

Prevalence and Determinants of Anxiety and Depression among Pregnant Women Living with HIV/AIDS in a Tertiary Hospital South East Nigeria

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Abstract

Background: Pregnancy affects women's mental health, and women living with HIV are particularly susceptible to psychological illnesses. This study is aimed at evaluating the prevalence and determinants of anxiety and depression among HIV positive pregnant women in Nnewi, Nigeria. **Materials and Methods:** A cross-sectional survey was conducted among HIV positive pregnant antenatal attendees in a tertiary hospital in Nnewi. An interviewer-administered questionnaire was used for data collection. **Results:** The study included 330 participants, of whom all reported symptoms of depression and anxiety. Moderate to severe anxiety occurred in more than half of the women; less than half (49.4%) had minimal to low level of anxiety. Minimal to mild depression occurred in 32.1% while 67.9% had moderate to severe depression. IPV is associated with increased odds of anxiety and depression ($P > 0.5$). Determinants of depression include nulliparity (aOR = 54.0 95% CI 3.9 - 747.6; 0.003), second parity (aOR = 9.395% CI 1.7 - 50.1; 0.009) and gestational age ≤ 28 weeks (aOR = 2.4395% CI 1.02 - 5.76; 0.043). Unemployment (aOR = 0.91 95% CI 0.99 - 0.33; $P < 0.05$) and Housewife (aOR = 0.15 95% CI 0.02 - 0.80; $P = 0.026$) increased the odds of moderate to severe anxiety. Women with secondary education were at increased odds of developing minimal to low level of anxiety compared to those that had tertiary education (aOR = 1.30

95% CI 0.52 - 3.25). **Conclusion:** The study showed a high prevalence of anxiety and depression among HIV/AIDS pregnant women. It calls for routine screening of mental health problems for all pregnant women living with HIV/AIDS in the study area.

Keywords

Depression, Anxiety, Antenatal Attendees, HIV/AIDS, Pregnancy, Mental Health

1. Introduction

Human immunodeficiency virus (HIV) infection is a public health problem [1] [2]. It affects 79 million people with a greater burden in developing world [1] [3]. Nigeria remains at increased risk of the epidemic with 1.9 million people estimated to be living with the disease [2]. Women in the reproductive age bracket are at increased risk of HIV infection as they constitute about 2 in 10 newly diagnosed cases [3]. Because of this, Nigerian women are prone to HIV infection since the main transmission route of HIV infection is sexual intercourse that can result in pregnancy. The global age-standardized HIV/AIDS death, and disability adjusted life years rates were 10.72 and 601.49 per 100,000 cases, respectively and this rate is likely to be higher in pregnancy [1]. Depression and anxiety being part of disability adjusted life years are high in HIV pregnant women [3]-[6].

Pregnant women are prone to psychiatric illnesses [3] [7] and this has made pregnancy a major public health problem. The burden of psychiatric illnesses during pregnancy varies globally, depression for example varies between 7.4% and 50.0% [8]. The prevalence of antenatal depression ranges from 7% in Taiwan region and Australia to 24.5% to 69.0% in Nigeria [9]. A systematic review in Africa showed that the mean prevalence of antenatal depression and anxiety was 11.3% and 14.8% respectively [10]. In developed countries, a meta-analysis study reported a prevalence rate of depression of 7.4% [2.2% - 12.8%], 12.8% [10.7% - 14.8%] and 12.0% [7.4% - 18.7%] during the first, second and third trimester respectively [11]. The prevalence rate of psychiatric illnesses is high among HIV pregnant women. It is reported to be 28.9% [6], and 60.8% [4] for anxiety and 21.0% [12], 32.5% [6], 69.0% [13], 30.6% and 41.0% [14] for depression.

The occurrence of psychiatric illnesses in HIV pregnant women is a risk factor for “vertical” transmission [4] [12]. In developing countries, about 365,000 of unborn children are at risk of getting HIV infection during the course of pregnancy and childbirth [15]. To reduce the burden of “vertical” transmission, adherence to tenets of Prevention of Mother to Child Transmission of HIV program is important [15]. The presence of such comorbid diseases, depression/anxiety disorder, is a risk factor to acquiring viral resistance due to non-adherence to care with

fatal trajectory [12]. It thus heightens the public health issues of HIV disease co-existing with psychiatric illnesses. Concepcion *et al.* in a prospective cohort study in four African countries among HIV pregnant women reported that depressive symptomatology was associated with increased odds of viral non-suppression (aOR 2.2; 95% CI 1.2 - 4.0, P = 0.011) [12]. This will lead to disease progression with increased maternal morbidity and mortality, and “vertical” transmission of virus to an unborn child. It then calls for an early identification and treatment of HIV pregnant women coexisting with psychiatric illnesses [12]. The current study is aimed at evaluating the prevalence of depression and anxiety among HIV pregnant attendees in Nnamdi Azikiwe University Teaching Hospital and factors affecting it. The findings from our study will help in auditing of care given to this vulnerable group of pregnant women.

2. Materials and Methods

2.1. Study Design

This study is a cross-sectional study that assessed the prevalence and determinants of anxiety and depression among HIV/AIDS pregnant women attending antenatal care in a tertiary hospital in Nnewi.

2.2. Study Setting

The study was carried out in the Department of Obstetrics and Gynaecology of Nnamdi Azikiwe University Teaching Hospital between January 1 and May 30, 2024. Nnamdi Azikiwe University Teaching Hospital is the one of the specialist teaching hospital in the state, receiving referrals from private and mission hospitals from within the state and from neighboring states. The antenatal clinic is held daily on Mondays through Fridays, as are the booking and postnatal clinics. The clinics are run by consultant obstetricians with their teams of resident doctors and are assisted by nurses. Health talks were given that covered various topical issues including nutrition, diet, personal and environmental hygiene, signs of danger during pregnancy, the experience of labor, care of the newborn, exclusive breastfeeding, and immunization. Other health issues, such as hypertension, diabetes mellitus, malaria, anemia, HIV/AIDS, and family planning were also discussed. The nurses measure the maternal weight, height, blood pressure, and dipstick urinalysis using COMBI 2. Baseline investigations requested at booking include: pack cell volume, Hepatitis B surface antigen (HbsAg), Venereal Disease Reaearch (VDRL), Hepatitis C virus (HCV), HIV screening after counselling with option to opt out, Blood group, genotype, and urinalysis. Women who screened positive to HIV are further asked to running the following investigations, which are free: serum electrolyte, urea and creatinine, liver function test, viral load, and CD4⁺ count. Folic acid, ferrous sulfate, intermittent preventive treatment for malaria, and multivitamin supplementation are prescribed. Antiretroviral therapy and Cotrimoxazole were also given to HIV-positive pregnant women and breast feeding

options discussed.

2.3. Study Population

The study population comprised HIV positive pregnant women that attended their routine visit to the antenatal clinic. Consecutive HIV positive women who presented for her ANC were recruited. This was continued until the sample size was obtained. Resident doctors in the Department of Obstetrics and Gynaecology who were trained to administer the questionnaire interviewed them. Facemasks were provided to the study population during the process of data collection and each of the researchers also wore a face mask. Translation into native languages was done in cases where the respondents had lower levels of education.

2.4. Study Instrument and Data Source

The study population was interviewed with a pretested interviewer administered structured questionnaire, which was divided into sections: socio-demographic and obstetric characteristics. The study population were interviewed with Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder Assessment (GAD-7). The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as “0” (not at all) to “3” (nearly every day). PHQ-9 is good in making diagnosis of depressive disorders and it is a reliable and valid measure of depression severity [16]. GAD-7 is a seven-item instrument that is used to measure or assess the severity of generalized anxiety disorder [17]. GAD-7 was validated in both the primary care setting and the general population. Each questionnaire took 5 - 10 minutes to complete [17].

2.5. Sample Size Determination

The sample size was calculated using the formula for cross-sectional study ($N = Z^2 PQ/D^2$) where N is the required sample size, Z is 1.96 at 95% confidence interval (CI), P is estimated patient psychiatric illness prevalence from similar studies; D is the margin of error at 5% (standard deviation of 0.05), and Q is $1 - P$. P is 0.306 from previous study [5]. A minimum sample size of 326 patients was obtained and, after the addition of 5% attrition rate, it was increased to 342.

2.6. Statistical Analysis

Data were analysed using a statistical package for Social Science (IBM SPSS) software (version 22, Chicago II, USA). Continuous variables were presented as mean and standard deviation (Mean \pm 2SD), while categorical variables were presented as numbers and proportions. Bivariate and multivariable regressions analyses were performed to interrogate the effect of dependent factors on the independent variable. The level of depression and anxiety were classified into two thus: minimal to low anxiety and moderate to severe anxiety; minimal to mild depression and moderate to severe depression. A difference with a P-value < 0.05 was considered statistically significant.

3. Results

During the study period, 340 pregnant women who were HIV positive were approached for an inclusion into the study but only 335 women gave informed consent. They were included and interviewed. Out of this, 5 questionnaires were invalid because of incomplete information, this gave a recovery rate of 98%.

Table 1 represents the social, obstetric and demographic characteristics of the study population. The mean age of the women was 30 (95% CI 29 - 31) years. The minimum and maximum age was 15 years and 42 years respectively. More than 90 percent of the women were married with more than half attaining secondary education as their highest level of education. Majority were booked and the mean parity was 2.0 (95% CI 2.1 - 2.7); most were between para 0 and para 2.

Table 1. Social, obstetrics and demographics characteristics of the study population.

Variable	n (%)
Age	
≤28	93 (36.0)
>28	237 (64.0)
Religion	
Christianity	319 (96.6)
Islam	4 (1.1)
Traditional	7 (2.2)
Marital status	
Married	300 (91.0)
Unmarried	30 (9.0)
Education	
Secondary	210 (63.5)
Tertiary	120 (36.5)
Occupation	
Government employed	30 (9.0)
Unemployed	43 (12.9)
Self-employed	11 (3.4)
Trading	137 (41.6)
Housewife	61 (18.5)
Student	48 (14.6)
Residence	
Urban	193 (58.4)
Rural	137 (41.6)
Booking status	
Booked	324 (98.3)
Un-booked	6 (1.7)

Continued

Parity	
0	48 (14.6)
1	59 (18.0)
2	96 (29.2)
3	43 (12.9)
4	33 (10.1)
5	26 (7.9)
6	24 (7.3)
Gestational age	
≤28 weeks	172 (52.2)
>28 weeks	158 (47.8)

Table 2. Clinical features of the study population.

Variable	n (%)
HIV disclosure	
Undisclosed	37 (11.2)
Disclosed to family/friend	267 (60.9)
Disclosed to husband	26 (7.9)
Partner HIV status	
Unknown	33 (10.1)
Negative	159 (48.3)
Positive	138 (41.6)
Time of HIV diagnosis for the women	
Diagnosed before current pregnancy	284 (86.0)
Diagnosed during current pregnancy	46 (14.0)
Psychological intimate partner violence	
Yes	83 (25.3)
No	247 (74.7)
Physical intimate partner violence	
Yes	76 (23.0)
No	254 (77.0)
Sexual intimate partner violence	
Yes	48 (31.5)
No	282 (68.5)

Table 2 is the clinical findings from the cohort of women studied. The burden of Intimate Partner Violence (IPV) was very high as 62.7% of women are victim of one form of IPV during the index pregnancy. Sexual IPV is the most common form of IPV followed by psychological IPV. More than five-sixth of the study population had the HIV diagnosis made prior to index pregnancy with sera-concordance rate of 42%. On HIV disclosure, the majority of the women did not disclose their HIV status to their husband but chose either a family member or a friend.

Table 3. Bivariate and multivariate regression analysis between level of anxiety and its associated factors among the study population.

Variable	Level of anxiety		COR	P-value	AOR	P-value
	minimal to low	moderate to severe				
	n (%)	n (%)				
Education						
Secondary	107 (51.2)	102 (48.7)	1.23 (0.66 - 2.26)	0.506	1.30 (0.52 - 3.25)	0.575
Tertiary	56 (46.2)	65 (53.8)	Ref		Ref	
Occupation						
Govt. employed	18 (62.5)	11 (37.5)	3.14 (0.86 - 11.49)	0.083	0.26 (0.03 - 1.98)	0.197
Unemployed	9 (21.7)	33 (78.3)	0.52 (0.14 - 1.88)	0.323	0.09 (0.01 - 0.67)	0.018
Self-employed	6 (50.0)	6 (50.0)	1.88 (0.31 - 11.34)	0.487	0.26 (0.02 - 2.82)	0.272
Trading	85 (62.2)	52 (37.8)	3.10 (1.21 - 7.90)	0.018	0.30 (0.06 - 1.48)	0.141
Housewife	28 (45.5)	33 (54.5)	1.57 (0.54 - 4.54)	0.401	0.15 (0.02 - 0.80)	0.026
Student	17 (34.6)	32 (65.4)	Ref		Ref	
Residence						
Urban	52 (50.0)	52 (50.0)	1.05 (0.58 - 1.91)	0.859	1.13 (0.52 - 2.45)	0.745
Rural	36 (48.6)	38 (51.4)	Ref		Ref	
Parity						
0	17 (34.6)	32 (65.4)	0.23 (0.05 - 0.98)	0.047	0.58 (0.09 - 3.44)	0.549
1	28 (46.9)	32 (53.1)	0.39 (0.10 - 1.58)	0.180	0.37 (0.08 - 1.77)	0.216
2	38 (40.4)	57 (59.6)	0.30 (0.08 - 1.10)	0.071	0.61 (0.14 - 2.68)	0.518
3	26 (60.9)	17 (39.1)	0.69 (0.16 - 2.93)	0.617	1.21 (0.25 - 5.83)	0.805
4	20 (61.1)	13 (38.9)	0.69 (0.15 - 3.16)	0.642	0.74 (0.15 - 3.60)	0.710
5	17 (64.3)	9 (35.7)	0.80 (0.16 - 3.99)	0.785	1.00 (0.18 - 5.62)	0.992
6	17 (69.2)	7 (30.8)	Ref		Ref	
Gestational age						
≤28 weeks	56 (41.9)	100 (58.1)	0.53 (0.29 - 0.96)	0.037	0.87 (0.40 - 1.88)	0.731
>28 weeks	107 (57.6)	67 (42.4)	Ref		Ref	
HIV disclosure						
Undisclosed	22 (60.0)	15 (40.0)	1.61 (0.62 - 4.17)	0.319	0.61 (0.17 - 2.15)	0.449
Disclosed	141 (48.1)	152 (51.9)	Ref		Ref	
Partner's HIV status						
Negative	80 (47.7)	88 (52.3)	0.65 (0.35 - 1.22)	0.188	0.74 (0.33 - 1.65)	0.468
Positive	84 (58.1)	60 (41.9)	Ref		Ref	
HIV diagnosis						
Before current pregnancy	137 (48.4)	145 (51.6)	0.73 (0.31 - 1.72)	0.480	0.29 (0.08 - 1.01)	0.052
During current pregnancy	26 (56.0)	22 (44.0)	Ref		Ref	

Continued

Psychological IPV						
Yes	41 (48.9)	43 (51.1)	0.97 (0.49 - 1.90)	0.132	1.20 (0.46 - 3.07)	0.703
No	122 (49.6)	124 (50.4)	Ref		Ref	
Physical IPV						
Yes	43 (56.1)	33 (43.9)	1.41 (0.70 - 2.86)	0.332	1.72 (0.66 - 4.44)	0.260
No	120 (47.4)	134 (52.6)	Ref		Ref	
Sexual IPV						
Yes	48 (46.4)	56 (53.6)	0.83 (0.44 - 1.58)	0.587	0.58 (0.25 - 1.33)	0.202
No	115 (50.8)	111 (49.2)	Ref		Ref	

Reference category for the level of anxiety is “moderate to severe anxiety” IPV—intimate partner violence.

From **Table 3**, all the women under study are anxious. Moderate to severe depression occurred in more than half of the women. Less than half (49.4%) had minimal to low level of anxiety. The presence of any form of IPV is associated with increase burden of any form of anxiety. Diagnosis of HIV infection prior to index pregnancy is associated with increase odds of having ML anxiety in bivariate analysis (cOR = 0.73 95% CI 0.31 - 1.72; P = 0.480) but became of less importance in multivariate analysis (aOR = 0.29 95% CI 0.08 - 1.01; P = 0.052). Even though, it is not significant there is increased odds of developing ML anxiety among the women that were victim of physical IPV (aOR = 1.72 95% CI 0.66 - 4.44). Unemployment status is associated with 91% chance of developing moderate to severe anxiety (aOR = 0.91 95% CI 0.99 - 0.33; P < 0.05). The parity of the women is not significantly associated with increased odds of developing anxiety state. Women with secondary education are at an increased odds of developing ML anxiety compared to those that have tertiary education (OR = 1.30 95% CI 0.52 - 3.25) although it is not significant.

From **Table 4**, the risk of developing moderate to severe depression (MS depression) was high among women with secondary education. Being a trader (OR = 5.22 95% CI 1.44 - 18.98; P = 0.012) or a housewife (OR = 4.98 95% CI 1.24 - 20.02; P = 0.24) is associated with a high risk of occurrence MS depression which was significant in bivariate analysis but became less of importance in multivariate regression analysis. Women living with HIV infection prior to index pregnancy had a higher burden of MS depression. Physical and sexual IPV were more common among women with MS depression with OR > 1. Women in 1st and 2nd trimesters of pregnancy (OR = 2.43 95% CI 1.02 - 5.76; P = 0.043) and those that were yet to disclosed their HIV status (OR = 3.03 95% CI 0.68 - 13.46; P = 0.144) to either the husband or anybody were associated with increased likelihood of developing severe disease (depression). Women who were Para 0 (OR = 54.0 95% CI 3.9 - 747; P = 0.003) Para 2 (OR = 9.30 95% CI 1.7 - 50.1; P = 0.009) were significantly at increased risk of developing severe depression.

Table 4. Bivariate and multivariate regression analysis between level of depression and its associated factors among the study population.

Variable	Level of depression		COR	P-value	AOR	P-value
	minimal to mild	moderate to severe				
	n (%)	n (%)				
Education						
Secondary	74 (35.4)	135 (64.6)	1.54 (0.78 - 3.03)	0.205	0.83 (0.29 - 2.38)	0.734
Tertiary	32 (26.2)	89 (73.8)	Ref		Ref	
Occupation						
Govt. employed	11 (37.5)	18 (62.5)	4.60 (0.95 - 22.16)	0.057	0.34 (0.02 - 5.45)	0.452
Unemployed	6 (13.0)	37 (87.0)	1.15 (0.20 - 6.35)	0.873	0.49 (0.03 - 7.81)	0.616
Self-employed	4 (33.3)	7 (66.7)	3.83 (0.47 - 30.7)	0.206	0.27 (0.01 - 5.65)	0.403
Trading	55 (40.5)	82 (59.5)	5.22 (1.44 - 18.98)	0.012	0.26 (0.24 - 2.86)	0.274
Housewife	24 (39.4)	37 (60.6)	4.98 (1.24 - 20.02)	0.024	0.20 (0.21 - 2.32)	0.199
Student	6 (11.5)	43 (88.5)	Ref		Ref	
Residence						
Urban	60 (30.8)	133 (69.2)	0.87 (0.46 - 1.64)	0.671	1.20 (0.50 - 2.88)	0.676
Rural	46 (33.8)	91 (66.2)	Ref		Ref	
Parity						
0	7 (15.4)	41 (84.6)	0.08 (0.01 - 0.39)	0.002	54.0 (3.9 - 747.6)	0.003
1	15 (25.0)	44 (75.0)	0.14 (0.03 - 0.61)	0.009	6.60 (1.2 - 36.3)	0.300
2	18 (19.2)	78 (80.8)	0.10 (0.02 - 0.41)	0.001	9.30 (1.7 - 50.1)	0.009
3	21 (47.8)	22 (52.2)	0.40 (0.09 - 1.70)	0.220	2.90 (0.56 - 15.1)	0.201
4	18 (55.6)	15 (44.4)	0.55 (0.12 - 2.49)	0.443	2.20 (0.42 - 11.7)	0.343
5	9 (35.7)	17 (64.3)	0.24 (0.05 - 1.23)	0.080	3.80 (0.64 - 22.8)	0.140
6	18 (69.2)	7 (30.8)	Ref		Ref	
Gestational age						
≤28 weeks	39 (22.6)	133 (77.4)	0.39 (0.20 - 0.76)	0.005	2.43 (1.02 - 5.76)	0.043
>28 weeks	67 (42.4)	91 (57.6)	Ref		Ref	
HIV disclosure						
Undisclosed	9 (25.0)	28 (75.0)	0.67 (0.23 - 1.97)	0.477	3.03 (0.68 - 13.46)	0.144
Disclosed	97 (32.9)	196 (67.1)	Ref		Ref	
Partner's HIV status						
Negative	48 (30.2)	111 (69.8)	0.75 (0.39 - 1.46)	0.043	0.52 (0.21 - 1.30)	0.165
Positive	50 (36.5)	88 (63.5)	Ref		Ref	
HIV diagnosis						
Before current pregnancy	87 (30.7)	196 (69.3)	0.66 (0.27 - 1.58)	0.359	2.71 (0.72 - 10.16)	0.139
During current pregnancy	19 (40.0)	28 (60.0)	Ref		Ref	

Continued

Psychological IPV						
Yes	28 (33.3)	56 (66.7)	1.08 (0.52 - 2.22)	0.827	0.64 (0.22 - 1.85)	0.415
No	78 (31.6)	168 (68.4)	Ref		Ref	
Physical IPV						
Yes	24 (31.7)	52 (68.3)	0.98 (0.46 - 2.07)	0.961	1.86 (0.63 - 5.42)	0.350
No	82 (32.1)	172 (67.9)	Ref		Ref	
Sexual IPV						
Yes	28 (26.8)	76 (73.2)	0.69 (0.34 - 1.41)	0.321	1.88 (0.75 - 4.72)	0.178
No	78 (34.4)	148 (65.8)	Ref		Ref	

Reference category for the level of depression is “minimal to mild depression” IPV—intimate partner violence.

4. Discussion

Anxiety and depression are some of the psychological problems that could complicate pregnancy [18]. The study aims at assessing the prevalence of anxiety and depression among HIV pregnant women and the factors influencing its occurrence in our health facility. The burden of anxiety and depression is very high among the study population as none of the women in our study was free from psychological problems. Our finding is in keeping with the high incidence rate of depression/anxiety disorder in HIV pregnant women [5] [6] [19]-[21]. This can have a negative effect on adherence to HIV-related care during pregnancy thereby potentially increasing “vertical” transmission. In our study, the point prevalence rate of moderate to severe depression was 67.9% while minimal to mild depression occurred in 32.1% of the study population. Even though, depression is common in pregnancy, the high burden of severe depression seen in our women could be a testament of HIV complicating pregnancy [5] [21] [22]. Anxiety level was also high as 50.1% had moderate/severe disease. Above findings, corroborate earlier report of increase burden of psychological distress in HIV pregnant women. [4] Qin *et al.* reported a positive detection rate of 60.8% and 54.1% of anxiety and depression in HIV pregnant women [4]. Previous studies by Yousuf *et al.* [6], Harrington *et al.* [19], Zhu *et al.* [20] and Nyamukoho *et al.* [21] have reported on the anxiety/depression disorder among HIV, positive pregnant women.

Prevention of Mother to Child Transmission of HIV (PMCT) is to reduce the burden of “vertical” transmission of HIV. HIV pregnant women non-utilization of PMCT services increases the infants HIV positivity rate compared to infants of mothers that are on Highly Active Antiretroviral Therapy (HAART) [15]. HIV pregnant women with psychological issues have increased odds of not utilizing PMCT care [12]. In our study, the burden of psychological issues is very high and is under the influence of various independent predictors. The level of depression is highly influenced by parity. Women who are nulliparous bear high odds of being depressed even though the effect size is low (OR = 54.0 95% CI 3.9 - 747.6; P = 0.003). Other levels of parity are not immune from severe depression as shown

in **Table 4**. Secundiparous women are 9.3 times at greater risk of severe disease when compared to women who are Para 6 ($P = 0.009$). Among the women we studied, moderate to severe depression was more in women in 1st and 2nd trimester of pregnancy. This early onset of severe disease is likely going to have a deleterious effect on the ability of the women to care for her family and her pregnancy. This finding of early onset of severe depression is a clarion call for mother and child health care providers in the study area to anticipate this problem and set in motion actions for early identification of women at risk and provision of adequate care. There is need for the provision of social support to these women. Previous study has highlighted the role of social support in boosting the psychological resilience of HIV/AIDS affected women coping positively with depression and anxiety [23]. Majority of the women we studied have disclosed their HIV status to somebody but only 7.9% has informed her partner. This might contribute to the level of depression seen in our study and can impair the women uptake of PMCT services. Intake of HAART will suffer and infant post exposure prophylaxis will not be adequate thereby defeating the noble goal of prevention of “vertical” transmission. The poor disclosure rate seen in our study is not in keeping with high disclosure rate of 75% reported in Ethiopia [24]. Partner disclosure of her status is essential in prevention and control of HIV [24]. A plausible reason for poor disclosure to sexual partner might be the high occurrence of psychiatric illness cum the high level of IPV evidence in our study. The burden of IPV is high among the study population as 62.7% of the women are victims of one form of IPV during the index pregnancy. This is in support of the high prevalence of untold domestic trauma that women bear in sub Saharan Africa [21] [25]. Sexual IPV is the most common form of IPV followed by psychological IPV. This is in keeping with previous studies. It is also obvious from **Table 4** that participants in the study who are victim of IPV have increased odds of depression. IPV as a single factor increases the odds of non-adherence to PMCT [26].

Pregnancy constitutes a maternal challenge and HIV infection adds an additional risk [3]. This will task a woman’s coping ability leading to a variety of fluctuating emotional states such as anxiety [3]. Previous studies have documented on the increasing prevalence of anxiety state in HIV pregnant women [6] [22] [23], in line with our finding. In our study, 51.0% of the study population had moderate/severe anxiety state while minimal/low anxiety state occurred in 49.0%. The level of education, area of residence, presence of IPV and parity were associated with increased odds of not developing moderate/severe anxiety. From our study, attainment of tertiary education is a risk factor for moderate/severe anxiety. A plausible explanation could be the full understanding of its implication by these educated women and perceive loss of self-esteem attributable to testing positive to HIV infection. It is an irony that the presence of psychological (OR = 1.20 95% CI 0.46 - 3.07; $P = 0.703$) and physical (OR = 1.72 95% CI 0.66 - 4.44; $P = 0.260$) IPV favours minimal/low anxiety state. This finding could be as a result of adaptation and coping style adopted by these women. These coping strategies include self-control; escape-avoidance and manifestation of responsibility to the diagnosis

of HIV infection [3]. It is also evident from our study (**Table 3**) that prior diagnosis of HIV infection before the index pregnancy favours minimal/low anxiety (OR = 0.29 95% CI 0.08 - 1.01; P = 0.05).

5. Limitations of the Study

Our study is limited by its cross sectional nature. Being a cross sectional design, our assessment was a point evaluation and could represent the true trend of anxiety/depression issues that they pass through during the course of pregnancy and childbirth. A better approach would have been the assessment of these psychological issues during each trimester. This approach will be difficult as majority of pregnant women in the study book late (2nd and 3rd trimester). The problem of social desirability bias cannot be ruled out. Efforts were made to limit social desirability bias via anonymizing the questionnaire, proper counselling and education of the women that findings will not affect their care in the facility. A trained research assistant who is independent of the study design did data collection. This was to limit the bias inherent in data collection by the authors.

6. Conclusion

Our study has shown the unacceptable level of psychological distress that HIV pregnant women in our study bear during the process of pregnancy and childbirth. There is need for a routine screening of anxiety and depression among HIV positive pregnant women in the study area.

Declarations

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Health Research and Ethics Committee of Nnamdi Azikiwe University Teaching Hospital. Informed written consent was obtained from the study population before being included in the study. The study was performed in accordance with relevant guidelines/regulations to avoid any harm being done to the study participants by ensuring autonomy, and confidentiality.

Consent for Publication

Not applicable.

Availability of Data and Material

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Authors' Contributions

CCA, IHA & OSU: conceptualization/study design, data collection/analysis, and interpretation of findings and drafting and writing of the manuscript. All participated in the review of the final manuscript. All the authors approved the manuscript. CCA, IHA & OSU: conceptualization/study design, data collection/analysis, and interpretation of findings and drafting and writing of the manuscript. CCI, ACI, VNO, CJO, CIE, PCO, ANO, MPO, & RLE—data collection/analysis, interpretation of findings and writing of the manuscript All participated in the review of the final manuscript. All the authors approved the manuscript.

Conflicts of Interest

The authors declare that they have no competing interests.

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