Research article

Effect of antenatal depression on the initiation of breastfeeding in South Gondar zone, Northwest Ethiopia: A population-based prospective cohort study

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ABSTRACT

Background: Delayed initiation of breastfeeding has been found to increase early neonatal morbidity, mortality, and impaired mother-infant bonding. However, there is no study that revealed the effect of antenatal depression on breastfeeding initiation in Ethiopia. This study aimed to see the effect of antenatal depression on the practice of initiation of breastfeeding among women in urban Ethiopia.
Methods: The Edinburgh Postnatal Depression Scale (EPDS) was administered to 970 women in the second and third trimesters of pregnancy to screen for antenatal depression. Information was collected on initiation of breastfeeding of newborns and mother's socio-demographic, obstetric, clinical, psychosocial, and behavioral factors. A logistic regression model was used to adjust for the confounders and determine association between antenatal depression and initiation of breastfeeding.
Results: The cumulative incidence of late initiation of breastfeeding (LIBF) was found to be 166 (18.34%). The cumulative incidence of LIBF in those born from depressed pregnant women was 37% as compared to 8.4% in nondepressed. Antenatal depression at the second and third trimester of pregnancy remained a potential predictor of late initiation of breastfeeding after adjusting for potential confounders (AOR = 6.42: (95% CI 3.72, 11.05)). A significant association was also seen between infants who were born by cesarean section, a complication of current pregnancy, inadequate ANC follow-up, lack of advice about the importance of early initiation of breastfeeding (EIBF), home delivery, and low quartile of wealth index and late initiation of breastfeeding.
Conclusions: These findings suggest that screening for antenatal depression can help to identify women at risk for late initiation of breastfeeding. Health care providers shall have to give emphasis on the treatment of antenatal depression to benefit both the mother and the physical health, growth, and development of the fetus.

1. Introduction

World Health Organization (WHO) defines early initiation of breast-feeding (EIBF), is the initiation of breast milk feeding within 1 h of birth [1]. Globally there were 140 million live births in 2015; only less than half of all newborns started breastfeeding within an hour of birth [2].

Despite the WHO's recommendation that every newborn should feed breast milk within 1 h of birth, the rate of early initiation of breastfeeding improvement has been slow over the past 15 years, with global rates increasing only by 14 percent [2]. The trend is similar in Ethiopia; a recent Demographic Health Survey (DHS) report shows that only 52% in 2011 and 74.3% in 2016 of newborn infants were breastfed within the

first hour of birth [3, 4]. Despite the existence of slow improvements in the prevalence of EIBF from 52% in 2011 to 74.3% in 2016, still, the percentage of EIBF is below the target (90%) set by the Ethiopian Health Sector Transformation Plan (HSTP) [5].

Early initiation of breastfeeding practices has short and long-term benefits for both children and mothers. For children, it increases the ability to defend against infections, increases child survival, reduces the risk of diarrhea, pneumonia, and other childhood illnesses [6, 7], and in the long run, it reduces the incidence of overweight, obesity, and diabetes later in life [8]. Maternal health benefits have also received considerable attention, including lower risk of developing breast and ovarian cancers, reduces postpartum hemorrhage, lowers the risk of

obesity, delay ovulation; as a result, helping women to improve birth spacing [8, 9, 10, 11]. In spite of the benefits, initiation of breastfeeding within the first hour is often delayed by feeding newborns anything other than breast milk [12]. Research in Ethiopia has indicated that 27% of infants are given prelacteal feeds prior to breastfeeding [4, 13, 14]. One study in Ethiopia revealed that mothers who give birth at home were more likely to give prelacteal feeding as compared to mothers who deliver in health institutions [15]. Delayed initiation of breastfeeding has been associated with increased early neonatal mortality [16, 17], diarrheal episodes [18], and impaired mother-infant bonding [19].

Evidence indicates that globally, approximately three million neonates die every year in their first month of life [16]. The risk of dying for neonates who didn't feed breast milk within the first hour is increased threefold when compared to neonates who feed breast milk within 1 h after birth [20, 21].

In Ethiopia, neonatal morbidity and mortality is a public health problem [22], specifically true in the Amhara region ranging from 18.6 to 48.3 per 1000 live births in Gojam and Gondar, respectively [23, 24]. Different studies indicated that up to 22%–33% of neonatal morbidity and mortality could be prevented by promoting the early initiation of breastfeeding [12, 20, 21, 25, 26, 27].

To realize the benefit of EIBF, Ethiopia implemented different breastfeeding programs in addition to the Primary Health Care program, such as the Baby-friendly Hospital Initiative (BFHI) and community integrated management of childhood illnesses (IMCI) program [28, 29]. Despite these activities, EIBF is still below the target (92%) set by the Ethiopian Ministry of Health Sector Development Program Four HSDP-IV [30]. This indicates the presence of new barriers that require further investigation. Common mental disorders during pregnancy (depression, anxiety, and somatic symptom disorders)appeared to be possible significant contributors to delayed initiation of breastfeeding [31]. Additionally, antenatal depression affects not only breastfeeding practice but also it makes the women experience social dysfunction, more emotionally withdrawn [32], develop diabetes [33], preeclampsia [34], prolonged pregnancy [35] as well as it affects infant's birth weight [36, 37] and development [38].

The relationship between antenatal depression and early cessation of breastfeeding has been explored [39, 40]. However, we are unaware of published studies addressing the association between antenatal depression and late initiation of breastfeeding. The study aimed to assess the effect of antenatal depression on the initiation of breastfeeding.

2. Methods

2.1. Study design and settings

A community-based prospective cohort study was conducted at Debre Tabor and Woreta towns, which are situated in the South Gondar zone from June 2019 to March 2020 in the Northwest, Ethiopia.

According to the South Gondar zonal catchment profile, the total population of Debre Tabor town has an estimated population of 84,382, of which 40753 are females. About 2844 and 1404 women were estimated to be pregnant per year at Debre Tabor and Woreta towns, respectively [41]. In these towns, there were one government-operated referral hospital, five health centers, and ten private health institutions providing health services during the data collection period. Health extension workers (HEWs) are responsible for performing prevention and promotion activities, identifying pregnant mothers, and updating maternal records in each Kebele. The magnitude of antenatal care services at Debre Tabor and Woreta towns was estimated to be 75% and 64%, respectively [41].

2.2. Sample size

The sample size was estimated using the double population formula, with the exposed and non-exposed ratio of 1:2 (exposed are those who are depressed and non-exposed are those who are not depressed). A 95% level of confidence, 80% power and 10% non-response rate were considered.

2.3. Cohort recruitment and eligibility

This is the part of the previously published a community based prospective cohort study [42]. We recruited all pregnant women who consented and who were living in Debre Tabor and Woreta towns at least for the preceding six months, who were in their second and third trimesters of pregnancy, and who were without any cognitive or hearing impairment during the study period into the cohort. Health Extension Workers (HEWs) identify all pregnant women in their respective kebeles and register them based on the criteria mentioned above.

The data collectors (HEWs) conducted an interview through the home-to-home visits to identify pregnant women who were willing to participate in this study and declared untraceable after three recruiting visits had been unsuccessful.

All pregnant women who were aware of their pregnancy and fulfilled the criteria from June 2019 to October 2019 were included in the study. A total of 970 eligible women were identified and prospectively followed up until March 2020. Potentially newborn is eligible if they were breastfed (Figure 1).

970 women eligible to the study (recruited and assessed for depressive symptoms at their second and third trimesters of pregnancy).

2.4. Data quality management

Twenty experienced data collectors and two supervisors participated in the data collection process after two days of training. All the data collectors were recruited from each Kebele. The data collectors were nurses some with diploma and others with a bachelor degree. The supervisors had MSc educational level. The training was aimed to help trainees understand the contents of the questionnaire, objectives, and ethical issues relevant to the study. The ongoing quality of the data was closely monitored by supervisors and first authors of the study through weekly meetings and regular telephone calls.

2.5. Measurement

2.5.1. Primary exposure

Antenatal depression was the main exposure for the present study, which was assessed using the Edinburgh Postnatal Depression Scale
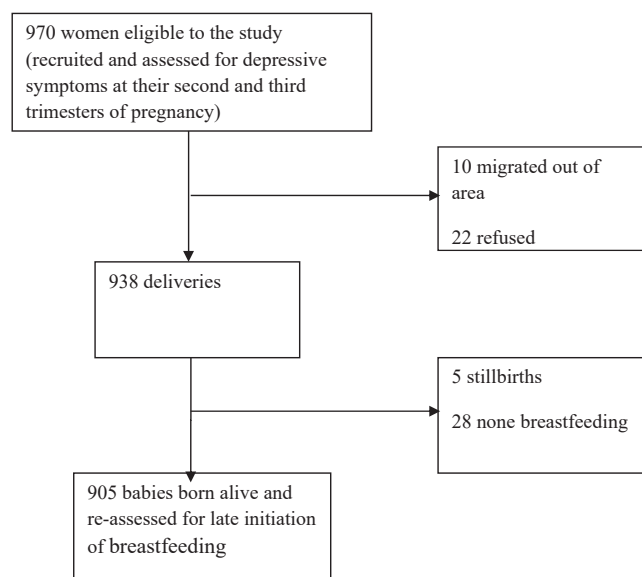

Figure 1. Flow chart of recruited pregnant women and outcome of initiation of breastfeeding.

(EPDS), which was validated in Ethiopia among postnatal women and had 78.9% sensitivity and 75.3% specificity [43]. The EPDS includes ten items with a Likert scale of responses scored from 0-3 to a maximum score of 30, which was then coded as Yes [1] if there is depression (score ≥12) and No (0) if otherwise (<12 scores) to indicate scores that are likely to suggest depressive disorder.

The EPDS is a preferable scale to other depression scales to screen depression during pregnancy because it removes the physical symptoms of depression associated with pregnancy [44]. In these kebeles, women who reported suicidal ideation were referred to the psychiatric clinics for formal assessment of depression and appropriate management.

2.5.2. Outcome variables

The primary outcome variable was the late initiation of breastfeeding. Initiation of breastfeeding was categorized as a binary variable, as early initiation of breastfeeding if a woman breastfed her newborn within 1 h of birth and late initiation of breastfeeding if a woman breastfed her newborn after 1 h of birth. Health extension workers (HEWs) working in each Kebele asked the participants about whether they breastfed their baby or not and if yes, when they initiated.

2.5.3. Potential confounding variables

Most common maternal and child variables were used in the analyses to control for potential confounding effects. These variables are chronic medical condition, complications of current pregnancy, threatening life events, social support, intimate partner violence, alcohol use, Gender of the infants, term of the infant, being twins, parity, gravidity, mid upper arm circumference (MUAC), socio-demographic and economic variables were assessed.

The history of physician-diagnosed chronic medical conditions, such as cardiac disease, diabetes, etc., was taken for each woman and recorded as ("yes/no"). Preterm was defined as a baby born alive before 37 weeks of pregnancy (yes/no). History of current pregnancy complications: anemia, hypertension, and APH were counted for each woman and recorded as "yes/no".

The Oslo Social Support Scale (OSSS-3) was used to measure maternal social support during pregnancy. The level of social support is classified as "poor support" 3–8, "moderate support" 9–11, and "strong support," 12–14 scores. The OSSS-3 has good convergent and predictive validity [45].

Experiences of stressful life events during the six months before assessment were assessed using the List of Threatening Experiences (LTE). The scale contains twelve items and includes questions of death, illness, conflicts, and loss of property. The presence of one or more stressful life events in the last six months was considered [46]. Both the Oslo Social Support Scale (OSSS-3) and the list of threatening experiences (LTE-12) have been used in a population-level study in Ethiopia [47]. The presence of intimate Partner Violence (IPV) during pregnancy was assessed by using three questions on emotional IPV, physical IPV, and sexual IPV. The presence of IPV was ascertained by the presence of at least one type of IPV [48].

The Fast Alcohol Screening Test (FAST) was used to assess alcohol use. The score ranges from 0 to 16, the presence of hazardous or harmful drinking was indicated by a score of three or more.

The potential biases in this study were the previous history of depression and current depression status, which were measured using EPDS and semi-structured questionnaire based on self-report, which may lead to a recall and/or measurement bias that may underestimate or overestimate the association between antenatal depressive symptoms and late initiation of breastfeeding, but this was minimized by telling the participants to provide truthful responses, and the information would be kept confidential and used for the study purpose alone and by preparing a case vignette.

2.6. Data analysis

We used Stata software (version 14) for data analysis. We calculated descriptive statistics and correlation of all the quantitative study variables. Percentage values, with their corresponding 95% confidence intervals (CIs), were used to summarize categorical variables. The odds ratio was used to measure the effect of antenatal depression on birth weight. Univariate logistic regression analyses were carried out for each risk factor to identify possible predictors associated with LBW (<2500 g). Variables significant at $p < 0.2$ in the bivariable analysis were included in multiple logistic models for controlling the simultaneous confounding effects of possible predictors. The significance of a variable was declared at a P-value of <0.05. The total number of loss to follow up was 32 (3.2%). Thus, complete case analysis was used as it was suggested that less than 5% lost to follow up was with little concern [49, 50].

3. Results

A total of 970 pregnant women were enrolled in the study. Thirty-two (3.3%) women were excluded from the study because they refused to participate (n = 22) and moving away from the area (n = 10). Another 33 women were excluded from the analysis because they were not breast-feeding (n = 28) and had stillbirth (n = 5). Finally, 905 participants were included in the analysis, with a response rate of 93.3%.

3.1. Socio-demographic characteristics of the study participants

The majority of the women 390 (43.1%) were 25–29 years of age, 284 (31.4%) had completed diploma and above, 466 (51.5%) more than half of the participants were housewives, 831 (91.8%) were married, and 814 (89.9%) reported having enough money for food (Table 1).

3.2. Clinical and obstetric variables of the study participants

With regard to clinical and obstetric factors, 104 (12.5%) of women reported a history of current pregnancy complications. More than three-fourth of the participants had two or more ANC follow up. One-fourth of women reported a history of depressive symptoms prior to pregnancy. Of the participants, only 710 (78.5%) received advice on the early initiation of breastfeeding by skilled health professionals (Table 2). A Hosmer-Lemeshow test indicated that the model fit the data well (p = 0.90).

3.3. Psychosocial and behavioral characteristics of the study participants

Of the 905 included in this analysis, almost half 470 (51.9%) of the women reported intimate-partner violence and 555 (61.3%) not experienced life treating events (Table 3).

3.4. The magnitude of late initiation of breastfeeding

Of the 905 mother-infant pairs, 166 (18.3%) did not initiate breast-feeding within 1 h of delivery, with the mean initiation of breastfeeding (55.7 ± 59 SD minutes). The women who were excluded did not differ significantly from participating women in terms of age, level of education, and economic status. The overall timely initiation of breastfeeding was 739 (81.7%) within 1 h of birth, followed by after one to 4 h 148 (16.3%), and after 4 h was18 (2.00%) (Figure 2).

3.5. Risk factors for late initiation of breastfeeding within 1 h

Before adjusting for confounders, regression analysis showed a significant positive association between late initiation of breastfeeding and antenatal depressive symptoms. Wealth index, unplanned pregnancy, a complication of current pregnancy, inadequate ANC follow up, life-threatening events, social support, intimate partner violence, preterm, lack of advice about the importance of EIBF, mode of delivery, and place of delivery were also significantly associated with late initiation of breastfeeding (Table 4).

During bivariate analysis, mothers who had antenatal depression were 6.34 (COR = 6.34 (95 CI: 4.38, 9.17)) times more likely to have late

Table 1. Frequency distribution of Socio-demographic factors among pregnant women at Debre Tabor and Woreta towns, Northwest Ethiopia, 2020.

Characteristics	Frequency (n = 905)	(%)
Age group		
≤19	33	3.7
20–24	229	25.3
25–29	390	43.1
30–34	175	19.3
>35	78	8.6
Religion		
Orthodox	839	92.7
Muslim	55	6.1
Protestant	11	1.2
Ethnicity		
Amhara	893	98.7
Tigre	12	1.3
Marital status		
Single	45	5.0
Married	831	91.8
Widowed	13	1.4
Divorced	16	1.8
Education		
Unable to read and write	112	12.4
Able to read and write	22	2.4
Primary	247	27.3
High school	240	26.5
Diploma and above	284	31.4
Occupation		
Housewife	466	51.5
Employee	232	25.6
Merchant	140	15.5
Student	21	2.3
Daily laborer	46	5.1
Lack of food or Hunger		
Yes	72	8.0
No	833	92.0
Debit		
Yes	91	10.1
No	814	89.9
Wealth Index		
Low	302	33.4
Middle	303	33.5
High	300	33.1

Table 2. Frequency distribution of obstetric and clinical factors among pregnant women at Debre Tabor and Woreta towns, Northwest Ethiopia, 2020.

Characteristics	Frequency (n = 905)	(%)
Depression		
Yes	314	34.7
No	591	65.3
Unplanned pregnancy		
Yes	341	37.7
No	564	62.3
Trimesters		
Second trimester	522	57.7
Third trimester	383	42.3
Number of live children(510)		
One	241	47.3
Two-four	255	50.0
Five and above	14	2.7
History of current pregnancy complication		
Yes	104	11.5
No	801	88.5
Type of current pregnancy complication (n = 104)		
Anemia	33	31.7
APH	21	20.2
Edema	20	19.2
Hypertension	13	12.5
UTI	17	16.4
History of abortion(n = 540)		
Yes	86	15.9
No	454	84.1
Modes of previous abortion (n = 86)		
Spontaneous	78	90.7
Induced	8	9.3
Gravidity		
One	365	40.3
Two-four	478	52.8
Five and above	62	6.9
Antenatal service		
Yes	827	91.4
No	78	8.6
Number of Antenatal services		
One	265	32.1
Two	253	30.6
Three	193	23.3
Four and above	116	14.0
Previous history of depression		
Yes	242	26.7
No	663	73.3
Family history of depression		
Yes	122	13.5
No	783	86.5
Parity(527)		
One	241	45.7
Two-four	270	51.3
Five and above	16	3.0
History of stillbirth(n = 540)		
Yes	33	6.1
No	507	93.9
Fear of pregnancy complication		
Yes	469	51.8
No	436	48.2
Chronic illness		
Yes	64	7.1

initiation of breastfeeding as compared to those who had no antenatal depression. Also, after adjusting for confounders, the results of multivariable logistic regression showed that experiencing antenatal depression was significantly associated with late initiation of breastfeeding (OR = 6.42; 95% CI 3.67, 11.25). Pregnant women in low quartile of wealth index (OR = 2.14; 95% CI 1.25, 3.66), Complication of current pregnancy (OR = 2.15; 95% CI 1.12, 4.10), inadequate ANC follow up (OR = 1.67; 95% CI 1.04, 2.70), lack of advice about importance of early initiation of breastfeeding (EIBF) (OR = 3.50; 95% CI 2.19, 5.59), home delivery (OR = 3.00; 95% CI 1.49, 5.99), and infants who were born by caesarean section (OR = 6.42; 95% CI 3.72, 11.05) were more likely to have late initiation of breastfeeding within 1 h delivery (Table 4).

4. Discussion

Trends in early initiation of breastfeeding in Ethiopia increased from 52% in 2011 to 75% in 2016. This study revealed that timely initiation of

Table 2 (continued)

Characteristics	Frequency (n = 905)	(%)
No	841	92.9
Types of chronic illness(64)		
Anemia	12	18.7
CHF	19	29.7
Hypertension	21	32.8
UTI	12	18.8
MUAC		
≤21	760	84.0
>21	145	16.0
Gender of the infant		
Male	472	52.2
Female	433	47.8
Twins		
Yes	6	0.7
No	899	99.3
Preterm		
Yes	816	90.2
No	89	9.8
Advice on early initiation of breastfeeding		
Yes	710	78.5
No	195	21.5
Mode of delivery		
Vaginal	791	87.4
Caesarean	114	12.6
Place of delivery		
Institutional	92.49	92.5
Home	7.51	7.5

Table 3. Frequency distribution of psychosocial and behavioral factors among pregnant women at Debre Tabor and Woreta towns, Northwest Ethiopia, 2020.

Characteristics	Frequency (n = 905)	(%)
Life treating events		
Yes	350	38.7
No	555	61.3
Social support		
Poor	401	44.3
Moderate	309	34.1
Strong	195	21.6
Intimate partner violence(IVP)		
Yes	470	51.9
No	435	48.1
Alcohol use		
Yes	198	21.9
No	707	78.1

Figure 2. Time to initiate first breastfed.

antenatal depression on the late initiation of breastfeeding among women in the urban area of Ethiopia.

Mothers who had antenatal depression were 6.34 (COR = 6.34 (95 CI: 4.38, 9.17)) times more likely to have late initiation of breastfeeding in bivariate analysis. Antenatal depression (AOR = 6.42: (95% CI 3.72, 11.05)) remains significantly associated with late initiation of breastfeeding after adjusted for complication of current pregnancy, mode of delivery, place of delivery, unplanned pregnancy, inadequate ANC follow up, life-threatening events, social support, intimate partner violence, preterm, lack of advice about time initiation of early breastfeeding, and wealth index.

Our finding of an independent and prospective association between antenatal depression and late initiation of breastfeeding is consistent with findings from another study in Ethiopia among pregnant women with common mental disorders [31]. However it is in contrast to research findings in Chicago [39, 54]. The main reasons for the delay in breastfeeding were lack of early skin to skin contact between baby and mother [55]. This is more pronounced in women with antenatal depressive symptoms (such as loss of interest and fatigue) that disturb normal mother-infant bonding [56, 57], which in turn leads to delayedinitiation of breastfeeding. Besides this, women who are affected by antenatal depression might lack the resources to initiate breastfeeding. The reason for inconsistency might be study settings (rural and facility based), socioeconomic difference, health litracy and access to information. Although the WHO recommended for cesarean section rate not to exceed 15%, the cesarean section rate in Ethiopia has reach up to 21.4% [58]. Scientific evidence reported that Caesarean delivery was an important determinant of delayed initiation of breastfeeding. In this study, women delivered by Caesarean were more than six times more likely to have delayed initiation of breastfeeding as compared to women delivered spontaneously. This association is consistent with a recent systematic review [59] as well as other studies [60, 61, 62]. The delay could be attributed to the very nature of cesarean delivery (pain and discomfort); postoperative care given to women interrupt the contact between the mother and her newborn in the postpartum period [63, 64, 65]. There is a rapid rise in the rate of cesarean sections in Ethiopia, the most effective strategy to reduce delayed intiation of breastfeeding would be to avoid unnecessary caesarean sections.

Complication during pregnancy potentially affects breastfeeding practices of the women. In our study, complications during pregnancy were significantly associated with delayed initiation of breastfeeding. This result accords with the finding of the WHO Global Survey [66]. Current pregnancy complications may cause maternal morbidities during delivery and the early postpartum period that need urgent interventions for mothers or neonates, which interrupt mother-baby interaction.

Different research findings revealed that delivering at home was associated with delayed initiating breastfeeding. The number of home deliveries in our study was low; however, delayed initiation of breastfeeding was more likely to occur in women who delivered at home. Mothers who delivered at home were more likely to delay initiating

breastfeeding was 82%, which means that delayed initiation of breastfeeding accounted for only 18%. The overall trends of delayed initiation of breastfeeding reflect the impact of the national infant and young child feeding strategy to reduce delayed initiation of breastfeeding implemented in Ethiopia [51].

According to our study incidence of delayed initiation of breastfeeding was 18%, which is lower than the estimated national average reported by the Ethiopian demographic and health survey 2016 (26%) [52]. Even if the figure has reduced, it is above the target (8%) set by the Ethiopian Health Sector Development Program Four HSDP-IV [53].

The result of our study indicates that women reporting antenatal depressive symptoms were more likely to have delayed initiation of breastfeeding as compared to those without antenatal depressive symptoms. This is the first study that specifically addressed the effect of
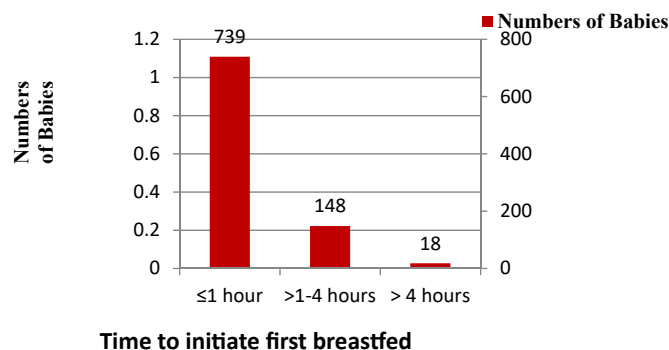
Table 4. Bivariate and multivariable analysis for factors associated with late initiation of breastfeeding among babies born alive at Debre Tabor and Woreta towns, Northwest Ethiopia, 2020.

Characteristics	Late initiation of breastfeeding		COR at 95%CI	AOR at 95%C
	Yes	No		
Depression				
Yes	116	198	6.34 [4.38, 9.17] **	6.42 [3.67, 11.25] **
No	50	541	1	1
Occupation				
Housewife	92	374	1	1
Employee	45	187	0.98[0.66, 1.45]	1.12[0.67, 1.87]
Merchant	16	124	0.52[0.29, 0.92] *	0.70[0.35, 1.40]
Student	5	16	1.27[0.45, 3.55]	1.55[0.44, 5.42]
Daily laborer	8	38	0.86[0.38, 1.89]	1.33[0.56, 3.48]
Wealth index				
Low	69	233	1.72[1.13, 2.61] *	2.14[1.25, 3.66] *
Middle	53	250	1.23[0.79, 1.90]	1.51[0.87,2.63]
High	44	256	1	1
Unplanned pregnancy				
Yes	77	264	1.56[1.10, 2.18] *	1.52[0.97, 2.36]
No	89	475	1	1
A complication of current pregnancy				
Yes	32	72	2.21[1.40, 3.49] *	2.15[1.12, 4.10] *
No	134	667	1	1
Inadequate ANC follow up				
Yes	108	383	1.97[1.34, 2.90] *	1.67[1.04, 2.70] *
No	42	294	1	1
Life-threatening events				
Yes	94	256	2.46[1.74, 3.46] **	0.92[0.52, 1.60]
No	72	483	1	1
Social support				
Poor	90	311	1.88[1.17, 3.02] *	0.82[0.42, 1.58]
Moderate	50	259	1.25[0.75, 2.09]	1.42[0.73, 2.74]
Strong	26	169	1	1
Intimate partner violence (IPV)				
Yes	62	373	1.71[1.21, 2.41] *	0.85[0.52, 1.40]
No	104	366	1	1
Preterm				
Yes	29	60	2.40[1.48, 3.87] **	1.18[0.58, 2.38]
No	137	679	1	1
Lack of EIBF advice				
Yes	78	117	4.71[3.27, 6.77] **	3.50[2.19, 5.59] **
No	88	622	1	1
Mode of delivery				
Vaginal	109	682	1	1
Caesarean	57	57	6.26[4.11, 9.51] **	6.42[3.72, 11.05] **
Place of delivery				
Institutional	136	701	1	1
Home	30	38	4.07[2.44, 6.79] **	3.00[1.49, 5.99] *

NB: CI = Confidence Interval; **OR** = Odds Ratio; **COR** = Crude Odds Ratio; **AOR** = Adjusted Odds Ratio; ** (P < 0.001); *(P < 0.005); Hosmer-lemeshow: (p = 0.90).

breastfeeding compared to mothers who delivered at health facilities. The result is similar to those reported by others [67, 68, 69]. The likely reasons for the delay in initiation of breastfeeding could be that many of the home deliveries were assisted by traditional birth attendants and family members who have inadequate knowledge about the correct time of initiation of breastfeeding [70, 71].

Besides this, women who gave birth at home have negative cultural beliefs about the colostrum, that the initial milk is dirty and hence

harmful to the neonate, so they were had to wait for the milk to clear before they initiate breastfeeding and hence the delayed initiation of breastfeeding [72, 73].

Health services utilization by pregnant women has a great role in the improvement of optimal breastfeeding practices. This study suggests that women who had less than four ANC follow up were almost two times more likely to had delayed initiation of breastfeeding. This is similar to the finding in Bangladesh [74]. In addition to inadequate ANC follow up, women who lack advice about early initiation of breastfeeding at ANC follow up was almost two times more likely to have delayed initiation of breastfeeding as compared to women who received advice about early initiation of breastfeeding. This finding is similar to the finding of a systematic review [59] and a study done in Congo [75]. This reemphasizes that women who were had inadequate ANC follow up and who did not receive advice about early initiation of breastfeeding may lack counseling and support given by health professionals on the correct time and importance of early initiation of breastfeeding.

We also observed a positive association between household wealth index and late initiation of breastfeeding. In this study, women from the poorest households had significantly higher odds of late initiation of breastfeeding compared to mothers from wealthier households. This finding is similar to finding from Bangladesh [74], Nigeria [9], and another study in Ethiopia [52]. This is possible as a result of the positive effect of wealthier household index on mothers' health care utilization, which in turn leads to receiving counseling about the early initiation of breastfeeding and women were from the lowest wealth quintile may not have access to mass media, which promotes the importance of early initiation of breastfeeding. However, our finding contradicts a study done in Nepal, which indicates that the household wealth index was not associated with the initiation of breastfeeding [68]. The possible explanation might be less access and availability of health resources.

4.1. Limitation

It is important to interpret the result of this study in the presence of some limitations. This study did not address the effects of antenatal depression on women's breastfeeding behaviors. Further research is needed to determine if depressive symptoms during pregnancy might affect women's breastfeeding decisions and late initiation of breastfeeding more in depth beyond 1 h after birth. In addition, we didn't address the reason why women did not breastfeed the newborn, such as physical breastfeeding challenges and infant health status, which may underestimate or overestimate the association between antenatal depressive symptoms and late initiation of breastfeeding. Despite these limitations, the study has strengths, including the selection of women was from a population-based sample with minimal loss-to follow-up, large sample size, therefore, likely to be representative of the odds ratio and factors that predict late initiation of breastfeeding within the region. Besides these, we use EPDS to screen pregnant women for depression. This study may have implications for policymakers, health administrators, and health care professionals. This study confirmed that antenatal depression has an adverse effect on the initiation of breastfeeding among urban areas of Ethiopia. Efforts to reduce the effect of antenatal depression such as routine screening of all pregnant women for depressive symptoms and to treat them at the primary health care level by integrating the service is crucial, since screening is an effective approach for reducing morbidity in depressed people [76], and prevent the adverse effects of depression on the initiation of breastfeeding. The association between antenatal depression and late initiation of breastfeeding could help to promote women's mental health in the health care services.

5. Conclusion

This population-based follow-up study found an independent association between antenatal depression in the second and third trimester of pregnancy and late initiation of breastfeeding in a sample of Ethiopian

urban settings. Therefore antenatal depression has serious breastfeeding consequences, early identification of depressive symptoms using the EPDS, and treatment of antenatal depression could benefit not only maternal mental health but also the physical health, growth, and development of the fetus. The effect of antenatal depression on late initiation of breastfeeding should be discussed during ANC counseling in pregnant women.

6. Ethics approval and consent to participate

This study was approved by the University of Gondar Ethical Review Board and the Regional research office. Permission to conduct the study was received from Debre Tabor and Woreta towns' health department and administration office. Written informed consent and assent was obtained from each participant. Those women who were expressing suicidal ideation were referred to the psychiatric clinician for formal assessment of depression and appropriate management. The decision to refer was made by the project co-coordinator (GM) based on a review of all women who were expressing suicidal ideation.

7. Consent for publication

Not applicable.

Declarations

Author contribution statement

Getnet Mihretie Beyene, Telake Azale, Kassahun Alemu Gelaye and Tadesse Awoke Ayele: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

This work was supported by the University of Gondar.

Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

Acknowledgements

References

[1] Organization WH, Early Initiation of Breastfeeding to Promote Exclusive Breastfeeding, WHO. e-Library of Evidence for Nutrition Actions (eLENA), 2019.
[2] Unicef, From the First Hour of Life: Making the Case for Improved Infant and Young Child Feeding Everywhere, UNICEF, New York, 2016.
[3] Ethiopia CSAo, ICF, 2016 Ethiopia Demographic and Health Survey Key Findings, Central Statistical Agency and ICF International Addis Ababa and Rockville, MD, 2017.
[4] C.S. Authority, I. Macro, Ethiopia Demographic and Health Survey, Preliminary Report, Central Statistical Agency/ORC Macro Addis Ababa and Calverton, Md, USA, 2011.
[5] Health EFMo, Health Sector Transformation Plan (2015/16–2019/20), 2015.
[6] L. Oot, A. Sommerfelt, K. Sethuraman, J. Ross, Estimating the Effect of Suboptimal Breastfeeding Practices on Child Mortality: a Model in Profiles for Country-Level Advocacy, FHI, Washington, DC, 2015, p. 360.
[7] M.A. Quigley, Y.J. Kelly, A. Sacker, Breastfeeding and hospitalization for diarrheal and respiratory infection in the United Kingdom Millennium Cohort Study, Pediatrics 119 (4) (2007) e837–e842.
[8] C.G. Victora, R. Bahl, A.J. Barros, G.V. França, S. Horton, J. Krasevec, et al., Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect, Lancet 387 (10017) (2016) 475–490.
[9] A.S. Berde, S.S. Yalcin, Determinants of early initiation of breastfeeding in Nigeria: a population-based study using the 2013 demograhic and health survey data, BMC Pregnancy Childbirth 16 (1) (2016) 32.
[10] N.-N. Luan, Q.-J. Wu, T.-T. Gong, E. Vogtmann, Y.-L. Wang, B. Lin, Breastfeeding and ovarian cancer risk: a meta-analysis of epidemiologic studies, Am. J. Clin. Nutr. 98 (4) (2013) 1020–1031.
[11] R. Chowdhury, B. Sinha, M.J. Sankar, S. Taneja, N. Bhandari, N. Rollins, et al., Breastfeeding and maternal health outcomes: a systematic review and meta-analysis, Acta Paediatr. 104 (2015) 96–113.
[12] N.S. Group, Timing of initiation, patterns of breastfeeding, and infant survival: prospective analysis of pooled data from three randomised trials, Lancet Glob. Health 4 (4) (2016) e266–e275.
[13] T. Belachew, Human Nutrition for Health Science Students Jimma, 2003, 2003.
[14] F. MoH, National Strategy for Child Survival in Ethiopia, Addis Ababa, Ethiopia, 2005.
[15] M. Legesse, M. Demena, F. Mesfin, D. Haile, Prelacteal feeding practices and associated factors among mothers of children aged less than 24 months in Raya Kobo district, North Eastern Ethiopia: a cross-sectional study, Int. Breastfeed. J. 9 (1) (2014) 189.
[16] K.M. Edmond, C. Zandoh, M.A. Quigley, S. Amenga-Etego, S. Owusu-Agyei, B.R. Kirkwood, Delayed breastfeeding initiation increases risk of neonatal mortality, Pediatrics 117 (3) (2006) e380–e386.
[17] L.C. Mullany, J. Katz, Y.M. Li, S.K. Khatry, S.C. LeClerq, G.L. Darmstadt, et al., Breast-feeding patterns, time to initiation, and mortality risk among newborns in southern Nepal, J. Nutr. 138 (3) (2008) 599–603.
[18] J. Clemens, R.A. Elyazeed, M. Rao, M. MEngg, S. Savarino, B.Z. Morsy, et al., Early initiation of breastfeeding and the risk of infant diarrhea in rural Egypt, Pediatrics 104 (1) (1999) e3–e.
[19] W.H. Organization, Evidence for the Ten Steps to Successful Breastfeeding, World Health Organization, 1998.
[20] S. Berkat, R. Sutan, The effect of early initiation of breastfeeding on neonatal mortality among low birth weight in Aceh Province, Indonesia: an unmatched case control study, Adv. Epidemiol. 2014 (2014).
[21] D. Phukan, M. Ranjan, L. Dwivedi, Impact of timing of breastfeeding initiation on neonatal mortality in India, Int. Breastfeed. J. 13 (1) (2018) 27.
[22] Y. Mekonnen, B. Tensou, D.S. Telake, T. Degefie, A. Bekele, Neonatal mortality in Ethiopia: trends and determinants, BMC Publ. Health 13 (1) (2013) 483.
[23] R. Yirgu, M. Molla, L. Sibley, Determinants of neonatal mortality in rural Northern Ethiopia: a population based nested case control study, PLoS One 12 (4) (2017), e0172875.
[24] B. Kebede, A. Gebeyehu, H.R. Sharma, S. Yifru, Prevalence and associated factors of neonatal mortality in North Gondar zone, Northwest Ethiopia, Ethiop. J. Health Dev. 26 (2) (2012) 66–71.
[25] G. Mugadza, M. Zvinavashe, F.Z. Gumbo, B.S. Pedersen, Early breastfeeding initiation and incidence of neonatal sepsis in Chipinge District Zimbabwe, Int. J. Contemp. Pediatr. 5 (1) (2018) 1.
[26] E.R. Smith, L. Hurt, R. Chowdhury, B. Sinha, W. Fawzi, K.M. Edmond, et al., Delayed breastfeeding initiation and infant survival: a systematic review and meta-analysis, PLoS One 12 (7) (2017), e0180722.
[27] Organization WH, Early Initiation of Breastfeeding: the Key to Survival and beyond. Breastfeeding Is Today the Single Most Effective Preventive Intervention for Improving the Survival and Health of Children WHO Secretariat, 2010.
[28] N.P. Miller, A. Amouzou, M. Tafesse, E. Hazel, H. Legesse, T. Degefie, et al., Integrated community case management of childhood illness in Ethiopia: implementation strength and quality of care, Am. J. Trop. Med. Hyg. 91 (2) (2014) 424–434.
[29] M.H. Labbok, Global baby-friendly hospital initiative monitoring data: update and discussion, Breastfeed. Med. 7 (4) (2012) 210–222.
[30] Health Mo, Health Sector Development Program IV 2010/11–2014/15, 2010.
[31] C. Hanlon, G. Medhin, A. Alem, F. Tesfaye, Z. Lakew, B. Worku, et al., Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: the P-MaMiE population-based cohort study, Trop. Med. Int. Health 14 (2) (2009) 156–166.
[32] J.S. Norbeck, V.P. Tilden, Life stress, social support, and emotional disequilibrium in complications of pregnancy: a prospective, multivariate study, J. Health Soc. Behav. (1983) 30–46.
[33] A. Spirito, L. Ruggiero, D. Coustan, S. McGarvey, A. Bond, Mood state of women with diabetes during pregnancy, J. Reprod. Infant Psychol. 10 (1) (1992) 29–38.
[34] C. Qiu, S.E. Sanchez, N. Lam, P. Garcia, M.A. Williams, Associations of depression and depressive symptoms with preeclampsia: results from a Peruvian case-control study, BMC Wom. Health 7 (1) (2007) 15.
[35] Y. Qiao, J. Wang, J. Li, J. Wang, Effects of depressive and anxiety symptoms during pregnancy on pregnant, obstetric and neonatal outcomes: a follow-up study, J. Obstet. Gynaecol. 32 (3) (2012) 237–240.
[36] J. Eastwood, F.A. Ogbo, A. Hendry, J. Noble, A. Page, E.Y.R. Group, The impact of antenatal depression on perinatal outcomes in Australian women, PLoS One 12 (1) (2017), e0169907.

[37] S. Räisänen, S.M. Lehto, H.S. Nielsen, M. Gissler, M.R. Kramer, S. Heinonen, Risk factors for and perinatal outcomes of major depression during pregnancy: a population-based analysis during 2002–2010 in Finland, BMJ Open 4 (11) (2014).

[38] B. Figueiredo, A. Pacheco, R. Costa, A. Conde, C. Teixeira, Mother's anxiety and depression during the third pregnancy trimester and neonate's mother versus stranger's face/voice visual preference, Early Hum. Dev. 86 (8) (2010) 479–485.

[39] E.L. Stark, J. Shim, C.M. Ross, E.S. Miller, The association between positive antenatal depression screening and breastfeeding initiation and continuation, Am. J. Perinatol. (2019).

[40] B. Figueiredo, C. Canario, T. Field, Breastfeeding is negatively affected by prenatal depression and reduces postpartum depression, Psychol. Med. 44 (5) (2014) 927–936.

[41] DDHO, Debetabor District Health Office Annual Report on Maternal and Child Health Service Performance, 2018.

[42] G.M. Beyene, T. Azale, K.A. Gelaye, T.A. Ayele, The effect of antenatal depression on birth weight among newborns in South Gondar zone, Northwest Ethiopia: a population-based prospective cohort study, Arch. Publ. Health 79 (1) (2021) 1–12.

[43] M. Tesfaye, C. Hanlon, D. Wondimagegn, A. Alem, Detecting postnatal common mental disorders in Addis Ababa, Ethiopia: validation of the Edinburgh postnatal depression scale and Kessler scales, J. Affect. Disord. 122 (1-2) (2010) 102–108.

[44] J.L. Cox, J.M. Holden, R. Sagovsky, Detection of postnatal depression: development of the 10-item Edinburgh postnatal depression scale, Br. J. Psychiatr. 150 (6) (1987) 782–786.

[45] H. Boen, O.S. Dalgard, E. Bjertness, The importance of social support in the a ssociations between psychological distress and somatic health problems and socio-economic factors among older adults living at home: a crosssectional study, BMC Geriatr. 12 (2012).

[46] T.S. Brugha, D. Cragg, The list of threatening experiences: the reliability and validity of a brief life events questionnaire, Acta Psychiatr. Scand. 82 (1) (1990) 77–81.

[47] A. Fekadu, G. Medhin, M. Selamu, M. Hailemariam, A. Alem, Populationlevel mentaldistress inruralEthiopia, BMC Psychiatr. 14 (2014) 194.

[48] V. Rasch, T.N. Van, H.T.T. Nguyen, R. Manongi, D. Mushi, D.W. Meyrowitsch, et al., Intimate partner violence (IPV): the validity of an IPV screening instrument utilized among pregnant women in Tanzania and Vietnam, PLoS One 13 (2) (2018), e0190856.

[49] M.S. Fewtrell, K. Kennedy, A. Singhal, R.M. Martin, A. Ness, M. Hadders-Algra, et al., How much loss to follow-up is acceptable in long-term randomised trials and prospective studies? Arch. Dis. Child. 93 (6) (2008) 458–461.

[50] V. K, M. M, P. C, Loss to follow-up in cohort studies: how much is too much? Eur. J. Epidemiol. 19 (8) (2004) 751–760.

[51] Health EFMo, National Strategy for Infant and Young Child Feeding, 2004.

[52] J.R. John, S.K. Mistry, G. Kebede, N. Manohar, A. Arora, Determinants of early initiation of breastfeeding in Ethiopia: a population-based study using the 2016 demographic and health survey data, BMC Pregnancy Childbirth 19 (1) (2019) 69.

[53] Ethiopian Ministry of Health, Health Sector Development Program Four (HSDP-IV), 2010. http://tucghe.org/HSDP/IV.pdf. (Accessed 16 June 2018).

[54] B. Weobong, A.H. ten Asbroek, S. Soremekun, A.A. Manu, S. Owusu-Agyei, M. Prince, et al., Association of antenatal depression with adverse consequences for the mother and newborn in rural Ghana: findings from the DON population-based cohort study, PLoS One 9 (12) (2014), e116333.

[55] S. Bollipo, D. Pagali, H.B. Korrapolu, M.A. Rahman, The first golden hour of breastfeeding: where do we stand? Int. J. Contemp. Pediatr. 6 (1) (2019) 27.

[56] L. Murray, P.J. Cooper, Postpartum depression and child development, Psychol. Med. 27 (2) (1997) 253–260.

[57] EBdS. Cruz, G.L. Simões, A. Faisal-Cury, Rastreamento da depressão pós-parto em mulheres atendidas pelo Programa de Saúde da Família, Rev. Bras. Ginecol. Obstet. 27 (4) (2005) 181–188.

[58] E. Yisma, L.G. Smithers, J.W. Lynch, B.W. Mol, Cesarean section in Ethiopia: prevalence and sociodemographic characteristics, J. Matern. Fetal Neonatal Med. 32 (7) (2019) 1130–1135.

[59] T.M.B. Esteves, R.P. Daumas, MICd Oliveira, CAdFd Andrade, I.C. Leite, Factors associated to breastfeeding in the first hour of life: systematic review, Rev. Saude Publica 48 (2014) 697–708.

[60] H.J. Rowe-Murray, J.R. Fisher, Baby friendly hospital practices: cesarean section is a persistent barrier to early initiation of breastfeeding, Birth 29 (2) (2002) 124–131.

[61] J.B. Tongun, M.B. Sebit, D. Mukunya, G. Ndeezi, V. Nankabirwa, T. Tylleskar, et al., Factors associated with delayed initiation of breastfeeding: a cross-sectional study in South Sudan, Int. Breastfeed. J. 13 (1) (2018) 28.

[62] D. Mukunya, J.K. Tumwine, V. Nankabirwa, G. Ndeezi, I. Odongo, J. Tumuhamye, et al., Factors associated with delayed initiation of breastfeeding: a survey in northern Uganda, Glob. Health Action 10 (1) (2017) 1410975.

[63] A. Patel, A. Banerjee, A. Kaletwad, Factors associated with prelacteal feeding and timely initiation of breastfeeding in hospital-delivered infants in India, J. Hum. Lactation 29 (4) (2013) 572–578.

[64] M.K. Matthews, The relationship between maternal labour analgesia and delay in the initiation of breastfeeding in healthy neonates in the early neonatal period, Midwifery 5 (1) (1989) 3–10.

[65] R. Kalisa, O. Malande, J. Nankunda, J.K. Tumwine, Magnitude and factors associated with delayed initiation of breastfeeding among mothers who deliver in Mulago hospital, Uganda, Afr. Health Sci. 15 (4) (2015) 1130–1135.

[66] K. Takahashi, T. Ganchimeg, E. Ota, J.P. Vogel, J.P. Souza, M. Laopaiboon, et al., Prevalence of early initiation of breastfeeding and determinants of delayed initiation of breastfeeding: secondary analysis of the WHO Global Survey, Sci. Rep. 7 (2017) 44868.

[67] U. Senarath, I. Siriwardena, S.S. Godakandage, H. Jayawickrama, D.N. Fernando, M.J. Dibley, Determinants of breastfeeding practices: an analysis of the Sri Lanka demographic and health survey 2006–2007, Matern. Child Nutr. 8 (3) (2012) 315–329.

[68] M. Adhikari, V. Khanal, R. Karkee, T. Gavidia, Factors associated with early initiation of breastfeeding among Nepalese mothers: further analysis of Nepal Demographic and Health Survey, 2011, Int. Breastfeed. J. 9 (1) (2014) 21.

[69] A. Tariku, G.A. Biks, M.M. Wassie, A.G. Worku, M.K. Yenit, Only half of the mothers practiced early initiation of breastfeeding in Northwest Ethiopia, 2015, BMC Res. Notes 10 (1) (2017) 501.

[70] T. Setegn, M. Gerbaba, T. Belachew, Determinants of timely initiation of breastfeeding among mothers in Goba Woreda, South East Ethiopia: a cross sectional study, BMC Publ. Health 11 (1) (2011) 217.

[71] T.A. Ogunlesi, Maternal socio-demographic factors influencing the initiation and exclusivity of breastfeeding in a Nigerian semi-urban setting, Matern. Child Health J. 14 (3) (2010) 459–465.

[72] G. Gunnlaugsson, M.C.D. Silva, L. Smedman, Determinants of delayed initiation of breastfeeding: a community and hospital study from Guinea-Bissau, Int. J. Epidemiol. 21 (5) (1992) 935–940.

[73] T.W. Hailemariam, E. Adeba, A. Sufa, Predictors of early breastfeeding initiation among mothers of children under 24 months of age in rural part of West Ethiopia, BMC Publ. Health 15 (1) (2015) 1076.

[74] S. Mihrshahi, I. Kabir, S.K. Roy, K.E. Agho, U. Senarath, M.J. Dibley, et al., Determinants of infant and young child feeding practices in Bangladesh: secondary data analysis of Demographic and Health Survey 2004, Food Nutr. Bull. 31 (2) (2010) 295–313.

[75] R.M. Kambale, J.B. Buliga, N.F. Isia, A.N. Muhimuzi, O. Battisti, B.M. Mungo, Delayed initiation of breastfeeding in Bukavu, south Kivu, eastern Democratic Republic of the Congo: a cross-sectional study, Int. Breastfeed. J. 13 (1) (2018) 6.

[76] N. Calonge, D.B. Petitti, T.G. DeWitt, A.J. Dietrich, L. Gordis, K.D. Gregory, et al., Screening for depression in adults: US preventive services task force recommendation statement, Ann. Intern. Med. 151 (11) (2009) 784–792.