilled birth assistance, essential newborn care, and emergency obstetric services [30].

2.2. Study Period

The study took place between February and August 2022.

2.3. Study Design

An analytical cross-sectional design was employed in this study.

2.4. Population

2.4.1. Source Population

The source population was postpartum mothers in Addis Ababa, Ethiopia who delivered within the last 4 weeks.

2.4.2. Study Population

The study population were mothers who came to the vaccination clinic which is given on the forty-fifth day after delivery.

2.5. Inclusion and Exclusion Criteria

2.5.1. Inclusion Criteria

All women attending postnatal care and vaccination services on the forty-fifth day after delivery at the selected health centers who provided consent were included in the study.

2.5.2. Exclusion Criteria

No exclusion criteria were applied in this study.

2.6. Sampling Procedure and Sample Size

2.6.1. Sampling Procedure

A multistage sampling technique was employed. First, three sub-cities (Lideta, Kirkos, Nifas Silk) were randomly selected from Addis Ababa's ten sub-cities. Next, seven health centers (3 from Nifas Silk, 2 each from Kirkos and Lideta) were chosen based on feasibility.

The sample size per health center was determined using probability proportional to size allocation. The first partici-

pant was selected via lottery method, followed by systematic sampling (every third woman).

2.6.2. Sample Size Determination

To estimate the sample size for the first objective of measuring the prevalence of postpartum depression, we applied the single population proportion formula:

$$n = \frac{Z_{\alpha/2}^2 p(1-p)}{d^2} \quad (1)$$

Where:

n is the required sample size,

$Z_{\alpha/2}$ is the confidence level at 95% (standard value of 1.96),

d is the margin of error (5%),

p is the estimated prevalence of postpartum depression (23.3%) from a previous study [14].

Substituting the values into the formula, we get:

$$n = \frac{(1.96)^2 \times 0.233 \times (1-0.233)}{(0.05)^2} \quad (2)$$

$$n = 274$$

Thus, the sample size for the first objective was 274.

To calculate the sample size for the second objective, which focused on identifying associated factors, we applied the double population proportion formula:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times (p_1(1-p_1) + p_2(1-p_2))}{(p_1 - p_2)^2} \quad (3)$$

Where:

$Z_{\alpha/2}$ is the critical value for 95% confidence level (1.96),

Z_{β} is the critical value for 80% study power (0.84),

p_1 and p_2 represent the expected sample proportions of the two groups.

The sample size was calculated using Epi-Info version 7.0 with the following assumptions:

Confidence Interval (CI) = 95%

Study Power = 80%

Ratio of cases to controls = 1:1

Key factors considered in the calculation were marital status, occupation, and history of substance use, based on a previous study [14]. Based on that study, for occupation, the prevalence of postpartum depression was 19.9% among employed mothers with an adjusted odds ratio (AOR) of 0.99 (0.58, 1.70) and 27.4% among unemployed mothers with an AOR of 1. For history of substance use, the prevalence was 34.1% among those with a history of substance use (AOR = 2.57 (1.38, 4.81) and 21.4% among those with no history of substance use (AOR = 1). A design effect of 2 and a 10% non-response rate were also incorporated. After considering all these factors, the final sample size was determined to be 530.

2.7. Study Variables

2.7.1. Dependent Variables

Postpartum depression.

2.7.2. Independent Variables

Sociodemographic data

1. Age
2. Educational level
3. Marital status
4. Employment Status
5. Monthly Income

Obstetric factors

1. Number of children
2. Eventful Pregnancy and Delivery
3. Planned vs Unplanned pregnancy
4. History of stillbirth or Abortion
5. Sex of the youngest child

Psychiatric and behavioral factors

1. History of previous psychiatric illness
2. History of Substance Use

Maternal social support factors

2.8. Operational Definitions

Postpartum Depression (PPD): A form of major depression that begins within four weeks after delivery, assessed using the Edinburgh Postnatal Depression Scale (EPDS). A score of 10 or higher on the EPDS was used to indicate possible depression.

Maternal Social Support: Assessment was carried out using the Maternity Social Support Scale (MSSS), originally developed by Webster et al. The scale consists of six items assessing family support, friendship network, spousal help, conflict with spouse, feeling controlled by spouse, and feeling unloved by spouse. Each item is rated on a five-point Likert scale, with a total possible score of 30. Scores of 18–30 indicate high social support, while scores below 18 indicate low social support. Cronbach's alpha coefficient (0.74) was used to evaluate the internal consistency of the scale [31].

Unplanned Pregnancy: A pregnancy that is either unwanted (occurring when no children or no more children were desired) or mistimed (occurring earlier than desired) [32].

2.9. Data Collection, Analysis & Quality Control

Data collection was conducted using a structured questionnaire administered by an interviewer. Initially prepared in English, the questionnaire was translated into the local language, Amharic, and then back-translated into English to ensure accuracy and consistency.

The data collection process was carried out by four professional nurses under the guidance of a trained supervisor, with oversight from the principal investigator. To ensure familiarity with the data collection tool and adherence to

study protocols, the principal investigator provided comprehensive training to the data collectors and the supervisor. The Edinburgh Postnatal Depression Scale (EPDS), a well-established tool for identifying symptoms of postnatal depression, was employed. This tool has been validated across diverse countries and settings, including both urban and rural areas in Ethiopia, demonstrating sensitivity and specificity of 78.9% and 75.3%, respectively [33–36]. To further enhance data quality, a pretest involving 5% of the total sample size was conducted. Feedback from the pretest informed necessary adjustments to the questionnaire, ensuring clarity, completeness, and appropriate length.

Data entry was performed using EpiData version 4 for initial checks, after which the data were transferred to SPSS version 21 for thorough cleaning and analysis. Descriptive statistics were further employed to determine proportions, means, and standard deviations.

For inferential analysis, univariate binary logistic regression was performed at a 5% significance level to identify potential independent variables. From the Significant variables in the univariate analysis, those having a p-value < 0.25 were included in the multivariable binary logistic regression model to assess associations with the dependent variable.

Multi-collinearity was assessed using the Variance Inflation Factor (VIF), applying a threshold of VIF > 5. The model's fit was evaluated using the Hosmer-Lemeshow goodness-of-fit test, with a p-value greater than 0.05 indicating an adequate fit. In the multivariable analysis, statistical significance was determined by Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) and p-values less than 0.05.

2.10. Ethical Consideration

Ethical approval for the study was granted by the Ethics Review Committee of the Department of Public Health at Gamby Medical and Business College and the Addis Ababa Health Bureau. Formal communication was made through letters issued by the Addis Ababa Public Health Research and Emergency Management Directorate to all selected hospitals. Data collection commenced only after obtaining permission from the respective health center administrations.

Prior to participation, written and signed consent was obtained from all participants. During the consent process, participants were thoroughly informed about the study's objectives, the reasons for their selection, their role in the research, and the measures taken to ensure confidentiality. Personal identifiers were omitted from the questionnaires, and all data were analyzed in aggregate to protect privacy. Additionally, participants were informed of their full right to decline to answer any questions.

3. Result

3.1. Socio-demographic Characteristics

A total of 540 questionnaires were distributed across seven health centers from selected sub-cities (three from Nifas Silk, two from Kirkos, and two from Lideta). Of these, 530 were properly completed and returned, yielding a response rate of 98.1%. The large proportion of the study participants, 257 (48.5%), were between the ages of 25–29, followed by 141 (26.6%) in the 19–24 age group.

Regarding marital status, most respondents were married, accounting for 517 (90.7%), followed by 8 (1.5%) who were divorced and 5 (0.9%) who were single. In terms of education level, 258 (48.7%) had attended primary education, while 133 (25.1%) had completed secondary education. Additionally, 171 (32.3%) were employed, whereas 359 (67.7%) were unemployed (Table 1).

Table 1. Shows the socio-demographic characteristics of participants.

Variables	Frequency	Percent (%)
Age		
19-24	117	21.1
25-29	257	48.5
≥30	156	29.4
Education		
No Formal education	73	13.8
Primary education	258	48.7
Secondary education	133	25.1
Higher education	66	12.5
Marital status		
Married	517	97.5
Divorced	8	1.5
Single	5	0.9
Employment status		
Employed	171	32.3
Unemployed	359	67.7
Monthly income (ETB)		
> 20000	56	10.6
10001-20000	96	18.1
6001-10000	256	48.3
2001-6000	122	23.0

3.2. Obstetric Characteristics

The majority, 504 (94.9%) have planned their pregnancy while 26 (4.9%) did not plan the pregnancy. 454 (85.7%) of the participants had uneventful pregnancy and delivery while 22 (4.1%) had previous history of still birth or abortion (Table 2).

Table 2. Showing the obstetric characteristics of participants.

Variables	Frequency	Percent (%)
Number of children		
1	231	43.6
2	202	38.1
3	71	13.4
4	26	4.9
Pregnancy Status		
Planned	26	4.9
Unplanned	504	94.9
Eventful pregnancy and delivery		
Yes	454	85.7
No	76	14.3
History of stillbirth or abortion		
Yes	508	95.8
No	22	4.1
Sex of the youngest child		
Female	270	50.9
Male	260	49.1

3.3. Psychiatric, Behavioral, and Social Support Factors

Table 3. Shows Psychiatric, behavioral, and social support factors.

Variables	Frequency	Percent (%)
History of substance abuse		
Yes	5	0.9
No	525	99.2
Previous psychiatric history		
Yes	32	6
No	498	94
Maternal support system		

Variables	Frequency	Percent (%)
Strong	517	97.5
Poor	13	2.5

Among the study participants, 118 (22.3%) are depressed based on the standard EPDS score, 32 (6%) of the study participants had previous history of psychiatric illness, tension, and anxiety being the most common. 5 (0.9%) had history of substance abuse before and during pregnancy, the substances mostly used were determined to be (areke, tela, beer, and wine). Based on the scale for maternal social support, 517 (97.5%) have strong social support, whereas 13 (2.5%) have poor social support (Table 3).

3.4. Outcome Variable

Among the study participants, 118 (22.3%) are depressed

based on the standard EPDS score (Figure 1). Out of 530 scores, 115 (21.7%) scored 0, 81 (15.3%) scored 1, the maximum score was 26, with a mean score of 5 (Table 4).

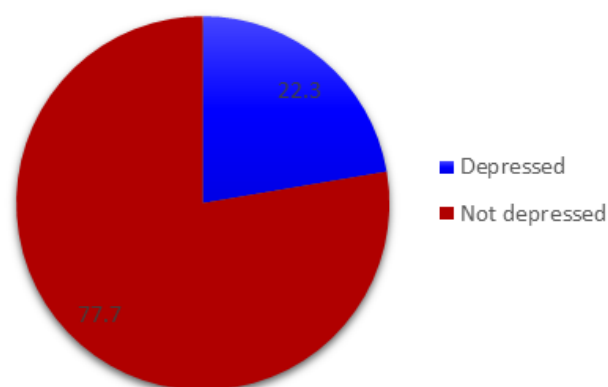


Figure 1. Showing the prevalence of postpartum depression based on the EPDS score of the study participant.

Table 4. Edinburgh Postnatal Depression Scale (EPDS) score of study participants.

EPDS Question	Score			
	0	1	2	3
1 I have been able to laugh and see the funny side of things	410 (77.2%)	47 (8.9%)	72 (13.6%)	1 (0.2%)
2 I have looked forward with enjoyment	407 (76.6%)	57 (10.7%)	66 (12.4%)	0
3 I have blamed myself unnecessarily when things went wrong	364 (68.5%)	50 (9.4%)	80 (15%)	36 (6.8%)
4 I have been anxious or worried for no good reason	363 (68.5%)	48 (9%)	81 (15.3%)	38 (7.2%)
5 I have felt scared or panicky for no very good reason	364 (68.5%)	50 (9.4%)	80 (15.1%)	36 (6.8%)
6 Things have been getting on top of me	250 (47.1%)	127 (23.9%)	99 (18.5%)	54 (10.2%)
7 I have been so unhappy that I have had difficulty sleeping	341 (64.2%)	45 (8.5%)	98 (18.5%)	46 (8.7%)
8 I have felt sad or miserable	526 (99.1%)	1 (0.2%)	3 (0.6%)	0
9 I have been so unhappy that I have been crying	198 (37.3%)	214 (40.3%)	81 (15.3%)	37 (7%)
10 The thought of harming myself has occurred to me	530 (100%)	0	0	0

3.5. Bivariable and Multivariable Logistic Regression Analysis for Postpartum Depression

To explore factors linked to Postpartum Depression, a univariate binary logistic regression model was utilized, with Postpartum Depression (dichotomous) serving as the dependent variable. Independent variables achieving a p-value of less than 0.25 in the univariate analysis were deemed sig-

nificant and included age, education, marital status, employment, monthly income, number of children, eventful delivery, history of stillbirth or abortion, planning of pregnancy, maternal support system, history of substance abuse, and previous psychiatric history.

At a 5% level of significance, the following variables were found to have a statistically significant association with postpartum depression: age, education, employment status, monthly income, and planned vs. unplanned pregnancy.

Accordingly, Postpartum mothers aged 19–24 years had 49%

lower odds of experiencing postpartum depression compared to those aged 30 years and older (AOR = 0.51, 95% CI: 0.004–0.73, $p < 0.05$).

Mothers without formal education had 10.65 times higher odds of experiencing postpartum depression compared to those with higher education (AOR = 10.65, 95% CI: 1.91–59.51, $p < 0.05$). Similarly, mothers who attended only secondary education were 1.12 times more likely to develop postpartum depression (AOR = 1.12, 95% CI: 0.020–2.76, $p < 0.05$).

Regarding employment status, unemployed postpartum mothers were 67.8% less likely to experience postpartum

depression compared to their employed counterparts (AOR = 0.322, 95% CI: 0.121–0.855, $p < 0.05$).

In terms of monthly income, postpartum mothers with an income of 2,001–6,000 ETB had a slightly higher chance (1.002 times) of developing postpartum depression compared to mothers earning a monthly income of >20,000 ETB (AOR = 1.002, 95% CI: 0.000–2.015, $p < 0.05$).

Postpartum depression was 1.61 times more common among mothers whose pregnancies were unplanned compared to those who reported their pregnancies as planned. (AOR = 9.96, 95% CI: 4.49–17.29, $p < 0.05$) (Table 5).

Table 5. Bivariable and multivariable Logistic Regression Analysis for postpartum depression prevalence and associated factors.

Variables	Categories	Postpartum Depression		COR (95% CI)	AOR (95% CI)	P-Value
		Yes	No			
Age	19-24	27	90	0.73 (0.147, 1.378)	0.51 (0.004, 0.73)	0.029
	25-29	63	194	0.66 (0.167, 1.422)	0.368 (0.025, 5.41)	0.466
	≥30	28	128	1	1	
Education	No Education	46	27	0.12 (0.82, 9.02)	0.655 (0.91, 9.51)	0.007
	Primary Education	54	204	0.76 (.648, 2.701)	1.145 (0.240, 5.461)	0.865
	Secondary Education	7	126	4.0 (0.102, 6.754)	1.123 (0.020, 2.76)	0.024
	Higher Education	11	55	1	1	
Employment	Employed	62	297	1	1	
	Unemployed	56	115	0.429 (.282,.653)	0.322 (0.121, 0.855)	0.023
Monthly income (ETB)	2001-6000	39	17	0.01 (0.001, 1.017)	1.002 (0.00, 2.015)	0.000
	10001-20000	56	40	0.021 (0.014, 0.487)	0.256 (0.076, 0.865)	0.280
	6001-10000	19	237	0.37 (0.002, 1.015)	1.002 (0.006, 1.008)	0.450
	>20000	4	118	1	1	0.000
Number of Children	1	34	197	1.41 (0.256, 2.053)	0.132 (0.012, 1.495)	0.102
	2	59	143	0.58 (0.624, 4.81)	1.328 (0.180, 9.786)	0.780
	3	20	51	0.61 (0.546, 4.97)	0.239 (0.027, 2.108)	0.197
	4	5	21	1	1	
Planned pregnancy	Yes	100	404	1	1	
	No	18	8	0.11 (0.04, 1.50)	1.61 (0.49, 7.29)	0.001
History of stillbirth/abortion	No	103	405	1	1	
	Yes	15	7	0.119 (0.047, 0.299)	0.192 (0.032, 1.149)	0.071
Maternal support	Weak	10	3	0.079 (0.021, 0.293)	0.075 (0.000, 14.727)	0.337
	Strong	108	409	1	1	
History of substance abuse	No	115	410	1	1	
	Yes	3	2	0.187 (0.031, 1.132)	9.167 (0.226, 71.56)	0.241

4. Discussion

Our reported PPD prevalence (22.3%) aligns with prior Ethiopian studies, specifically those conducted in Addis Ababa (23.3%) [14], Mizan Aman Town (22.4%) [13], and the Southern region of Ethiopia (22.89%) [12].

However, the prevalence in this study was lower compared to findings from Gondar Town (25%) [11], Southwest Ethiopia (33.82%) [12], and Northwest Ethiopia (23%) [15]. Studies conducted outside Ethiopia have reported higher prevalence rates, including Goa (24%) [37], Pakistan (28.8%) [38], and Uganda (43%) [7]. The differences in prevalence may be attributed to socio-cultural and economic variations, differences in sample sizes, record-keeping systems, and variations in the tools used to assess postpartum depression.

Conversely, the prevalence observed in this study was higher compared to studies conducted in Debre Birhan [39], Nekemte (20.9%) [40], and other international studies from China (13.5%), Japan (17%), India (23%), and New Dubai Hospital in Dubai (15.8%) [41]. The observed discrepancies may be due to differences in socio-cultural factors, sample size, sampling procedures, mental health awareness, and accessibility of maternal mental health services.

Several factors were found to be significantly associated with postpartum depression, including age, education, employment status, monthly income, and planned vs. unplanned pregnancy.

Postpartum mothers with an unplanned pregnancy were 1.61 times more likely to develop postpartum depression compared to those with planned pregnancies (AOR = 1.61, 95% CI: 4.49, 17.29). This finding is consistent with studies conducted in Southwest Ethiopia [12], Benchi Maji [13], Northwest Ethiopia [15], Nekemte [39], and a systematic review and meta-analysis conducted in Ethiopia in 2020 [38]. Unplanned pregnancies may arise due to contraceptive failure or lack of contraceptive use, resulting in inadequate preparation for pregnancy and childbirth, which may negatively impact the mental and emotional well-being of postpartum mothers. Additionally, stress associated with the transition into unplanned motherhood could contribute to postpartum depression, highlighting the importance of strengthening antenatal and postnatal counseling services to mitigate this risk.

Age was also found to be a significant factor in postpartum depression. Mothers aged 19–24 had a 49% lower likelihood of experiencing postpartum depression compared to those aged 30 and above (AOR = 0.51, 95% CI: 0.004–0.73). This finding is consistent with studies conducted in Gondar [11] and Southwest Ethiopia [12] but contradicts studies from Benchi Maji [13], South Africa [42], and Uganda [7]. Pregnancy at older maternal ages (≥ 35 years) is often classified as high risk, which could contribute to increased psychological distress and anxiety, particularly when combined with higher parity and greater caregiving responsibilities.

Employment status was another significant predictor of postpartum depression. Unemployed postpartum mothers

were 67.8% less likely to develop postpartum depression compared to employed postpartum mothers (AOR = 0.322, 95% CI: 0.121–0.855). This result aligns with findings from Gondar [11] and a pooled prevalence analysis of postpartum depression in Ethiopia [39]. A possible explanation is that housewives may experience less work-related stress and avoid the physical and psychological demands of employment, which may contribute to decreased likelihood of postpartum depression.

In terms of monthly income, postpartum mothers with an income of 2,001–6,000 ETB had a slightly higher chance (1.002 times) of developing postpartum depression compared to mothers earning a monthly income of >20,000 ETB (AOR = 1.002, 95% CI: 0.000–2.015, $p < 0.05$). This finding is similar to results from studies conducted in Addis Ababa (2016) [14] and the pooled prevalence study of postpartum depression in Ethiopia [39]. Financial constraints may increase stress related to providing for the child's needs, thereby increasing the risk of postpartum depression. Economic strain has been identified as a major psychosocial stressor during pregnancy and the postpartum period, further supporting the need for financial and psychological support interventions for low-income mothers.

5. Strengths and Limitations of the Study

5.1. Strengths

This study utilized a relatively large sample size, determined using the double population proportion formula, ensuring adequate statistical power. Additionally, the selection of study participants was conducted using proportion-to-size allocation and systematic random sampling, which helped minimize selection bias and enhance the representativeness of the findings.

5.2. Limitations

While this study provides important insights, we should acknowledge its limitations. Because we only collected data at one point in time, we can't say for certain whether the factors we identified actually cause postpartum depression or simply occur alongside it. We also recognize that relying mainly on questionnaire responses means we might have missed some objective depression indicators, such as physiological measures (e.g., hormone levels). Adding in-depth interviews could have helped us better understand the experiences of mothers and how to design more effective support programs.

6. Conclusion and Recommendation

This study revealed that postpartum depression is common

among postpartum mothers, with a prevalence of 22.3% in the selected public health centers. Factors such as age, education level, employment status, monthly income, and whether the pregnancy was planned or unplanned were significantly associated with postpartum depression.

To address this issue, healthcare institutions should prioritize delivering mental health assessments as a standard part of all postnatal check-ups, emphasizing early and routine screening for postpartum depression. Special attention should be given to high-risk groups, including employed mothers, those with unplanned pregnancies, low-income mothers, and older mothers. Healthcare providers should receive regular training on identifying and managing postpartum depression, as well as implementing early intervention strategies. Additionally, stronger follow-up systems, including community-based care, should be put in place to ensure mothers receive ongoing support even after leaving the hospital.

Abbreviations

PPD	Postpartum Depression
AOR	Adjusted Odds Ratio
CI	Confidence Interval
ETB	Ethiopian Birr
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICD	International Classification of Diseases
EPDS	Edinburgh Postnatal Depression Scale
MSSS	Maternity Social Support Scale
SPSS	Statistical Package for Social Sciences
VIF	Variance Inflation Factor

Acknowledgments

We would like to express our heartfelt gratitude to GAMBY Medical and Business College for providing the opportunity and guidance to conduct this research.

Author Contributions

Saron Negasi Gidey: Conceptualization, Methodology, Validation, Writing-original draft.

Fanuel Alemayehu Tefera: Conceptualization, Writing-review and editing, Project Administration.

Tsion Habtamu Ababiya: Validation, Formal Analysis, Investigation.

Fiyameta Abreham Fissehatsion: Software, Investigation, Supervision, Project Administration.

Bemnet Gossaye Teka: Writing-original draft, Software, Funding Acquisition.

Rediet Tekele Zergaw: Methodology, Data Curation, Supervision.

Eden Bekele Urgecha: Writing-Review and Editing, Resources, Data Curation, Visualization.

Yosef Alemayehu Habtegiorgis: Formal Analysis, Methodology, Funding Acquisition.

Zelalem Geletu Bate: Resources, Data Curation, Funding Acquisition.

Arsema Kinfemichael Seifu: Software, Visualization, Funding Acquisition.

Institutional Review Board Statement

Our research adhered to international ethical standards for human subject research according to the Declaration of Helsinki, with formal approval obtained through two oversight bodies: the Institutional Review Board at Gamby Medical and Business College (Protocol #GMBC/PH-2022) and the Addis Ababa Health Bureau's Research Ethics Council. Prior to implementation, all participating health centers received official authorization documents from the city's Public Health Research Directorate.

Funding

Entirely self-financed research. No external funding was used.

Data Availability Statement

Researchers interested in accessing our study data may request it directly from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Stewart, D. E., Vigod, S. N. Postpartum depression: Pathophysiology, treatment, and emerging therapeutics. *Annual Review of Medicine*. 2019, 70, 183–196.
<https://doi.org/10.1146/annurev-med-041217-011106>
- [2] American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington, DC: American Psychiatric Publishing; 2013, "Depressive Disorders" section (pp. 155–188), specific criteria on p. 186.
<https://www.psychiatry.org/psychiatrists/practice/dsm>
- [3] Janca, A., Hiller, W. ICD-10 checklists-a tool for clinicians' use of the ICD-10 classification of mental and behavioral disorders. *Comprehensive Psychiatry*. 1996, 37(3), 180–187.
[https://doi.org/10.1016/s0010440x\(96\)90034-6](https://doi.org/10.1016/s0010440x(96)90034-6)
- [4] World Health Organization. *The World Health Report 2001: Mental Health: New Understanding, New Hope*. Geneva: World Health Organization; 2001, pp. 23, 30.
https://iris.who.int/WHR_2001

- [5] World Health Organization (WHO). *Maternal mental health*. Available from https://www.who.int/mental_health/maternal-child/maternal_mental_health/en (accessed 13 November 2021)
- [6] Fisher, J., Cabral de Mello, M., Patel, V., Rahman, A., Tran, T., Holton, S., Holmes, W. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: A systematic review. *Bulletin of the World Health Organization*. 2012, 90(2), 139G–149G. <https://doi.org/10.2471/BLT.11.091850>
- [7] Kakyo, T. A., Muliira, J. K., Mbalinda, S. N., Kizza, I. B., Muliira, R. S. Factors associated with depressive symptoms among postpartum mothers in a rural district in Uganda. *Midwifery*. 2012, 28(3), 374–379. <https://doi.org/10.1016/j.midw.2011.05.001>
- [8] Khalifa, D. S., Glavin, K., Bjertness, E., Lien, L. Determinants of postnatal depression in Sudanese women at 3 months postpartum: A cross-sectional study. *BMJ Open*. 2016, 6(3), e009443. <https://doi.org/10.1136/bmjopen-2015-009443>
- [9] Ferrari, A. J., Charlson, F. J., Norman, R. E., Patten, S. B., Freedman, G., Murray, C. J., Vos, T., Whiteford, H. A. Burden of depressive disorders by country, sex, age, and year: Findings from the global burden of disease study 2010. *PLoS Medicine*. 2013, 10(11), e1001547. <https://doi.org/10.1371/journal.pmed.1001547>
- [10] Federal Democratic Republic of Ethiopia Ministry of Health (FDRE MoH). *Ethiopian National Mental Health Strategy: 2012/13–2015/16*. Addis Ababa: FDRE MoH; 2012, pp. 9, 42. <http://repository.iphce.org/handle/123456789/264>
- [11] Ayele, T. A., Azale, T., Alemu, K., Abdissa, Z., Mulat, H., Fekadu, A. Prevalence and associated factors of antenatal depression among women attending antenatal care service at Gondar University Hospital, Northwest Ethiopia. *PLoS ONE*. 2016, 11(5), e0155125. <https://doi.org/10.1371/journal.pone.0155125>
- [12] Kerie, S., Menberu, M., Niguse, W. Prevalence and associated factors of postpartum depression in Southwest, Ethiopia, 2017: A cross-sectional study. *BMC Research Notes*. 2018, 11(1), 623. <https://doi.org/10.1186/s13104-018-3730-x>
- [13] Toru, T., Chemir, F., Anand, S. Magnitude of postpartum depression and associated factors among women in Mizan Aman town, Bench Maji zone, Southwest Ethiopia. *BMC Pregnancy and Childbirth*. 2018, 18, 442. <https://doi.org/10.1186/s12884-018-2072-y>
- [14] Fantahun, A., Cherie, A., Deribe, L. Prevalence and factors associated with postpartum depression among mothers attending public health centers of Addis Ababa, Ethiopia, 2016. *Clinical Practice and Epidemiology in Mental Health*. 2018, 14, 196–206. <https://doi.org/10.2174/1745017901814010196>
- [15] Asaye, M. M., Muche, H. A., Zelalem, E. D. Prevalence and predictors of postpartum depression: Northwest Ethiopia. *Psychiatry Journal*. 2020, 9565678. <https://doi.org/10.1155/2020/9565678>
- [16] Sawyer, A., Ayers, S., Smith, H. Pre- and postnatal psychological wellbeing in Africa: A systematic review. *Journal of Affective Disorders*. 2010, 123(1–3), 17–29. <https://doi.org/10.1016/j.jad.2009.06.027>
- [17] Misri, S., Reebye, P., Kendrick, K., Carter, D., Ryan, D., Grunau, R. E., Oberlander, T. F. Internalizing behaviors in 4-year-old children exposed in utero to psychotropic medications. *American Journal of Psychiatry*. 2006, 163(6), 1026–1032. <https://doi.org/10.1176/ajp.2006.163.6.1026>
- [18] Carter, A. S., Garrity-Rokous, F. E., Chazan-Cohen, R., Little, C., Briggs-Gowan, M. J. Maternal depression and comorbidity: Predicting early parenting, attachment security, and toddler social-emotional problems and competencies. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2001, 40(1), 18–26. <https://doi.org/10.1097/00004583-200101000-00012>
- [19] Sohr-Preston, S. L., Scaramella, L. V. Implications of timing of maternal depressive symptoms for early cognitive and language development. *Clinical Child and Family Psychology Review*. 2006, 9(1), 65–83. <https://doi.org/10.1007/s10567-006-0004-2>
- [20] Oberlander, T. F., Reebye, P., Misri, S., Papsdorf, M., Kim, J., Grunau, R. E. Externalizing and attentional behaviors in children of depressed mothers treated with a selective serotonin reuptake inhibitor antidepressant during pregnancy. *Archives of Pediatrics & Adolescent Medicine*. 2007, 161(1), 22–29. <https://doi.org/10.1001/archpedi.161.1.22>
- [21] Xiao, R. S., Kroll-Desrosiers, A. R., Goldberg, R. J., Pagoto, S. L., Person, S. D., Waring, M. E. The impact of sleep, stress, and depression on postpartum weight retention: A systematic review. *Journal of Psychosomatic Research*. 2014, 77(5), 351–358. <https://doi.org/10.1016/j.jpsychores.2014.09.016>
- [22] Milgrom, J., Skouteris, H., Worotniuk, T., Henwood, A., Bruce, L. The association between ante- and postnatal depressive symptoms and obesity in both mother and child: A systematic review of the literature. *Women's Health Issues*. 2012, 22(3), e319–e328. <https://doi.org/10.1016/j.whi.2011.12.001>
- [23] Chapman, S. L., Wu, L. T. Postpartum substance use and depressive symptoms: A review. *Women & Health*. 2013, 53(5), 479–503. <https://doi.org/10.1080/03630242.2013.804025>
- [24] Dias, C. C., Figueiredo, B. Breastfeeding and depression: A systematic review of the literature. *Journal of Affective Disorders*. 2015, 171, 142–154. <https://doi.org/10.1016/j.jad.2014.09.022>
- [25] Benahmed, N., Devos, C., San Miguel, L., et al. Caring for Mothers and Newborns After Uncomplicated Delivery: Towards Integrated Postnatal Care (Health Technology Assessment [HTA], KCE Reports 232). Brussels: Belgian Health Care Knowledge Centre (KCE); 2014, p. 25. https://kce.fgov.be/Postnatal_care_Synthesis
- [26] Nilsson, I., Danbjørg, D. B., Aagaard, H., Strandberg-Larsen, K., Clemensen, J., Kronborg, H. Parental experiences of early postnatal discharge: A meta-synthesis. *Midwifery*. 2015, 31(10), 926–934. <https://doi.org/10.1016/j.midw.2015.07.004>

- [27] Yahya, N. F. S., Teng, N. I. M. F., Shafiee, N., Juliana, N. Association between breastfeeding attitudes and postpartum depression among mothers with premature infants during COVID-19 pandemic. *International Journal of Environmental Research and Public Health*. 2021, 18(20), 10915. <https://doi.org/10.3390/ijerph182010915>
- [28] Central Statistical Authority (CSA) Ethiopia. *2007 Population and Housing Census of Ethiopia*. Central Statistical Authority: Addis Ababa, Ethiopia; 2007.
- [29] Addis Ababa City Administration Health Bureau. *Addis Ababa Health Bureau Demography, 2021 Annual Report*. Addis Ababa City Administration Health Bureau: Addis Ababa, Ethiopia; 2021.
- [30] Institute of Ethiopian Standards (IES), Ministry of Health-Ethiopia. *Ethiopian Standards for Health Centers*. Addis Ababa, Ethiopia: Ethiopian Standards Agency (ESA); 2012, pp. 8, 28, 52, 57. <http://repository.iphce.org/Ethiopian> health center standards.
- [31] Webster, J., Linnane, J. W., Dibley, L. M., Hinson, J. K., Starrenburg, S. E., Roberts, J. A. Measuring social support in pregnancy: Can it be simple and meaningful? *Birth*. 2000, 27(2), 97–101. <https://doi.org/10.1046/j.1523-536x.2000.00097.x>
- [32] Centers for Disease Control and Prevention (CDC). Unintended Pregnancy: Division of Reproductive Health at a Glance. National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP). Available from: <https://www.cdc.gov/reproductive-health/hcp/unintended-pregnancy/index.html> (accessed March 2022).
- [33] Tesfaye, M., Hanlon, C., Wondimagegn, D., Alem, A. Detecting postnatal common mental disorders in Addis Ababa, Ethiopia: Validation of the Edinburgh Postnatal Depression Scale and Kessler Scales. *Journal of Affective Disorders*. 2010, 122(1–2), 102–108. <https://doi.org/10.1016/j.jad.2009.06.020>
- [34] Bergink, V., Kooistra, L., Lambregtse-van den Berg, M. P., Wijnen, H., Bunevicius, R., van Baar, A., Pop, V. Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research*. 2011, 70(4), 385–389. <https://doi.org/10.1016/j.jpsychores.2010.07.008>
- [35] Adewuya, A. O., Ola, B. A., Dada, A. O., Fasoto, O. O. Validation of the Edinburgh Postnatal Depression Scale as a screening tool for depression in late pregnancy among Nigerian women. *Journal of Psychosomatic Obstetrics & Gynecology*. 2006, 27(4), 267–272. <https://doi.org/10.1080/01674820600915478>
- [36] Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Hughes, M., Tesfaye, M., Wondimagegn, D., Patel, V., Prince, M. Detecting perinatal common mental disorders in Ethiopia: Validation of the self-reporting questionnaire and Edinburgh Postnatal Depression Scale. *Journal of Affective Disorders*. 2008, 108(3), 251–262. <https://doi.org/10.1016/j.jad.2007.10.023>
- [37] Patel, V., Rodrigues, M., DeSouza, N. Gender, poverty, and postnatal depression: A study of mothers in Goa, India. *American Journal of Psychiatry*. 2002, 159(1), 43–47. <https://doi.org/10.1176/appi.ajp.159.1.43>
- [38] Ali, N. S., Ali, B. S., Azam, I. S. Postpartum anxiety and depression in peri-urban communities of Karachi, Pakistan: A quasi-experimental study. *BMC Public Health*. 2009, 9, 384. <https://doi.org/10.1186/1471-2458-9-384>
- [39] Tolossa, T., Fetensa, G., Yilma, M. T., et al. Postpartum depression and associated factors among postpartum women in Ethiopia: A systematic review and meta-analysis. *Public Health Reviews*. 2020, 41, 21. <https://doi.org/10.1186/s40985-020-00136-3>
- [40] Abadiga, M. Magnitude and associated factors of postpartum depression among women in Nekemte town, East Wollega zone, West Ethiopia, 2019: A community-based study. *PLoS ONE*. 2019, 14(11), e 0224792. <https://doi.org/10.1371/journal.pone.0224792>
- [41] Halbreich, U., Karkun, S. Cross-cultural and social diversity of prevalence of postpartum depression and depressive symptoms. *Journal of Affective Disorders*. 2006, 91(2–3), 97–111. <https://doi.org/10.1016/j.jad.2005.12.051>
- [42] Phukuta, N. S. J., Omole, O. B. Prevalence and risk factors associated with postnatal depression in a South African primary care facility. *African Journal of Primary Health Care & Family Medicine*. 2020, 12(1), e 1–e 6. <https://doi.org/10.4102/phcfm.v12i1.2538>