

# Depression Among HIV-Positive Pregnant Women at Northwest Amhara Referral Hospitals During COVID-19 Pandemic

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**Background:** Depression is the most common mental health disorder among HIV-positive pregnant mothers, which increases mortality, poor quality of life; it also increases the burden of disease. Depression hurts birth outcomes and maternal health.

**Objective:** To assess depression and its associated factors among HIV-positive pregnant women attending antenatal care at Northwest Amhara referral hospitals, 2021.

**Methods:** An institution-based cross-sectional study was conducted among 291 HIV-positive pregnant mothers from March 15, 2021 to April 30, 2021 at Northwest Amhara referral hospitals. Census was applied to reach the study participants. An interviewer-administered questionnaire was used for data collection. A binary logistic regression was conducted to see the relationship between dependent variables and independent. Those variables having a p-value of  $\leq 0.05$  were found to be statistically associated with the response.

**Results:** Depression among HIV-positive pregnant women was found to be 28.7% [95% CI (24.8–33.40)] with a response rate of 96.04. Age  $\geq 30$  years [AOR = 1.32, 95% CI (1.24–3.35)], urban residency [AOR = 1.76, 95% CI (1.57–4.61)], having first pregnancy  $< 18$  years [AOR = 3.82, 95% CI (1.54–17.34)], known HIV serostatus during pregnancy [AOR = 1.29, 95% CI (1.08–2.47)], and COVID-19-related knowledge [AOR = 0.32, 95% CI (0.12–1.12)] were significantly associated with depression.

**Conclusions and Recommendations:** Nearly one-third of the pregnant women attending antenatal care were depressed. The age of the mother, residence, known HIV serostatus during pregnancy, age in the first pregnancy, and COVID-19-related knowledge were significantly associated with depression, and strengthening the existing care provided was the recalled interventions to combat antenatal depression during the COVID-19 pandemic.

**Keywords:** COVID-19, depression, prevalence, HIV positive mothers, pregnancy, referral hospitals, Ethiopia

## Background

Depression is a sign and symptom complex experienced during the pregnancy period.<sup>1</sup> The sudden occurrence of the COVID-19 pandemic with the surge in the number of infected cases and death has caused a serious and critical impact on public health including mental illnesses such as depression, sleep disturbance and other psychological disorders among the general public.<sup>2,3</sup> The coronavirus disease 2019 (COVID-19) has resulted in unpredictable effects and is prone to people with severe depression.<sup>4</sup> The World Health Organization reported that around 28% of the global burden of disease neuropsychiatric disorders occurred, of which one-third

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are due to depression.<sup>5</sup> Evidence has shown that 15–23% of the pregnant women were prone to depression<sup>6,7</sup> in comparison with 3–5% depression symptoms in the total population.<sup>8</sup> The prevalence of depression in developing countries is ranged from 10% to 25%.<sup>9</sup> Depressed individuals are prone at least as heavily disabled as individuals with the woman and her family.<sup>10</sup>

The COVID-19 pandemic has increased the level of depression because of the uncontrolled worry about their health for the safety of the fetus and the use of vaccines or medications for treatment and prophylaxis purposes.<sup>11</sup> It also increases the level of depression as a result of the effect of lockdown measures.<sup>12</sup> The development of the unborn baby depends on the psychological health status of women during the time of pregnancy.<sup>13</sup> Untreated depression can increase the risk of miscarriage, preterm labour, low Apgar score at birth, and low birth weight.<sup>14</sup> It also induces mental and behavioural difficulties due to changes in brain function.<sup>15</sup>

During the era of COVID-19, depression in pregnant women was associated with age, marital status, occupation, education, parity, history of abortion, awareness of COVID-19, history of mental illness, and duration of pregnancy.<sup>16</sup> Evidence also showed that factors like previous birth outcome, number of gravidities, number of parties, and history of pregnancy complications were found to be significant predictors of depression among HIV-positive women.<sup>17–20</sup>

In the context of the COVID-19 pandemic, maternal distress can be aggravated by worries and fears regarding the risk of infection and hospitalization due to COVID-19, especially as perinatal morbidity and mortality associated with COVID-19 of positive pregnant women have been described. Several patient groups including HIV-positive pregnant women were found to be more vulnerable to COVID-19 infection. COVID-19 was speculated to be poisoning a high risk to pregnant women due to superimposed immune system during pregnancy.<sup>21,22</sup> Pregnant women can be challenged significantly due to the recommended restriction of social distancing, isolation, difficulty to get regular antenatal care visits, and fear to handle the baby.<sup>3</sup> Identifying factors associated with increasing the burden of depression or protection from mental distress is vital to guide the development of effective prevention and intervention strategies.<sup>23</sup> This study was new for the study area, and little is known at large in Ethiopia. Therefore, this study aimed to assess depression and its associated factors among HIV-positive pregnant women who had

visited the three referral hospitals in northwest Amhara regional state, Ethiopia.

## Method

### Study Design

A multicenter institutional-based cross-sectional study was conducted.

### Study Area and Period

This study was done in three Northwest referral hospitals (Gondar, Bahir Dar, and Debre Markos) found in the Amhara Regional State of Ethiopia. These hospitals are owned by the government and they serve above 19 million populations in the catchment area (Data from city woreda administration bureaus). The study was conducted from March 15, 2021 to April 30, 2021.

### Source Population

All HIV-positive pregnant women who had visited the three referral hospitals were considered the source population.

### Study Population

All HIV-positive pregnant women who had visited during data collection at the three referral hospitals were considered as the study population.

### Inclusion and Exclusion Criteria

All randomly selected HIV-positive pregnant women to visit at three referral hospitals were found during the data collection time. HIV-positive pregnant mothers who were unable to communicate and seriously ill were excluded from the study.

### Sample Size Determination and Procedures

The sample size of this study was calculated by using the single population proportion formula  $n = (Z_{\frac{\alpha}{2}})^2 * p(1 - p) / (d)^2$ . In the formula “n” denotes sample size, “ $\frac{\alpha}{2}$ ” is the reliability coefficient of standard error at the 5% level of significance with  $z = 1.96$ , “p” is the proportion and “d” is the level of standard error. Taking into account the following assumptions; p-value of 50% (0.5), since there is no previous study, with a 95% confidence interval (=0.05), 5% margin of error, and 10% to none response rate the final sample size was estimated as 423. However, in these hospitals,

there were a total of 303 HIV-positive pregnant mothers who had ANC follow-up during the data collection period. Therefore, we took all to participate in the study since it was less than the calculated sample 423. Therefore, a census was applied to reach the study participants. A structured questionnaire was used to conduct a face-to-face interview among participants attending ANC visits at selected referral hospitals in Northwest Amhara referral hospitals.

## Operational Definition of Variables

**Depression:** The total score of >10 points on the PHQ-9 scale was categorized to have a depressive symptom.<sup>24</sup>

**COVID-19-related knowledge:** The participants who scored the mean above the mean ( $\geq 12.25$ ) had good knowledge, whereas participants who scored less than the mean ( $< 12.25$ ) had poor knowledge.<sup>25</sup>

## Data Collection Tools and Procedures

A structured interviewer-administered questionnaire was adapted from different kinds of literature.<sup>16,26,27</sup> The questionnaire includes socio-demographic data, obstetric-related information, and HIV and psychosocial support-related information, and COVID-19-related knowledge questions. The COVID-19-related knowledge was assessed 16 questions with answer “Yes” (1 point) and “No” (0 points) options. The total knowledge score ranged from 0 to 16. The participants who scored the mean and above the mean ( $\geq 12.25$ ) had good knowledge, whereas participants who scored less than the mean ( $< 12.25$ ) had poor knowledge. The levels of depression were assessed by using a nine-item patient’s Health Questionnaire (PHQ-9), which was validated in Ethiopia. Each component has a score of 0–3 with a score ranging from 0 to 27. A total score of more than 10 indicates the presence of depressive symptoms.<sup>28</sup> The reliability of the tool was ensured and the Cronbach’s alpha for knowledge related to COVID-19 and depression items were 0.74 and 0.81, respectively. The face validity of the tool was assessed by the experts in the area of this research and necessary modification had been done on each item of the tool. The questionnaire was initially prepared in English, then translated to Amharic, and then back to English to check its consistency. The Amharic version of the questionnaire was used for data collection. Data were collected using an interviewer-based structured questionnaire from each participant at selected referral hospitals in Northwest Amhara referral hospitals having ANC visits

during the study period. Data collectors were the principal investigators (five in number). Upon data collection, the data collectors interviewed the participants independently to maintain transmitting of information or information bias between the participants.

## Data Quality Control

The necessary correction was done after the pretest before the actual time data collection period. The collected data were checked for completeness and clarity accuracy by the principal investigators and data collectors. On the spot, the quality check was done every day to clear out the errors made during data collection. Data cleaning and cross-checking were done before the actual and further analysis.

## Data Processing and Analysis

The data completeness and consistency were checked. The data were entered through Epi Info version 7. The data were cleaned accordingly and then exported to Statistical Package for Social Science (SPSS) version 20 software for further analysis. The missing data were handled by imputation (given code) in replacing the missing data with different values. Descriptive and summary statistics were used to describe the sample. Bivariable and multivariable logistic regression analysis was employed to identify variables associated with depression. The statistical association between independent and dependent variables was measured by using logistic regression analysis. Variables having a p-value  $\leq 0.2$  in the bivariable analysis were considered for multiple logistic regression analysis to adjust for potential confounders and associated with the outcome variable in the final model. The odds ratio with its corresponding 95% confidence interval was computed and interpreted accordingly. Finally, the result was presented using tables and text based on the data sets obtained.

## Result

### Socio-Demographic Characteristics of Respondents

Among a total of 303 study respondents, 291 were responding with a response rate of 96.04%. The mean age of the respondents was ( $30.37 \pm 5.12$  SD). However the majority (73.5%) and (88.7%) of the respondents were married and urban dwellers, respectively. Of the participants (65.3%) were Orthodox followers (Table 1).

**Table 1** Socio-Demographic Characteristics of Participants Attending at Northwest Amhara Referral Hospitals, Ethiopia, 2019/2020 (n=291)

Variables		Frequency	Percentage (%)
Age in years	<30	181	62.2
	≥30	110	37.8
Marital status	Single	39	13.4
	Married	214	73.5
	Divorced	26	8.9
	Widowed	12	4.1
Level of education	No formal education	72	24.7
	Formal education	219	75.3
Residence	Urban	258	88.7
	Rural	33	11.3
Religious	Orthodox	190	65.3
	Muslim	71	24.4
	Protestant	26	8.9
	Others	4	1.4
Occupation	Employed	88	29.1
	Unemployed	203	12.7
Ethnic group	Amhara	246	84.5
	Tigray	19	6.5
	Oromo	22	7.6
	Others	4	1.4

## Obstetric-Related Information of Participants

The majority (96.9%) and (95.9%) of the participants had ≥18 years in their pregnancy and less than five pregnancies, respectively. Of the participants, 30.9% and 34.0% had a history of stillbirth and abortion, respectively (Table 2).

## HIV, Psychiatry, and Social Support Related Information of Participants

The vast majority (80.7%) of the participants had taken ART for less than 6 months. In the study, participants (63.9%) were starting ART during pregnancy and

(56.3%) had husband support. The depression among HIV-positive pregnant women was 28.7% [95% CI (24.3–33.4)] at Northwest Amhara referral hospitals (Table 3).

## Factors Affecting Antenatal Depression Among HIV-Positive Pregnant Women

In this study, among the variables entered in multivariable logistic regression, six variables were associated with the outcome variable of depression. In this regard, being ≥30 years of age was nearly 1.62 times more [AOR=1.62, 95% CI (1.24–3.35)] depressed compared to its counterpart, whereas being an urban residency was nearly two times [AOR =1.76, 95% CI (1.57–4.61)] to be depressed compared to being rural. Age at the first pregnancy was 3.82 times more [AOR=3.82, 95% CI (1.54–17.34)] depressed as compared with its counterpart. Those having known HIV serostatus during pregnancy were 1.29 times more [AOR=1.29, 95% CI (1.08–2.47)] depressed compared to its counterpart. The participants who had good COVID-19 knowledge were 68% [0.32 (0.12–1.12)] less likely depressed compared to poor COVID-19-related knowledge (Table 4).

## Discussion

The finding of this study has assessed the depression of HIV-positive pregnant women in the Northwest referral hospitals, Amhara regional state of Ethiopia, which can be generalized peoples coming from the catchment area. As it is known, depression is the most common mental health disorder among HIV-positive pregnant mothers, which increases mortality, poor quality of life; it also increases the burden of disease during the era of COVID-19. This study showed that the magnitude of depression among HIV-positive pregnant mothers was found 28.7% with 95% CI (24.3–33.4).

The finding of this study was higher than the studies done in Malawi (18.9%)<sup>29</sup> and a systematic review conducted in Ethiopia (25.33%).<sup>19</sup> The possible reason might be because the study period in which the current study was conducted during the era of COVID-19. The finding of this study was lower than the studies conducted in India (69.4%),<sup>26</sup> Iran (42.1%)<sup>30</sup> and Canada (29.4%, 35.21%, 37%),<sup>26,31,32</sup> respectively. The possible explanation might be because of the higher transmission rates of COVID in India, Canada, and Iran, which lead to high depression in HIV-positive pregnant women.<sup>33,34</sup> The finding of the study was also lower than the study conducted in Nigeria

**Table 2** Obstetric-Related Information of Participants Attending at Northwest Amhara Referral Hospitals, Ethiopia, 2019/2020 (n=291)

Variables	Categories	Frequency	Percentage (%)
Age in the first pregnancy	<18 years	9	3.1
	≥18 years	282	96.9
Number of pregnancy	<5	279	95.9
	≥ 5	12	4.1
History of problems in a previous pregnancy	Yes	118	40.5
	No	173	59.5
History of stillbirth	Yes	90	30.9
	No	201	69.1
Previous pregnancy-related hospitalization	Yes	118	40.5
	No	173	59.5
History of abortion	Yes	99	34.0
	No	192	66.0
Is the pregnancy planned	Yes	150	51.5
	No	141	48.5
ANC follow-up	Yes	194	66.7
	No	97	33.3
History of pregnancy-induced hypertension	Yes	158	54.3
	No	133	45.7
History of nausea and vomiting	Yes	126	43.3
	No	165	56.7

**Abbreviation:** ANC, antenatal care.

(45.2%)<sup>35</sup> and across European countries (15%).<sup>27</sup> The possible explanation may be due to the time gap for access to COVID-19-related information.<sup>36</sup> This implies that the knowledge about COVID-19 can reduce the depression and anxiety level of people during COVID-19 by directing the promotion of health behaviours.<sup>37</sup>

In this study, among the variables entered in the multi-variable logistic regression analysis, six variables were associated with the outcome variable of depression. In this regard, being ≥30 years of age was nearly 1.62 times more to be depressed compared to age <30 years. This finding was in line with the study done in India.<sup>36</sup> The finding is also supported by studies in South Africa and Atlanta Georgia.<sup>17,38</sup> The possible explanation might be

because as age increased there might be again hormonal changes responsible for mood disturbance.<sup>39</sup>

Having poor COVID-19 knowledge was 68% less likely depressed than its counterpart. This finding was supported by a study done in Croatia.<sup>37</sup> The possible explanation might be participants who had good knowledge of COVID-19 can decrease the virus propagation, which leads to a decrease in the level of depression.<sup>40</sup> An urban residency was nearly twofold to be depressed compared to being rural. This finding was in line with the study done in India.<sup>16</sup> The possible explanation might be because there could be lifestyle variations between urban and rural dwellers. The rural residency also has less information towards COVID-19 and does not have more

**Table 3** HIV, Psychiatry, and Social Support-Related Information of Participants Attending at Northwest Amhara Referral Hospitals, Ethiopia, 2019/2020 (n=291)

Variables	Categories	Frequency	Percentage (%)
HIV exposure through	Unsafe sex	109	37.5
	From family	50	17.2
	Sharing of sharps	95	32.6
	Others	37	12.7
ART start	Before pregnancy	114	36.1
	After pregnancy	202	63.9
Duration of ART	<6 months	239	82.1
	≥6 months	52	17.9
Family history of psychiatric problems	Yes	99	34.0
	No	192	66.0
Husband support	Yes	170	58.4
	No	121	41.6
Depression of HIV-positive pregnant women	Yes	84	28.7
	No	210	71.3

**Abbreviations:** ART, antiretroviral therapy; HIV, human immune virus.

concern/stress about the transmission as well as prevention mechanism of the pandemic.<sup>41</sup>

Having a first pregnancy <18 years was nearly four times to have depression in their pregnancy compared to ≥18 years. This finding was supported by a study done in Iran.<sup>30</sup> The possible explanation might be because those <18 years old pregnant women might have greater stress than the elders. They are under different pressure during the youth period, which makes them assume they lag behind their friends. This in turn increased their stress level and led them to be depressed.<sup>42</sup> Those having known HIV serostatus during pregnancy was 29% more to be depressed compared to its counterpart. This finding was supported by the study done in Iran.<sup>16</sup> The possible explanation might be because of the combined effect of COVID-19 and HIV on the level of depression during pregnancy of women.<sup>5,17,18</sup>

## Limitations of the Study

The study was not conducting clinical confirmation for antenatal depression to ascertain the finding. Recall

bias was a limitation in this study because of the self-reporting of the questionnaire by participants. The participants also might respond only to socially acceptable answers. The cross-sectional nature of the study cannot rule out the cause–effect relationship.

## Conclusion

Although there was no clinical confirmation done for depression, nearly one-third of the pregnant women attending antenatal care were depressed during the era of the COVID-19 pandemic. Among the variables entered in the multivariable logistic regression analysis; the age of the mother, residence, known HIV serostatus during pregnancy, age in the first pregnancy, and COVID-19-related knowledge were independently associated with the outcome variable of depression. Therefore, the promotion of family planning and integration of maternal health care services with the existing care have to be strengthened as before during the era of COVID-19.

**Table 4** Bivariable and Multivariable Logistic Regression Analysis of Variables Predicting Antenatal Depression Among HIV-Positive Pregnant Mothers Attending Northwest Amhara Referral Hospitals, Ethiopia, 2019/2020 (n=291)

Variables	Category	Depression		COR (95% CI)	AOR (95% CI)
		Yes	No		
Age in years	<30	39	142		
	≥30	17	93	1.5(0.97–3.54)	1.32(1.24–3.35)*
Residence	Urban	46	212	2.0(0.89–4.49)	1.76(1.57–4.61)*
	Rural	10	23		
Educational status	No formal education	15	57		
	Formal education	41	178	1.3(0.67–2.46)	1.01(0.47–2.13)
Monthly income	≤1000 ETB	18	60	0.72(0.32–1.09)	0.84(0.40–1.73)
	>1000 ETB	38	175		
Age in a first pregnancy	<18 years	5	4	5.66(1.47–21.83)	3.82(1.54–17.34)*
	≥18 years	51	231		
Problem in previous pregnancy	Yes	20	98	1.28(0.84–2.90)	1.06(0.54–2.08)
	No	36	137		
Planned pregnancy	Yes	22	128	0.54(0.29–1.98)	0.47(0.26–1.79)
	No	34	107		
Depression in a previous pregnancy	Yes	8	63	2.19(0.87–4.04)	1.45(0.32–4.67)
	No	48	172		
Time of knowing HIV serostatus	Before pregnancy	31	130		
	After pregnancy	25	105	0.99(0.51,1.64)	1.29(1.08–2.47)*
Family HX of psychiatric problem	Yes	12	87	2.16(0.97,3.75)	1.94(0.88–4.28)
	No	44	148		
History of stillbirth	Yes	17	73	1.27(0.55,1.95)	0.93(0.48–1.82)
	No	39	162		
Duration of ART	<6 month	49	190		
	≥6 month	7	45	1.66(0.70,3.90)	1.67(0.69–3.99)
Husband support	Yes	31	139	0.86(1.48,1.54)	0.67(1.35–0.98)
	No	25	96		
Being happy with married	Yes	32	137	0.95(1.53,1.72)	0.79(1.46–0.97)
	No	24	98		
COVID-related knowledge	Good	45	185		
	Poor	6	55	0.45(0.21,1.43)	0.32(0.12–1.12)*

**Note:** \*Indicates P value less than 0.05.

**Abbreviations:** COVID-19, coronavirus disease 2019; ETB, Ethiopian birr; HIV, human immune virus; AOR, adjusted odds ratio; COR, crude odds ratio.

## Abbreviations

AIDS, acquired immune deficiency syndrome; AOR, adjusted odds ratio; ART, antiretroviral therapy; ARVS, antiretroviral drugs; BDI, Beck Depression

Inventory; COR; crude odds Ratio; HIV; human immunodeficiency virus; MBF; mixed breast feeding; MTCT; mother to child transmission; WHO; World Health Organization.

## Data Sharing Statement

The data could not be given to protect participants' confidentiality by far for this study. However, the whole summary data is available in the mother document.

## Ethical Approval and Consent to Participate

The study was performed based on the ethical standards of put down the declaration of Helsinki. Ethical clearance was obtained from the institutional ethical review committee of the school of nursing and college of health science of University Gondar with ethical clearance letter reference number of Rf. No. S/N2013/06/2013. Permission and supportive letters were obtained from the respective clinical directors of each hospital. All participants of the study were well informed about the overall rationale of the study. They had got written informed consent to secure their confidentiality.

## Consent to Publish

Consent to publish is not applicable.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is, in the conception, study design, execution, acquisition of data, analysis and interpretation or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

All authors have declared that they have no conflicts of interest concerning this manuscript.

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