

Comparison of Anxiety and Depression Among HIV-Positive and HIV-Negative Pregnant Women During COVID-19 Pandemic in Ekiti State, Southwest Nigeria

Idowu Pius Ade-Ojo¹, Mobolaji Usman Dada², Tolulope Benedict Adeyanju³

¹Department of Obstetrics & Gynecology, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria; ²Department of Psychiatry, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria; ³Department of Obstetrics & Gynecology, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria

Correspondence: Idowu Pius Ade-Ojo, Department of Obstetrics & Gynecology, Ekiti State University, PMB 5363, Ado-Ekiti, Ekiti State, Nigeria, Tel +234 8033886173, Email idowu.ade-ojo@eksu.edu.ng

Purpose: Coronavirus disease 2019 (COVID-19) pandemic is the significant public health crisis of the 21st century that has disrupted personal, local, and international territorial relationships. Earlier studies have shown that people with HIV were at least twice at risk of dying from COVID-19 than the general population. There are also deep concerns about the indirect impact of COVID-19 on women within the reproductive age group in Sub-Saharan Africa who were already struggling to access reproductive healthcare services. In addition, pregnant HIV-positive women have an increased rate of anxiety and depression. This study, therefore, examined depression and anxiety disorders in pregnant HIV-positive women in response to the COVID-19 pandemic.

Patients and Methods: This cross-sectional study used a structured questionnaire containing sociodemographic information, Patient Health Questionnaire-9 (PHQ-9), and General Anxiety Disorder-7 (GAD-7) assessment tools. Data obtained were analyzed using Statistical Package for Social Science version 26.

Results: Ninety-nine (99) representing 78% of 127 pregnant HIV-positive women enrolled in the PMTCT program were eligible for this study. This number matched 99 randomly selected pregnant HIV-negative in the study areas as controls. Major depressive disorder (MDD) and severe anxiety disorder were significantly higher among the HIV-positive group than in the HIV-negative group (PHQ-9 Mean $\pm$ SD 8.0 $\pm$ 5.4 vs 2.3 $\pm$ 2.9; $p = 0.000$) and (GAD-7 Mean $\pm$ SD 5.9 $\pm$ 4.6 vs 1.2 $\pm$ 2.2; $p = 0.000$).

Conclusion: Given the high prevalence of major depressive disorder and severe anxiety disorder among pregnant HIV-positive women, mental health care should be incorporated into the prevention with positive interventions and strategies to reduce the indirect consequences of the COVID-19 pandemic.

Keywords: COVID-19 pandemic, HIV, pregnancy, depression, anxiety

Introduction

The emergence of severe acute respiratory syndrome corona virus-2 (SARS-CoV-2) in Wuhan city of China in late December 2019 has dramatically impacted lives and relationships.^{1,2} Coronavirus disease 2019 (COVID-19) has been described by WHO as the leading health crisis of the 21st century.³⁻⁵ It seems that the coronavirus will be around for a long time. Although there was an initial decline in its pandemic curve, another wave of COVID-19 is rapidly re-surfacing in most countries of the world,⁶ hence, the need to devise strategies to continue to neutralize its direct and indirect effects on morbidity and mortality. Most countries in the world have improved their human capital over the past decades; unfortunately, this is being threatened by the impact of the pandemic on healthcare, citizens' liberties, and the economies of nations. There are deep concerns about the indirect impact of COVID-19 on women within the reproductive age group who already struggle to access reproductive healthcare services, particularly in resource-constrained countries. Shreds of evidence have supported that COVID-19 affects pregnant women and those who have co-morbidities disproportionately.^{7,8} Although Human

Immunodeficiency Virus (HIV) presents a more chronic progression than COVID-19, it continues to be a significant global public health issue, having claimed more than a 36.3 million lives so far.⁹ The availability of antiretroviral drugs has reduced HIV infection to chronic disease. HIV-positive women now live longer, achieve pregnancies, and are exposed to and infected with SARS-CoV-2. Earlier studies from South Africa and the United Kingdom have shown that people living with HIV were at least twice at risk of dying from COVID-19 than the general population.^{10–12} There is a consensus among studies that the highest risk of mortality is among blacks, Asians, and other people from minority ethnic communities living with HIV.^{10–13} Contrary to the above, a scoping review of literature by Prabhu et al did not show a higher risk of morbidity from Covid-19 among HIV-positive people compared to the general population.^{13,14} Supposedly, pregnancy should be a period of psychological well-being, particularly among Africans with a high premium on childbearing. However, mental health disorders are prevalent among African women during pregnancy.¹⁵ Depression and anxiety disorders are the most common mental health disorders frequently encountered in pregnancy. The literature has quoted a prevalence of 13% and 12%, respectively.^{16,17} According to the National Institute for Health and Care Excellence guidelines, various forms of anxiety disorders (including generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, phobias, post-traumatic stress disorder, social anxiety disorder, and tokophobia (extreme fear of childbirth), and depression are under-recognized throughout pregnancy and the postnatal period.¹⁸ Mothers with these disorders may not get proper antenatal care services and pay less attention to their health status. Studies have shown that depression and anxiety are associated with low birth weight, preterm delivery, and intrauterine growth restriction.^{19–21} These may be due to the stimulation of the hypothalamic-pituitary-adrenal axis by the physical and psychological stressors associated with maternal depression and anxiety disorders.²² In the postpartum period, there may be a problem with proper bonding between the mothers with mental health disorders and their newborns, reduced attention for the care of newborns with the risk for infant infections, under-immunization, malnutrition, impaired childhood growth and development, and even behavioral problems culminating into developing mental disorders in adulthood.^{23,24} Expectedly, pregnant HIV-positive women will have a heightened rate of anxiety and depression.^{25,26} The current escalating COVID-19 pandemic may worsen this. This study investigated the prevalence of depression and anxiety among pregnant HIV-positive women during the COVID-19 pandemic. The PHQ-9²⁷ and GAD-7²⁸ scales were used to measure depression and anxiety, respectively, in pregnant HIV-positive women as cases, and the outcome was compared with those of pregnant HIV-negative women who will serve as controls. This study was the first to address this subject in our environment and the first to compare the prevalence of depression and anxiety among HIV-positive and HIV-negative. This study would serve as a baseline for comparing future studies. In addition, the outcome of this study will help formulate management plans that will mitigate the indirect impact of COVID-19 on people living with HIV.

Materials and Methods

Participants

This study was a cross-sectional design conducted among pregnant HIV-positive pregnant and HIV-negative women in Ekiti State, Nigeria. Participants were drawn from eight health facilities in the three senatorial zones between June 1 to November 30, 2020. The study group (cases) comprised all pregnant women who tested positive for HIV and were attending antenatal care clinics at the Ekiti State University Teaching Hospital Ado-Ekiti, State Specialists' Hospital Ikere-Ekiti, Federal Teaching Hospital Ido Ekiti, State Specialists' Hospital Ikole-Ekiti, General Hospital Emure-Ekiti, and State Specialists' Hospital Ijero-Ekiti. In addition, they were matched with HIV-negative pregnant women at those hospitals as controls. The exclusion criteria were pregnant HIV-positive and HIV-negative women who had existing mental illnesses, co-morbid illnesses, or refused consent.

Procedure

Trained clinical nurses and mentor mothers recruited pregnant women with HIV who presented for their routine antenatal care clinics. All (127) pregnant HIV-positive women enrolled in the PMTCT program in the study areas during the study period were approached to participate, but only 99, representing 78%, gave their consent to participate. Consequently, 99 pregnant HIV-negative women attending antenatal care clinics were equally selected by simple random sampling to serve as the control. First out of every 3 HIV-negative women were counseled, and those who consented and met the inclusion

criteria were recruited until the desired number (99) was attained. The questionnaire's content was explained to each participant in English or local languages, depending on her preference. Those who agreed to participate were given consent forms to sign, and those who could not sign were made to thumbprint on the appropriate column. The interviews were conducted in the private offices allocated within the premises of the hospitals where the research was conducted. Participants who were discomfited with the questions were encouraged by the trained study nurse and mentor mothers and were later referred back to the clinic counselor for further counseling.

Questionnaire

A structured questionnaire composed in the English language was administered to the participants, and clarification was provided by the investigators when requested. The questionnaire was divided into two sections. Section one obtained information on the participants' social demographic, antenatal care, and HIV status characteristics. After completing the first section, the participants were counseled to tick their desired answers in section two, which assessed depression using the Patient Health Questionnaire-9 (PHQ-9) and anxiety using the Generalized Anxiety Disorders-7 (GAD-7). The questions were explained verbally in the requisite local language (Yoruba) for those not fluent in English. The questionnaire was pretested to avoid possible ambiguity by administering it to 50 randomly selected antenatal clinic attendees at the Ekiti State University Teaching Hospital in the month preceding the month of commencement of the research. The coefficient of reliability of 0.85 was obtained, which was considered appropriate.

Patient Health Questionnaire²⁷

The severity of depression in participants was measured using the Patient Health Questionnaire-9 (PHQ-9) scale.²⁷ The scale contained 9 questions assessing depressive symptoms based on the Diagnostic and Statistical Manual 4th edition (DSM-4) diagnostic criteria. Each question has four possible responses (not at all, several days, more often, and nearly every day), with an allocated score of 0 to 3. The total possible score ranged from 0 to 27, with 0–4 depicting none/minimal, 5–9 mild, 10–14 moderate, 15–19 moderately severe, and 20–27 severe depression. Scores ≥ 10 were considered major depressive disorders (MDD).

Generalized Anxiety Disorder²⁸

Similarly, the severity of anxiety was measured using the Generalized Anxiety Disorder-7 (GAD-7).²⁸ The scale contained seven questions assessing anxiety symptoms. Each question has four possible responses (not at all, several days, more often, and nearly every day), with an allocated score of 0 to 3. The total possible score ranged from 0 to 21. A total score of 8 was set as a cut-point for identifying probable cases of generalized anxiety disorder. The severity of anxiety was further divided into 0–4 minimal, 5–9 mild, 10–14 moderate, and 15–21 severe anxiety.

Statistical Analysis

Data obtained from the completed questionnaire and assessment tools were analyzed using Statistical Package for Social Science version 26 (SPSS, Inc., Chicago, IL). Shapiro Wilk test for normality was used to check for normality of continuous and logarithm transformation was also used to reduce the influence of the data on each other. Continuous variables are presented as mean $\pm$ standard deviation and categorical variables as frequency (percentage). We compared cases and control data using the Mann–Whitney *U*-test or Chi-square tests to compare proportions. Statistical significance was set at a *p*-value < 0.05 .

Ethics Approval

The Human Research and Ethics committee of Ekiti State University Teaching, Ado-Ekiti, approved the questionnaire and methodology for this study with protocol number EKSUTH/A67/2021/04/005. We obtained the consent of all the patients before including them in this study. There was no implication for those who declined consent. There were no undue risks to participants during the process of data collection. There was no financial cost to the subjects at any study stage. The study complies with the guidelines of the Declaration of Helsinki, Good Clinical Practice, and the World Association for Social, Opinion, and Market Research (ESOMAR).

Results

A total of 99 HIV-positive and 99 HIV-negative pregnant women participated in the study. Table 1 represents the sociodemographic details of the participants. There was no significant difference in most of the sociodemographic characteristics between cases and the controls except that the mean age of the pregnant HIV-positive women was significantly higher than the mean age of pregnant HIV-negative pregnant women (34.2 ± 4.1 years vs 32.0 ± 3.5 years and $p < 0.000$). The majority of the participants were married, in a monogamous family setting, and were Christians. Approximately half of the participants were para 1, with about half of the participants within 15–28 weeks estimated gestational age. A high proportion of the participants were unemployed (45.5% of cases and 33.3% among controls).

The Severity of Depression and Anxiety

Table 2 depicts the severity of depression and anxiety on the PHQ-9 and GAD-7 scales. More participants in the study group experienced more severe forms of depression and anxiety than the control group. Depression (None/

Table 1 Sociodemographic Characteristics of HIV-Positive Pregnant Women and HIV-Negative Pregnant Women in Ekiti State Nigeria

Characteristics	HIV-Positive (n=99)	HIV-Negative (n=99)	P-value
Age in Years			
Mean $\pm$ SD	34.2 $\pm$ 4.1	32.0 $\pm$ 3.5	0.000
Marital Status, n (%)			
Single	6(5.1%)	6(6.1)	0.572
Married	92(92.9%)	92(92.9)	
Widowed	1(1.0)	1(1.0)	
Types of Marriage, n (%)			
Monogamy	82(82.8)	89(89.9)	0.154
Polygamy	17(17.2)	10(10.1)	
Parity, n (%)			
1	44(22.2)	66(33.3)	0.021
2	38(19.2)	20(10.1)	
3	11(5.6)	10(5.1)	
4	5(2.5)	3(1.5)	
5	1(0.5)	0(0)	
Estimated Gestational Age, n (%)			
5–13 weeks	17(17.2)	12(12.1)	0.070
14–28 weeks	66(66.7)	41(41.4)	
28–40 weeks	15(15.2)	45(45.5)	
>40 weeks	1(1.0)	1(1.0)	
Religion, n (%)			
Christianity	81(81.8)	89(89.9)	0.139
Islam	17(17.2)	8(8.1)	
Traditional	1(1.0)	2(2.0)	
Level of Education, n (%)			
No formal education	5(5.1)	1(1.0)	0.090
Primary uncompleted	3(3.0)	1(1.0)	
Primary completed	8(8.1)	2(2.0)	
Secondary completed	22(22.2)	6(6.1)	
Secondary uncompleted	18(18.2)	5(5.1)	
Tertiary completed	37(37.4)	76(76.8)	
Tertiary uncompleted	6(6.1)	8(8.1)	
Occupation, n (%)			
Employed	54(54.5)	66(66.7)	0.081
Unemployed	45(45.5)	33(33.3)	

Table 2 Severity of Depression and Anxiety Using PHQ-9 and GAD-7 Scales

	HIV Positive	HIV Negative	Total	Mann-Whitney U	p-value
Depression					
None Minimal	17(17.2)	53(53.5)	70(35.4)	2180.000	0.000
Mild	33(33.3)	25(25.3)	58(29.3)		
Moderate	29(29.3)	15(15.2)	44(22.2)		
Moderately Severe	15(15.2)	5(5.1)	20(10.1)		
Severe	5(5.1)	1(1.0)	6(3.0)		
Anxiety					
Minimal	18(18.2)	51(51.5)	69(69.7)	2507.000	0.000
Mild	44(44.4)	27(27.3)	71(71.7)		
Moderate	28(28.3)	17(17.2)	45(45.5)		
Severe	9(9.1)	4(4.0)	13(13.1)		

minimal 16.7% vs 58.6%; Mild 13.1% vs 7.1%; Moderate 14.6% vs 0.5%; Moderately severe 5.1% vs 0.5% and Severe 0.5% vs 0%). Anxiety (Minimal 22.2% vs 58.6%); Mild 18.2% vs 2.5%; Moderate 6.6% vs 1.0%; Severe 3.0% vs 0.0%). Table 3 shows the dichotomized PHQ-9 and GAD-7 scores using the cut-off 10 and 8, respectively. PHQ-9 < 10 to denote no major depressive disorder (no MDD) and PHQ ≥ 10 to denote major depressive disorder (MDD). Similarly, for GAD-7 score of < 8 represents no generalized anxiety disorder (no GAD), while ≥ 8 represents severe generalized anxiety disorder (SGAD). The result showed that major depressive disorder (MDD) and severe generalized anxiety disorder were significantly higher among the HIV-positive group than in the HIV-negative group (MDD Mean ± SD 8.0 ± 5.4 vs 2.3 ± 2.9; p = 0.000) and (SGAD Mean ± SD 5.9 ± 4.6 vs 1.2 ± 2.2; p = 0.000).

Association Between Sociodemographic Characteristics and PHQ-9 Score Among HIV-Positive Pregnant Women

Table 4 highlights the factors associated with the PHQ-9 score among HIV-positive pregnant women. PHQ-9 score was significantly associated with religion on both simple and multiple linear regression analyses with an estimate of p = 0.002 and $\beta_3 = 3.032$ p = 0.031, respectively. In addition, simple linear regression analysis showed that type of marriage was significantly associated with PHQ-9 score with an estimate $\beta_3 = 3.032$ and p-value of 0.036. There was no significant association between other sociodemographic characteristics and PHQ-9 scores.

Table 3 Dichotomized PHQ-9 and GAD-7 Scores Using the Cut-Off 10 and 8, Respectively

	HIV Positive	HIV Negative	Total	Mann-Whitney U	p-value
Major Depressive Disorder					
No	50(50.5)	78(78.8)	128(64.6)	3019.500	0.000
Yes	49(49.5)	21(21.2)	70(35.4)		
PHQ-9 score					
Mean±SD	8.0±5.4	2.3±2.9			
Severe Generalized Anxiety Disorder					
No	62(62.6)	84(84.8)	146(73.7)	3712.500	0.000
Yes	37(37.4)	15(15.2)	52(26.3)		
GAD-7 score					
Mean±SD	5.9±4.6	1.2±2.2			

Table 4 Relationship Between Sociodemographic and PHQ-9 Depression Score Among HIV Positive Pregnant Women

Characteristics	B(SE)	P-value	B(SE)	P-value
Age	-0.449(0.481)	0.353	-0.247(0.518)	0.635
Marital Status	-0.030(2.112)	0.989	-0.339(2.169)	0.876
Type of Marriage	3.032(1.429)	0.036	2.370(1.550)	0.130
Parity	0.565(0.611)	0.357	0.583(0.673)	0.363
Estimated Gestational Age	0.667(0.912)	0.466	0.150(0.933)	0.872
Religion	4.078(1.250)	0.002	3.040(1.389)	0.031
Level of Education	-0.579(0.366)	0.117	-0.217(0.420)	0.606
Occupation	1.989(1.089)	0.071	0.943(1.278)	0.463
Partner HIV status	-1.191(0.786)	0.133	-0.399(0.888)	0.654

Association Between Sociodemographic Characteristics and GAD-7 Score Among HIV-Positive Pregnant Women

Simple linear regression analysis in Table 5 shows that the type of marriage ($\beta_3 = 4.16$, $p = .008$) and religion ($\beta_3 = 3.040$, $p = .000$) were significantly associated with the GAD-7 score. However, there was no significant association between other sociodemographic characteristics and GAD-7 scores.

Discussion

COVID-19 pandemic heralded an unprecedented heightened psychosocial distress among everyone and everywhere. This current study compares depression and anxiety among pregnant HIV-positive and HIV-negative women during the current COVID-19 pandemic. This study revealed that 49.5% of pregnant HIV-positive women met the criteria for major depressive disorder MDD (PHQ-9 ≥ 10) with a mean and standard deviation (PHQ-9 Mean $\pm$ SD 8.0 ± 5.4 vs 2.3 ± 2.9 ; $p = 0.000$). The study also observed that 37.4% of pregnant HIV-positive women have severe anxiety disorder with a mean and standard deviation (GAD-7 Mean $\pm$ SD 5.9 ± 4.6 vs 1.2 ± 2.2 ; $p = 0.000$). Various researchers have observed that pregnant women are physiologically prone to mental disorders during stressful life events due to the elevation in plasma cortisol levels.²¹ While this may be one of the reasons for the high rate of psychological morbidity among the participants during the pandemic, others have also observed that women living with HIV have an increased prevalence of most common mental health disorders^{10–13}. Although studies have shown that common mental disorders like depression and anxiety are common in pregnancy,^{16,29,30} there have been few studies among pregnant HIV-positive women.^{31,32} We are not aware of any study that has compared depression and anxiety among HIV-positive and HIV-negative pregnant women in our environment. In Nigeria, Thompson and Ajayi³³ found a prevalence of antenatal depression of 24.5% among pregnant women; similarly, in a study done in Ekiti State among pregnant women, psychological morbidity was 36.7%.³⁴ These prevalence rates are far less than 49.5% found among HIV-positive pregnant women but slightly higher than 21.2% found among HIV-negative pregnant women in this study. Studies from other African countries among HIV-positive pregnant women by Ngocho et al³² and Yousuf et al²⁵ conducted before the COVID-19 found a prevalence of depression and

Table 5 Relationship Between Sociodemographic and GAD-7 Anxiety Score Among HIV Positive Pregnant Women

Characteristics	B(SE)	P-value	B(SE)	P-value
Age	-0.449(0.409)	0.275	-0.140(0.422)	0.741
Marital Status	-1.231(1.794)	0.494	-0.666(1.766)	0.707
Type of Marriage	3.269(1.199)	0.008	2.472(1.262)	0.053
Parity	0.285(0.521)	0.586	0.307(0.519)	0.556
Estimated Gestational Age	0.194(0.778)	0.803	-0.189(0.760)	0.804
Religion	4.215(1.036)	0.000	3.262(1.131)	0.005
Level of Education	-0.526(0.311)	0.094	-0.220(0.342)	0.522
Occupation	1.324(0.986)	0.183	0.736(1.041)	0.481
Partner HIV Status	-1.210(0.665)	0.072	-0.461(0.723)	0.526

anxiety (25% and 24.3%) and (32.5% and 28.9%) in Tanzania and Ethiopia respectively. The prevalence of depression and anxiety found in these studies was far less than in our study conducted during the COVID-19 pandemic. The finding of significantly higher mean age of pregnant HIV-positive women than the HIV-negative women seen in this study (34.2 ± 4.1 vs 32.0 ± 3.5) may be due to stigmatization, higher use of family planning and more reported cases of union dissolution may delay marriage, conception and childbearing among the HIV-positive women.^{35–37} This study also found a strong association between marriage type and psychiatric morbidity among HIV-positive patients. Frequent marital disharmony in polygamous marriages in southwestern Nigeria may be responsible for this finding. This finding supports previous meta-analyses that have indicated that women in polygamous family settings are more susceptible to worsened mental health than their monogamous counterparts.^{38,39} A significant limitation of this study is the small sample size. However, this may have little effect on outcome because the prevalence of HIV in Ekiti State is about 2.9% according to the 2014 sentinel survey.^{38,40} Another limitation is the study's cross-sectional nature, which makes it difficult to establish causality.

Conclusion

Major depressive disorder (MDD) and severe anxiety disorders are common in pregnancy, with a more significant proportion in pregnant HIV-positive women than HIV-negative pregnant women. The prevalence of MDD and severe anxiety disorder found among pregnant HIV-negative women in this study was comparable with those found by other investigators before and during COVID-19. We, however, found a higher prevalence of these mental disorders in pregnant HIV-positive women than those found by other researchers before the advent of the COVID-19 pandemic. Therefore, the findings in this study may suggest that the COVID-19 pandemic has heightened depression and anxiety in pregnant HIV-positive women. We suggest that mental health care should be incorporated into the prevention with positive intervention and strategies to fill this conspicuous mental health gap and mitigate against the indirect consequences of the COVID-19 pandemic among HIV-positive pregnant women.

Acknowledgments

The invaluable contributions of all the healthcare workers who voluntarily participated in this study, the medical directors of the study sites, and the registrars who administered the questionnaire are acknowledged.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Adesola RO, Oladele OE, Tajudeen AO, Moses OO, Dinesh M. Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2): epidemiology and vaccinology in Nigeria. *Int J Travel Med Glob Health*. 2021;9(2):60–69.
2. Lai C-C, Shih T-P, Ko W-C, Tang H-J, Hsueh P-R. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. *Int J Antimicrob Agents*. 2020;55(3):105924.
3. Siddique F, Abbas RZ, Mansoor MK, et al. An insight into covid-19: a 21st-century disaster and its relation to immunocompetence and food antioxidants. *Front Vet Sci*. 2021;13(7):586637.
4. Chakraborty I, Maity P. COVID-19 outbreak: migration, effects on society, global environment, and prevention. *Sci Total Environ*. 2020;728:138882.
5. SeyedAlinaghi S, Afsahi AM, MohsseniPour M, et al. Late complications of covid-19; A systematic review of current evidence. *Arch Emerg Med*. 2021;9(1):e14. doi:10.22037/aaem.v9i1.1058
6. Pacheco-Barrios K, Cardenas-Rojas A, Giannoni-Luza S, Fregni F. COVID-19 pandemic and Farr's law: a global comparison and prediction of outbreak acceleration and deceleration rates. Radfar A, editor. *PLoS One*. 2020;15(9):e0239175.
7. Connor J, Madhavan S, Mokashi M, et al. Health risks and outcomes that disproportionately affect women during the Covid-19 pandemic: a review. *Soc Sci Med*. 2020;266:113364.
8. Mueller AL, McNamara MS, Sinclair DA. Why does COVID-19 disproportionately affect older people? *Aging*. 2020;12(10):9959–9981.
9. World Health Organization. Fact sheet on HIV/AIDS [internet]. 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/hiv-aids>. Accessed July 27, 2021.
10. Bhaskaran K, Rentsch CT, MacKenna B, et al. HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform. *The Lancet HIV*. 2021;8(1):e24–32.
11. Geretti AM, Stockdale AJ, Kelly SH, et al. Outcomes of coronavirus disease 2019 (COVID-19) related hospitalization among people with Human Immunodeficiency Virus (HIV) in the ISARIC World Health Organization (WHO) clinical characterization protocol (UK): a prospective observational study. *Clin Infect Dis*. 2020;73(7):e2095–106

12. Boule A, Davies M-A, Hussey H, et al.; Western Cape Department of Health in collaboration with the National Institute for Communicable Diseases, South Africa. Risk factors for coronavirus disease 2019 (COVID-19) death in a population cohort study from the western cape province, South Africa. *Clin Infect Dis*. 2020;29:ciaa1198.
13. Prabhu S, Poongulali S, Kumarasamy N. Impact of COVID-19 on people living with HIV: a review. *J Virus Erad*. 2020;6(4):100019.
14. SeyedAlinaghi S, Karimi A, MohsseniPour M, et al. The clinical outcomes of COVID-19 in HIV-positive patients: a systematic review of current evidence. *Immun inflamm dis*. 2021;9(4):1160–1185. doi:10.1002/iid3.497
15. Sawyer A, Ayers S, Smith H. Pre- and postnatal psychological well-being in Africa: a systematic review. *J Affect Disord*. 2010;123(1–3):17–29.
16. Woldetsadik AM, Ayele AN, Roba AE, Haile GF, Mubashir K. Prevalence of common mental disorder and associated factors among pregnant women in South-East Ethiopia, 2017: a community based cross-sectional study. *Reprod Health*. 2019;16(1):173.
17. Fawcett EJ, Fairbrother N, Cox ML, White IR, Fawcett JM. The prevalence of anxiety disorders during pregnancy and the postpartum period: a multivariate Bayesian meta-analysis. *J Clin Psychiatry*. 2019;80(4):1181.
18. National Institute for Health and Care Excellence. Antenatal and postnatal mental health: clinical management and service guidance [internet]. Report No.: Clinical guideline [CG192]. Available from: <https://www.nice.org.uk/guidance/cg192>. Accessed July 27, 2021.
19. Grote NK, Bridge JA, Gavin AR, Melville JL, Iyengar S, Katon WJ. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Arch Gen Psychiatry*. 2010;67(10):1012.
20. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. *Curr Opin Psychiatry*. 2012;25(2):141–148.
21. Li X, Gao R, Dai X, et al. The association between symptoms of depression during pregnancy and low birth weight: a prospective study. *BMC Pregnancy Childbirth*. 2020;20(1):147.
22. Sheng JA, Bales NJ, Myers SA, et al. The hypothalamic-pituitary-adrenal axis: development, programming actions of hormones, and maternal-fetal interactions. *Front Behav Neurosci*. 2021;13(14):601939.
23. Lutkiewicz K, Bieleninik Ł, Cieślak M, Bidzan M. Maternal–infant bonding and its relationships with maternal depressive symptoms, stress and anxiety in the early postpartum period in a Polish sample. *IJERPH*. 2020;17(15):5427.
24. Bernard-Bonnin A-C; Canadian Paediatric Society, Mental Health and Developmental Disabilities Committee. Maternal depression and child development. *Paediatr Child Health*. 2004;9(8):575–583.
25. Yousuf A, Ramli Musa ML, Isa SR. Anxiety and depression among women living with HIV: prevalence and correlations. *CPEMH*. 2020;16(1):59–66.
26. Kapetanovic S, Dass-Brailsford P, Nora D, Talisman N. Mental health of HIV-seropositive women during pregnancy and postpartum period: a comprehensive literature review. *AIDS Behav*. 2014;18(6):1152–1173.
27. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613.
28. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092.
29. Borba P, Zambaldi CF, Cantilino A, Sougey EB. Common mental disorders in mothers vs. infant and obstetric outcomes: a review. *Trends Psychiatry Psychother*. 2012;34(4):171–177.
30. Lilliecreutz C, Josefsson A, Mohammed H, Josefsson A, Sydsjö G. Mental disorders and risk factors among pregnant women with depressive symptoms in Sweden—A case control study. *Acta Obstet Gynecol Scand*. 2021;100(6):1068–1074.
31. Zhu Q-Y, Huang D-S, Lv J-D, Guan P, Bai X-H. Prevalence of perinatal depression among HIV-positive women: a systematic review and meta-analysis. *BMC Psychiatry*. 2019;19(1):330.
32. Ngocho JS, Watt MH, Minja L, et al. Depression and anxiety among pregnant women living with HIV in Kilimanjaro region, Tanzania. Yotebieng M, editor. *PLoS One*. 2019;14(10):e0224515.
33. Thompson O, Ajayi I. Prevalence of antenatal depression and associated risk factors among pregnant women attending antenatal clinics in Abeokuta north local government area, Nigeria. *Depress Res Treat*. 2016;2016:1–15.
34. Usman DM, Akintayo AA, Peter AO, Olutoyin OL, Adetunji O. Prevalence and correlates of psychological morbidity among pregnant women in southwestern Nigeria. *Int J Health Sci Res*. 2018;8(6):30–34.
35. Reniers G. Marital strategies for regulating exposure to HIV. *Demography*. 2008;45(2):417–438.
36. Grinstead OA, Gregorich SE, Choi K-H, Coates T. Positive and negative life events after counseling and testing: the voluntary HIV-1 counselling and testing efficacy study. *AIDS*. 2001;15(8):1045–1052.
37. Porter L, Hao L, Bishai D, et al. HIV status and union dissolution in Sub-saharan Africa: the case of Rakai, Uganda. *Demography*. 2004;41(3):465–482.
38. Rahmanian P, Munawar K, Mukhtar F, Choudhry FR. Prevalence of mental health problems in women in polygamous versus monogamous marriages: a systematic review and meta-analysis. *Arch Womens Ment Health*. 2021;24(3):339–351. doi:10.1007/s00737-020-01070-8
39. Shaiful Bahari I, Norhayati MN, Nik Hazlina NH, Nik Muhammad A. Psychological impact of polygamous marriage on women and children: a systematic review and meta-analysis. *BMC Pregnancy Childbirth*. 2021;21(1):823. doi:10.1186/s12884-021-04301-7
40. Awofala AA, Ogundele OE. HIV epidemiology in Nigeria. *Saudi J Biol Sci*. 2018;25(4):697–703.