A Comparison of Antenatal Depressive Disorders in Urban and Rural Pregnant Women in Nigeria

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Authors' contributions

Original Research Article

ABSTRACT

Background: The prevalence of antenatal depression (AND) is consistently higher in urban areas in developed counties while the reverse is the case in developing counties developing countries. This highlights that socioeconomic gaps and health disparities between different settings could

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have important implications on perinatal mental health. Nigeria, the most populous nation in Africa, is home to multiple ethnic and cultural groups and about half of the population is rural. But then a majority of Nigerian studies on and were conducted in the urban and semi-urban southern regions. Few, if any, such studies were ever conducted in the urban or rural settings of northern Nigeria. The study aimed to determine and compare the prevalence and factors associated with AND among pregnant women in urban and rural northern Nigeria settings. A descriptive comparative cross-sectional study was conducted among antenatal clinic attendees of an urban and a rural health facility in Kano State, northern Nigeria. Data were collected from pregnant mothers. A socio-demographic and clinical characteristics questionnaire was used to obtain the relevant data. Edinburgh Postnatal Depression Scale (EPDS), Hamilton Depression Rating Scale (HDRS) and the major depression module of the Mini International Neuropsychiatric Interview (MINI-7) were used to screen, rate and diagnose depression among the respondents respectively.

Results: The urban pregnant women were older (28.3±5.7 versus 26.0±5.6 years, p=0.001), better educated (12.8±2.8 versus 8.9±4.3 years of schooling, p<0.001), earning higher average monthly income (36.0 USD vs 13.0 USD, p<0.001), in the second trimester of the pregnancy (22% versus 9.7%, p=0.004). While the rural women were more likely to have planned to get pregnant (84.1% versus 69.3%, p=0.003) and used psychoactive substances while pregnant (20.7% versus 8.7%, p=0.003). The prevalence of AND was significantly higher among the rural respondents as compared to the urban respondents (33.1% versus 14.7% p<0.001). Anaemia in pregnancy (AIP), a history of a background medical problem (BMP) was significantly associated with AND in the urban setting (p= 0.032 and p= 0.001 respectively). While in the rural setting, AIP and a history of BMP were significantly associated with AND (p=0.0063 and p=0.008 respectively). Furthermore, among the multigravid urban and rural respondents, previous pregnancy complication was found to be significantly associated with AND (p=0.030). Among the urban women, the predictor for AND was a history of BMP (OR=5.049, 95%CI=1.451-17.570). The significant predictors for AND in the rural setting were AIP (OR=3.337, 95%CI=1.468-7.798) and history of BMP (OR=3.298, 95%CI=1.267-8.885).

Conclusion: Rural prevalence of AND was significantly much higher than the urban rate. Certain factors, such as BMP and AIP, were associated with AND in both urban and rural settings.

1. INTRODUCTION

The trend noted about the prevalence of antenatal depression is that in developed countries the prevalence tends to be higher among urban women [1]. Another trend showed prevalence is in developing countries where the prevalence is higher among rural women. This could be related to the wide social, economic and, educational gap between urban and rural women in third-world countries. The prevalence estimates of antenatal depression in an urban and a rural South African setting, according to two different studies, were 22% and 47% respectively [2,3]. It points to the fact that socio-economic inequalities, which occur between different settings, could have important implications on perinatal mental health. In Nigeria, the prevalence of antenatal depression ranged from 8.3% to 10.8% in semi-urban areas and up to 24.5% in a rural agrarian community, while in the cities of Port Harcourt and Enugu, the prevalence estimates were 9.57% and 23.5% respectively [4-8]. Women of younger age have

been found to have a higher probability of occurrence of depression [1,9]. Being married could be related to a lower risk of antenatal depression [1,10]. Unemployment has also been implicated [10]. Anaemia is one of the common complications of pregnancy, in developing countries where up to 24% of pregnant women are anaemic. A study among pregnant women found that anaemic women were 2.5 times more likely to be depressed [11]. Prevalence of depression in the anaemic and non-anaemic women was 45% and 25% respectively. Obese women were more likely to be depressed than those who were not [12,13]. Pregnancy-induced hypertension and unplanned pregnancy be associated with antenatal depression according to different studies [14,15,16]. Previous pregnancy complications such as preterm delivery, low birth weight, intrauterine growth retardation and undergoing obstetric instrumentation, as well as depression or anxiety, are associated with depression in the current pregnancy [4,6,16]. Women who have chronic medical illnesses, such as hypertension,

diabetes, asthma and gastrointestinal disorders, are at an increased risk of developing antenatal depression while pregnant [16,17,18].

Aim: This study aimed to determine and compare the prevalence and factors associated with antenatal depression among women in urban and rural settings in Kano, northern Nigeria.

2. METHODOLOGY

Study Area: The study was carried out in Kano state, Northern Nigeria. Kano state has a projected population of 3,999,000 in 2020 and 4,348,000 in 2023 [19]. Kano City serves as an important commercial center. It is a cosmopolitan city. The majority of the inhabitants of Kano belong to the Hausa-Fulani tribe and Islamic faith. The majority of the employed people are traders, civil servants or private sector employees; There were two study locations, urban and rural.

Urban Site: Aminu Kano Teaching Hospital (AKTH): Aminu Kano Teaching Hospital is a tertiary health facility located in Kano City. The hospital's Department of Obstetrics and Gynecology runs antenatal clinics in the morning hours of every Monday to Thursday.

Rural Site: Kumbotso Comprehensive Health Center (KCHC): Kumbotso is a rural town located in Kano state, it is 30 kilometers from Kano city. Farming and animal rearing are the major occupations of the people of Kumbotso. Kumbotso Comprehensive Health Centre has been the rural training facility of Aminu Kano Teaching Hospital. The antenatal clinic at the health center runs from Monday to Wednesday of every week.

Study Population: Comprised of all the pregnant women who were attending the Antenatal Clinics of Aminu Kano Teaching Hospital and Kumbotso Comprehensive Health Center, during the months of October 2019 to January 2020. The total numbers of women registered were 1582 and 700 pregnant women respectively.

Inclusion Criteria for the study were; (a) ≥13 weeks gestational, (b) At least 16 years old, (c) Must be residing at the designated area for at least two years.

Exclusion Criteria for the study were; (a) Personal or family history of a psychiatric disorder (b) Women who had not previously booked at the facility.

The study Type was a Comparative Cross-Sectional Study.

Sample Size was calculated;

Using the formula; [20]

$$n= (Z_{alpha} +Z_{1-beta})^2 \ (p1q1+p2q2)/(p1-p2)^2$$

Where, n= minimum sample size
n= 117.

After correction for possible dropout of 15%, the sample was increased to; 138, which was rounded up to 150 respondents per group of respondents.

Sampling Technique: A convenient sampling method was used to select antenatal clinics for Aminu Kano Teaching Hospital and Kumbotso Comprehensive Health Centre as the urban and rural study sites respectively. This was followed by a systematic sampling technique to pick the respondents for each clinic day.

The following Instruments were used in the study:

1. Socio-Demographic and Clinical/Obstetric Characteristics Questionnaire.
2. Edinburgh Postnatal Depression Scale (EPDS): EPDS has been validated among pregnant women in Nigeria, sensitivity and specificity levels of 0.867 and 0.915 were found [21]. A cut-off scores of 10 and 12 were found to be suitable for minor and major depression respectively. English and Validated Hausa versions of the Edinburgh postnatal depression scale were used in this study [22].
3. Hamilton Rating Scale for Depression (HDRS): The 17-item version was used for the clients in this study. The instrument has been validated; the test-retest reliability was found to be 0.89.
4. Mini Neuropsychiatric Interview (MINI-7): This is a short diagnostic interview and is used globally [23]. The current version corresponds to the DSM-5 diagnosis and the major depressive episode module of MINI was used to confirm the diagnosis of depression among the respondents. The instrument was translated into Hausa language and its correlation with the English version was 0.92.

Data Analysis: A p-value of <0.05 was considered statistically significant. Data were analyzed using SPSS 21 [24].

3. RESULTS

300 pregnant women were recruited into the study, and returned responses from 295 were found to be eligible for data analysis. The response rate was 98.3%. There was a slight preponderance of urban responders, who were 150 (51%), while the remaining 145 (49%) were rural dwellers.

Comparison of the Socio-demographic Characteristics between the Urban and Rural Respondents (Table 1): The urban pregnant women were significantly older (p=0.00), among the rural women, the age group 21-25 years had the highest frequency, as compared to the 26-30 years age group among the urban women. The rural women were also significantly more likely to belong to a younger age group (p=0.013). Up to 98% and 96% of the urban and rural women were married respectively. The Hausa ethnic group represented 67% of the urban sample, while among the rural sample, the value was 86%, this was found to be statistically significant (p<0.001). There were no statistically significant differences in terms of employment status or family type between the two samples (p=0.347 and 0.071).

The difference in the years of schooling, between the urban and rural respondents, was statistically significant (p<0.001). On average, the urban women had a higher monthly income, 12,950 Naira (36 USD) versus 4618 Naira (13 USD).

Muslims constituted 93.3 and 97.9% of the urban and rural respondents respectively.

All 30 rural women, who used psychoactive substances, during the index pregnancy, reported using Kola nut only. While 10 of the urban women were taking Kola nut, the remaining 3 urban women admitted to the abuse of tramadol tablet, codeine syrup and pentazocine injection respectively See Fig. 1.

A Comparison of the Obstetric and Clinical Characteristics between the Urban and Rural Respondents (Table 2): A significantly large proportion of pregnancies among rural women were planned (p=0.003). A significantly higher proportion of urban women were in the second trimester of their pregnancies (p=0.004). There was no statistically significant difference between the two samples in terms of gravidity, blood pressure status, or index pregnancy complications.

The types of pregnancy-related complications, among the urban and rural respondents, are outlined in Table 3. There was no significant difference in the proportion of respondents with a history of background medical problems between the two samples. However, among the 24 urban women who reported a history of background medical problems, over half (72.7%) had hypertension see Table 4.

The urban sample had an insignificantly higher percentage of women with normal haemoglobin concentration (p=0.156). A significantly larger proportion of the urban pregnant women were obese (p<0.001).
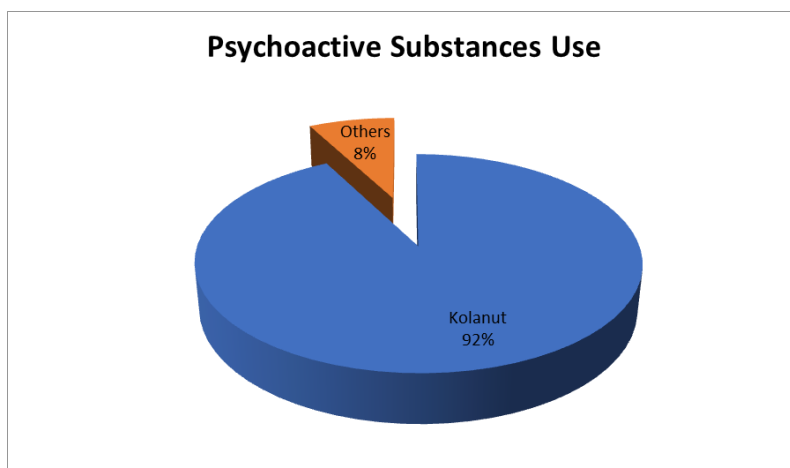
Fig. 1. Types of Psychoactive Substances used by the Respondents who admitted to have used psychoactive substance during the index pregnancy. N=43. Others included Tramadol tablet, Codeine syrup and Pentazocine injection

Table 1. A Comparison of Socio-demographic Characteristics between the Urban and Rural Respondents

Variables	Urban (n=150)	Rural (n=145)	Test Value	Df	p-value
Age (years)					
Mean (SD)	28.3 (sd±5.7)	26.0 (sd±5.6)	3.422[a]	293	**0.001***
Age Groups (years)					
16------20	13	27	12.723[b]	4	**0.013***
21------25	46	56			
26------30	48	37			
31------35	21	15			
≥36	22	10			
Marital Status					
Married	147	139	#	N/A	0.329
Others	3	6			
Ethnicity					
Hausa	103	125	12.922[b]	1	**<0.001***
Others	47	20			
Religion					
Christians	10	3	3.700[b]	1	0.054
Muslims	140	142			
Family Type					
Monogamous	121	104	3.25[b]	1	0.071
Polygamous	29	41			
Years of Schooling					
Mean (SD)	12.8 (sd±2.8)	8.9 (sd±4.3)	9.201[a]	293	**<0.001***
Employment					
Employed	50	41	0.884[b]	1	0.347
Unemployed	100	104			
Monthly Income (Naira)					
Mean (SD)	12950(±24,976)	1931 NGN(±4618)	5.226[a]	293	**<0.001***
Use of Psychoactive Substance					
No	137	115	8.559[b]	1	**0.003***
Yes	13	30			

a = Student's t-test. b = chi-square test. df = degree of freedom. NGN = Nigerian Naira.
*#=Fisher exacts Test. N/A= Not applicable. *p<0.05*

A Comparison of Previous Risk Factors between the Multigravid Urban and Rural Respondents: Among the multigravid urban women, 25 (22.1%) had a history of previous pregnancy complications, while among the rural women, 24 (20.2%) reported previous complications see Table 5.

A Comparison of the Prevalence of Antenatal Depression between the Urban and Rural Samples: Among the urban sample 22 out of the 150 women were found to be depressed, with an urban antenatal depression prevalence of 14.7% (95% CI = 9.4%- 21.4%). Out of the 22 depressed urban women; 10, 7 and 5 were rated as having mild, moderated and severe forms of depression respectively. Four of the urban

women were diagnosed with major depressive disorder. In the case of rural women, 48 out of the 145 respondents were found to have depression, a rural antenatal depression prevalence of 33.1% (95% CI = 25.5%- 41.4%). 28, 11 and 9 were rated as having mild, moderate and severe depression respectively. A major depressive disorder was diagnosed among 8 of the rural responders. The severity of antenatal depression between urban and rural women is projected in Fig. 2.

The prevalence of depression was not only higher among rural pregnant women, the difference was also found to be statistically significant (p<0.001), see Table 4.

Table 2. A Comparison of Obstetric and Clinical Characteristics between the Urban and Rural Respondents

Variables	Urban (N=150)	Rural (N=145)	Chi Test Value	df	p-value
Index pregnancy Complicated					
No	126	130	2.055	1	0.152
Yes	24	15			
Pregnancy planned					
No	46	23	9.018	1	**0.003***
Yes	104	122			
Trimester					
Second	33	14			
Third	117	131	8.389	1	**0.004***
Gravidity					
Primigravid	37	26			
Multigravid	113	119	1.992	1	0.158
Background Medical Problem					
No	106	115			0.087
Yes	44	30	2.931	1	
Hypertension in Pregnancy					
No	131	121			
Yes	19	24	0.894	1	0.344
Anaemia in Pregnancy					
No	122	108			
Yes	28	37	2.0126	1	0.156
Obese					
No	91	131	34.874	1	**<0.001***
Yes	59	14			

Table 3. The types of pregnancy-related Complications among the Urban (N=24) and Rural (N=15) Respondents who reported complications during their index pregnancies

Types of Complications	Urban Respondents n (%)	Rural Respondents n (%)	Total n (%)
Gestational hypertension	13 (54.2)	6 (40.0)	19 (48.7)
Gestational diabetes	5 (20.8)	4 (26.7)	9 (23.1)
Vaginal bleeding	3 (12.5)	3 (20.0)	6 (15.4)
Others	3 (12.5)	2 (13.3)	5 (12.8)

Others included recurrent headaches and leg swellings

Table 4. The Types of Background Medical Problems among the Urban (N=44) and Rural (N=30) Respondents who reported having Background Medical Problems

Types of the Medical Problems	Urban Respondents n (%)	Rural Respondents n (%)	Total n (%)
Hypertension	32 (72.7)	23 (76.7)	55(74.3)
Diabetes Mellitus	9 (20.5)	5 (16.7)	14 (18.9)
Others	3 (6.8)	2 (6.6)	5 (6.8)

Others included asthma and peptic ulcer disease

Table 5. Comparison of Previous Risk Factors between the Multigravid Urban and Rural Respondents

Variable	Urban N=113 n (%)	Rural N=119 n= (%)	χ2	df	p-value
Previous pregnancy complication					
No	88(77.9)	95(79.8)	1.592	1	0.207
Yes	25(22.1)	24(20.2)			
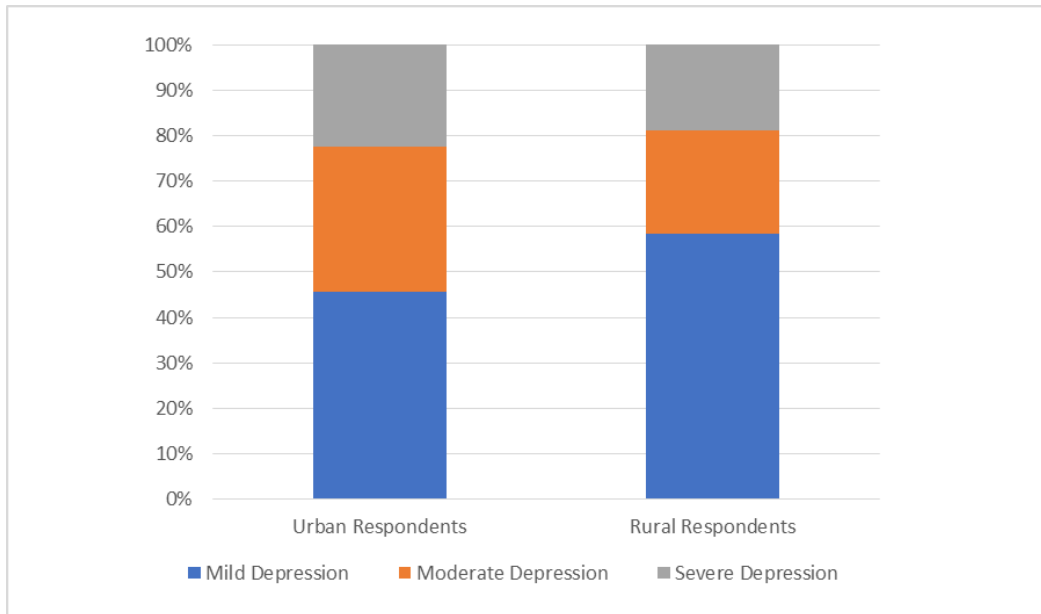
Fig. 2. Levels of Severity of Depression among the Depressed Urban (N=22) and Rural (N=48) Respondents

Table 6. A Comparison of the Prevalence of Antenatal Depression between the Urban (N=150) and Rural (N=145) Respondents

	Urban n (%)	Rural n (%)	Significance		
Depressed	22 (14.7)	48 (33.1)	χ2	df	p
Non-depressed	128 (85.3)	97 (66.9)	13.897	1	**<0.001***

A Comparison of the Association between Socio-demographic Characteristics and Antenatal Depression between the Urban and Rural Respondents: Tables 7 and 8 depict how the socio-demographic variables associated with antenatal depression among the urban and rural samples of pregnant women respectively. A median split was used to categorize the respondents into two age groups (<26 and ≥26-year-olds). Among the urban respondents, members of the younger age group were found to have a lower prevalence of depression (11%), while the older group recorded 16%. But in the rural sample, the reverse was the case; 36% and

30% of the younger and the older age groups were respectively depressed. However, in both the urban and rural settings there was no significant association between the age of the respondents and antenatal depression (p=0.435 and p=0.587). No significant association was found between marital status and antenatal depression in both urban and rural settings. However, among the urban respondents, 77% of the depressed persons were from monogamous homes, while it was 64% in the rural sample. Among the urban respondents, 68.2% of those with depression were unemployed, while among the rural respondents, 62.5% of those found to

be depressed were unemployed. About 4.5 and 29.2% of the depressed urban and rural respondents admitted having used psychoactive substances during the index pregnancy. The association between psychoactive drug abuse and antenatal depression was however insignificant in both the urban and rural samples. There was also no significant association, in both settings, between antenatal depression and other socio-demographic factors, such as education, ethnicity and religion.

A Comparison of Association between Clinical/Obstetric Factors and Antenatal Depression among the Urban and Rural Respondents: Clinical/obstetric factors associated with antenatal depression were determined and compared between the urban and rural samples. See Tables 9 and 10. Among the urban respondents, 15.2% of those who did not plan to conceive their current pregnancies

were depressed, while among their rural counterparts, the value was 34.8%, however, in both settings no significant association was found between antenatal depression and whether or not the index pregnancy was planned (p=0.899 and p=0.852 respectively). Among the urban respondents, 72.7% of those found to be depressed were reported to have experienced complications during the current pregnancy. However, among the rural respondents, 83.3% of depressed respondents suffered pregnancy complications. In the urban sample, 13.6% of the depressed were primigravids, while the rural primigravids constituted 18.8% of those found to be depressed. In both the urban and rural settings, the prevalence of antenatal depression was higher among women in the third trimester, 81.8% and 91.7% respectively. However, there was no significant association between gravidity or trimester and antenatal depression in both urban and rural settings.

Table 7. The Association between Socio-demographic Characteristics and Antenatal Depression among the Urban Respondents (N=150)

Variables	Depressed n (%)	Non-depressed n (%)	Test Value	df	p-value
Age (years)[a]					
Young	7 (31.8)	52 (40.6)	0.610[@]	1	0.435
Old.	15(68.2)	76 (59.4)			
Marital Status					
Married	22 (100.0)	125 (97.7)	#	N/A	>0.99
Others	0 (0)	3 (2.3)			
Family Type					
Monogamous	17 (77.3)	104 (81.3)	#	N/A	0.77
Polygamous	5 (22.7)	24 (18.7)			
Ethnicity					
Hausa	14 (63.6)	89 (69.5)	0.303[@]	1	0.582
Others	8 (36.4)	39 (30.5)			
Religion					
Christians	1 (4.5)	9 (7.0)	#	N/A	>0.99
Muslims	21 (95.5)	119 (93.0)			
Education					
Low	4 (18.2)	42 (32.8)	1.890[@]	1	0.1692
High	18 (81.8)	86 (67.2)			
Employment Status					
Employed	7 (31.8)	43 (33.6)	0.027[@]	1	0.870
Unemployed	15 (68.2)	85 (66.4)			
Use of Psychoactive Substance					
No	21 (95.5)	116 (90.6)	#	N/A	0.693
Yes	1 (4.5)	12 (4.0)			

a= Young refers to those aged less than 26 years, and old were those aged 26 years and above. b = other marital statuses c = other major ethnic groups d = low education those with no or years of education at most 5 years, and high education refers to those who had at least 6 years of schooling. @= Chi-square. #= Fisher exacts Test; N/A= Not applicable

Table 8. The Association between the Socio-demographic Characteristics and Antenatal Depression among the Rural Respondents (N=145)

Variables	Depressed n (%)	Non-depressed n (%)	Test Value	Df	p-value
Age (years)[a]					
Young.	29 (60.4)	54 (55.7)	0.296[@]	1	0.587
Old	19 (39.6)	43 (44.3)			
Marital Status					
Married	48 (100)	91 (93.8)			
Others	0 (0)	6 (6.2)	#	N/A	0.178
Family Type					
Monogamous	31 (64.6)	73 (75.3)			
Polygamous	17 (35.4)	24 (24.7)	1.804[@]	1	0.179
Ethnicity					
Hausa	42 ((87.5)	86 (88.7)			
Others	6 (12.5)	11 (11.3)	0.042[@]	1	0.838
Religion					
Christians	0 (0)	3 (3.1)	#	N/A	0.551
Muslims	48 (100)	94 (96.9)			
Education					
Low	20 (41.7)	33 (34.0)			
High	28 (58.3)	64 (66.0)	0.8097[@]	1	0.3682
Employment Status					
Employed	18 (37.5)	23 (23.7)			
Unemployed	30 (62.5)	74 (76.3)	3.010[@]	1	0.083
Use of Psychoactive Substance					
No	34 (70.8)	81 (83.5)	3.142[@]	1	0.076
Yes	14 (29.2)	16 (16.5)			

a= Young refers to those aged less than 26 years, and old are aged 26 years and above. b = other marital statuses. c = other major ethnic groups. d = low education those with no or years of education at most 5 years, and high education refers to those who had at least 6 years of schooling. @= Chi-square. #= Fisher exacts Test. N/A= Not applicable

Among the urban respondents, those with a history of a background medical problem constituted 59.1% of depressed cases and about 24.2% of the non-depressed respondents. While in the rural sample, those with a history of background medical problems made up 33.3% of those with depression and 14.4% of the non-depressed respondents. A significant association was found between antenatal depression and a history of a background medical problem in both urban and rural settings. The prevalence of antenatal depression among the anaemic and non-anaemic urban pregnant women was 28.6 and 11.5% respectively. A similar trend was observed among the rural respondents, where 51.4 and 26.9% of the anaemic and non-anaemic pregnant women were depressed. The association between anaemia and antenatal depression was significant in both settings. But there was no significant relationship between antenatal depression and factors such as blood pressure and obesity in both the urban and rural settings.

A Comparison of the Associations between Antenatal Depression and some previous Risk Factors among the Multigravid Urban and Rural Respondents: These are shown in Tables 11 and 12. Among the urban multigravid respondents, 44.4% of those found to be depressed had a history of previous pregnancy complications. But the urban respondents who suffered previous pregnancy complications constituted only 17.9% of the non-depressed respondents. Hence a significant association was found between previous pregnancy (ies) complications and antenatal depression among the urban respondents. But in the case of the multigravid rural respondents, only 28.2% of those found to be depressed had a positive history of previous pregnancy complications. However, 16.2% of the non-depressed rural

respondents had a history of previous pregnancy complications. The association between antenatal depression and previous pregnancy complications, among the multigravid rural respondents, was not statistically significant.

Predictors of depression: Model 1 for the urban sample was found to be statistically significant, χ^2 (9) = 37.192, p<0.001. The model explained 22% (using Cox and Snell method) to 38.8% (Nagelkerke method) variance in antenatal depression among the urban respondents. The model was able to identify 89.3 % of cases as either depressed or not. History of a background medical problem, made a statistically significant contribution to the model (p<0.001 the odds ratio for history of a background medical problem was 5.05. This meant that those with a history of background

medical problems were five times more likely to be depressed than those without see Table 13.

Model 2 was for the prediction of antenatal depression among the rural respondents, it was significant, χ^2 (9) = 23.078, p=0.006. The model explained a 14.7 to 20.5% variance in antenatal depression among the rural sample. It was able to identify 69.7 % of the rural pregnant women as having depression or not. History of a background medical disorder and anaemia in pregnancy were the significant predictors in this sample (p=0.02 and p=0.001). The odds ratio for a background medical disorder was 3.23, meaning that rural women who had a history of a background medical disorder were about three times more likely to be suffering from antenatal depression when compared with women with no such history. For anaemia in pregnancy, the odds ratio was 3.33 see Table 14.

Table 9. The Association between Obstetric/Clinical Characteristics and Antenatal Depression among the Urban Respondents (N=150)

Variables	Depressed n (%)	Non-depressed n (%)	Test Value	Df	p-value
Index pregnancy planned					
No	7 (31.8)	39 (30.5)	0.16[@]	1	0.899
Yes	15 (68.2)	89 (69.5)			
Current Pregnancy Complicated					
No	16 (72.7)	110 (85.9)			
Yes	6 (27.3)	18 (14.1)	#	N/A	0.125
Gravidity					
Primigravida	3 (13.6)	34 (26.6)			
Multigravida	19 (86.3)	94 (73.4)	1.688[@]	1	0.194
Trimester					
Second	4 (18.2)	29 (22.7)			
Third	18 (81.8)	99 (77.3)	#	N/A	0.785
Pre-existing Medical Disorder					
No	9 (40.9)	97 (75.8)			
Yes	13 (59.1)	31 (24.2)	11.01[@]	1	**0.001***
Hypertension in Pregnancy					
No	19 (86.4)	112 (87.5)			
Yes	3 (13.6)	16 (12.5)	#	N/A	>0.99
Anaemia in Pregnancy					
No	14 (63.6)	108 (84.4)			
Yes	8 (36.4)	20 (15.6)	#	N/A	**0.032***
Obese					
No	13 (59.1)	78 (60.9)	0.027[@]	1	0.870
Yes	9 (40.9)	50 (39.1)			

*a= pregnancy complication such as pregnancy-induced hypertension or high blood sugar. b=background medical disorders which predated the pregnancy such as hypertension and asthma. c=diastolic blood pressure ≥90mmHg on ≥2 occasions. d= low blood haemoglobin level of less than 11g/dl. @= Chi-square. #= Fisher Exact Test. N/A= Not applicable; *= p<0.05*

Table 10. The Association between Obstetric/Clinical Characteristics and Antenatal Depression among the Rural Respondents (N=145)

Variables	Depressed n (%)	Non-depressed n (%)	Test Value	df	p-value
Index pregnancy planned					
No	8 (16.7)	15 (15.5)	0.035[@]	1	0.852
Yes	40 (83.3)	82 (84.5)			
Current Pregnancy Complicated					
No	42 (87.5)	88 (90.7)			
Yes	6 (12.5)	9 (9.3)	#	N/A	0.57
Gravidity					
Primigravida	9 (18.8)	17 (17.5)			
Multigravida	39 (81.2)	80 (82.5)	0.033[@]	1	0.856
Trimester					
Second	4 (8.3)	10 (10.3)	#	N/A	>0.999
Third	44 (91.7)	87 (89.7)			
Pre-existing Medical Disorder					
No	32 (66.7)	83 (85.6)			
Yes	16 (33.3)	14 (14.4)	6.990[@]	1	**0.008***
Hypertension in Pregnancy					
Normotensive	40 (88.9)	81 (83.5)			
Hypertensive	8 (11.1)	16 (16.5)	0.001[@]	1	0.979
Anaemia in Pregnancy					
No	29 (60.4)	79 (81.4)			
Yes	19 (39.6)	18 (18.6)	7.470[@]	1	**0.0063***
Obese					
No	44 (91.7)	87 (89.7)			
Yes	4 (8.3)	10 (10.3)	#	N/A	>0.999

@= Chi-square. #= Fisher Exact Test. N/A =Not applicable

Table 11. The Association between previous risk factors and antenatal depression among the Multigravid Urban Respondents. (N=113)

Variables	Depressed n (%)	Non-depressed n (%)	Fisher exact Test	p-value
Previous pregnancies(s) complicated				
No	10 (55.6)	78 (82.1)		
Yes	8 (44.4)	17 (17.9)		**0.030***

Table 12. The Association between Previous Risk Factors and Antenatal Depression among the Multigravid Rural Respondents. (N=119)

Variables	Depressed n (%)	Non-depressed n (%)	χ^2	df	p-value
Previous pregnancies(s) complicated					
No	28 (71.8)	67 (83.8)			
Yes	11 (28.2)	13 (16.2)	2.327	1	0.127

Table 13. The predictors of Antenatal Depression among the Urban Respondents

Variables	SE	Df	Sig	Exp(B)	95% CI for Exp(B)
Age	0.064	1	0.463	0.967	0.853-1.096
Years of schooling	0.097	1	0.331	0.885	0.731-1.070
Polygamous family	0.740	1	0.482	0.614	0.144-2.615
Current pregnancy complication	0.76	1	0.983	0.754	0.168-3.383
Use of a psychoactive substance	1.360	1	0.337	0.240	0.017-3.4422
Multigravidity	0.901	1	0.105	3.928	0.671-22.986
Pre-existing medical condition	0.636	1	0.006*	5.049	1.451-17.570
Anaemia in pregnancy	0.647	1	0.169	2.239	0.631-7.952

Table 14. Independent Predictors of Antenatal Depression among the Rural Respondents

Variables	SE	Df	Sig	Exp(B)	95% CI for Exp(B)
Age	0.042	1	0.50	0.972	0.895-1.056
Years of schooling	0.048	1	0.370	1.044	0.950-1.148
Polygamous family	0.456	1	0.109	2.076	0.849-5.075
Current pregnancy complication	0.645	1	0.453	1.623	0.458-5.748
Use of a psychoactive substance	0.462	1	0.231	1.739	0.703-4.297
Multigravidity	0.569	1	0.530	0.669	0.229-2.134
Pre-existing medical condition	0.488	1	**0.015***	3.298	1.267-8.885
Anaemia in pregnancy	0.433	1	**0.005***	3.337	1.428-7.798

4. DISCUSSION

Socio-demographic Characteristics and their Comparisons among the Urban and Rural Respondents: The rural sample was made up of significantly younger women, rural women are more likely to get married earlier than urban women. According to the 2018 Nigeria Demographic and health survey (NDHS), the median age of marriage among Nigerian women was 19.1 years [25]. Also, rural women tend to drop out of school, where the schools exist, much earlier than their urban counterparts. Therefore, it is not surprising that in this study the urban women had significantly higher mean years of schooling. Nwizu and colleagues have reported that about 41% of the women attending the antenatal clinic in a tertiary hospital in Kano had attained a tertiary level of education [26]. While Ugwa has reported that up to 70% of women attending an antenatal clinic at a rural hospital in Kano state had no formal education at all [27]. These two respective revelations about the educational attainment among pregnant women from urban and rural settings of Kano are in keeping with the findings of this study. Although the employment rate was higher among the urban respondents, the difference was not statistically significant. This is in keeping with figures released by the National Bureau of Statistics (NBS), which indicated the unemployment rate among females in Kano state was about two times what was found among

males [28]. The high unemployment rate among pregnant women has been noted in other parts of the world. Wang and colleagues have reported that up to 86% of pregnant women in a rural Chinese population were unemployed. This was even higher than what was found in this study [29].

Although members of the Hausa ethnic group were the predominant participants in this study, the dominance was significantly more pronounced in the rural sample of respondents. This is because the majority of the non-indigenes of northern Nigeria tend to reside in urban areas due to better livelihood opportunities. A large percentage of the rural respondents were from polygamous homes, this is possibly because the traditional African polygamous family system is still more popular in the rural areas [30]. Intake of psychoactive substances, especially the caffeine-rich Kola nut, was significantly commoner among rural pregnant women. This is a manifestation of a culturally acceptable practice among Hausa people who eat Kola nuts for several reasons, ranging from ceremonies to self-medication. Lack of awareness about the high caffeine content of the Kola nut was possibly higher among rural pregnant women. The impact of caffeine intake among pregnant women on maternal mental health has been a subject of controversy, with some studies affirming its safety and others making contradictory findings [31,32]. In this study a higher proportion of the rural pregnant

women who eat Kola nut (caffeine) while pregnant were depressed when compared with those who did not take the Kola nut, however, the difference in the prevalence of depression between the two sub-groups was not statistically significant.

Clinical/Obstetric Characteristics and their Comparisons among the Urban and Rural Respondents: A relatively smaller proportion of rural pregnant women admitted that their pregnancies were unplanned. The lower rural prevalence of unplanned pregnancy, which was defined as a pregnancy that is unwanted or mistimed', could be linked to several factors [33]. The positive attitude of many rural families towards large family sizes could make the rural women to be 'ever ready' to get pregnant. The difference in ethnic composition, between the samples in this study, could also explain why the rural respondents were more likely to believe that their pregnancies were planned. In keeping with this statement, Ashimi and colleagues have reported that members of the Hausa-Fulani ethnic group were less likely to use family planning methods [34] Another possible reason, for the higher prevalence of planned pregnancy among the rural respondents, could be due to the relative lack of awareness of modern family planning options. On the other hand, some of the urban women could represent cases of contraceptive failure. In support of this claim, Rabiu and colleagues have reported a high rate of awareness about contraceptive options (92%), among a sample of pregnant women in Kano city [35]. Only 42% of the women ever practiced modern methods of family planning. Another finding in this study was that a significantly larger proportion of the rural women were in the third trimester of their pregnancies, suggesting that the rural women were more likely to book late at the antenatal clinic. This is in keeping with the findings of the secondary analysis of the 2013 NDHS by Adewuyi and colleagues [36]. Another possible explanation for the relatively late antenatal booking could be attributed to the lower level of education and income among the rural responders. A relatively larger percentage of urban pregnant women admitted having experienced previous or current pregnancy complications. This could be because the urban women were relatively more educated. As a result of that, they were more likely to be aware of the common complications of pregnancy and remember them. Another way to explain the higher prevalence of pregnancy complications among the urban respondents was that the rural

women who experienced pregnancy complications were more likely to be referred to secondary or tertiary health centers, the majority of which are located in urban or semi-urban areas. This might also be related to the fact that the rural health center where this study was conducted has a good referral agreement with a higher level of health care. Therefore, it was expected that the majority of rural pregnant women were in a stable state. Just under a quarter of the whole sample of respondents were anaemic. The prevalence of anaemia in pregnancy among the urban respondents was 18.7%. This was close to 17% reported by Nwizu and colleagues at the same clinic [26]. The prevalence of anaemia among the rural respondents was 25.5%. However, the difference in the prevalence of anaemia between the urban and rural respondents was not significant. In the nearby city of Zaria, the prevalence of anaemia in pregnancy ranged from 12.6 to 20.6% [37,38]. The revelation of a higher prevalence of anaemia among rural pregnant women is in keeping with the findings of Okafor and colleagues among a sample of urban and rural antenatal clinic attendees in Cross River State, Nigeria [39]. The higher prevalence of anaemia among the rural respondents could be related to findings that anaemia in pregnancy is commoner among women from lower socioeconomic classes [26]. Another reason could be related to the fact that poverty, malnutrition, ignorance and parasitic infestations, which are risk factors for anaemia, are more common in rural areas. Among the urban and the rural respondents, the prevalence estimates of obesity were 39.3 and 9.7% respectively. The difference in the proportion of obese respondents, among the urban and rural women, was found to be significant. The higher prevalence of obesity among the urban respondents could be related to better nutritional status and affluence among them. Another possible explanation for the higher proportion of urban obese women could be related to the fact that rural women were more likely to be leading a more physically active and vigorous lifestyle. Consistent with the findings of this study, Chigbu and Leornard reported that pregnant women from urban areas in Enugu state, Nigeria, were significantly more likely to be obese than rural women [40]. The prevalence of obesity reported among Nigerian pregnant women ranges from 10.7 to 33.1% [40,41].

Prevalence of Antenatal Depression and its Comparison among the Urban and Rural Respondents: An important finding in this study

was that the prevalence of depression among rural pregnant women was significantly higher. This is in keeping with the findings of some previous studies which suggested that antenatal depression is usually commoner among rural dwellers; especially in the context of developing countries [42]. This could be related to the fact that poverty, illiteracy and gender inequalities, among others, are commoner in the rural areas of developing countries. Such life adversities have been known to be associated with depression [43]. In addition, the urban respondents could benefit from relatively better socioeconomic opportunities and access to better healthcare. These could have increased their level of resilience to antenatal mental health challenges. The urban antenatal depression prevalence of 14.7% found in this study was higher than what was found, i.e., 9.6% among pregnant women in Port Harcourt City, Nigeria [8]. This could be related to the fact that different instruments were used to assess antenatal depression in the two studies. Another possible explanation for the differences could be that the respondents in the studies differ greatly in their sociodemographic characteristics. Two studies from urban areas of southwestern Nigeria also reported a lower prevalence of antenatal depression [4,5]. This could be attributed to the better accessibility and availability of both medical and mental healthcare services in that part of the country. However, the prevalence of antenatal depression among the urban respondents, in this study, was lower than what was reported in the eastern Nigerian city of Enugu [7]. The prevalence of antenatal depression reported from a rural agrarian area of southwestern Nigeria was 24.5% [6]. That value was higher than what was reported from the urban areas of the same region. This further implies that antenatal depression is more prevalent among rural women, regardless of the region. Pregnant women found to be depressed in this study were treated in line with the recommendations of the NICE guidelines [44. It is worthy to state that the rural women were referred to the weekly psychiatric clinic that runs at the comprehensive health center they were attending.

Association between socio-demographic variables and antenatal depression among the urban and rural respondents: No significant association was found between the age of the respondents and antenatal depression in both the urban and rural samples of this study. This was in keeping with the findings of Fatoye

and colleagues [45]. However, the prevalence of antenatal depression, in this study, was higher among the older and the younger respondents in the urban and the rural settings respectively. The finding that a larger proportion of older women were depressed in the urban setting could be linked to the fact that older urban women were more likely to be overburdened with taking care of their children and husband. In addition, the older women were more likely to be the first or second wives of their husbands and were less likely to receive adequate and passionate care from their husbands because of their pregnancy states and older age. Another possible explanation for the higher prevalence of antenatal depression among the older urban respondents could be attributable to the stress of formal sector employment since the employment rate was significantly higher among urban women. On the other hand, the higher prevalence of antenatal depression among the younger rural women, in this study, could be linked to the fact that the rural women were significantly younger than their urban counterparts, as such less experienced with the stress of pregnancy and marital life. The finding that the prevalence of antenatal depression was higher among the younger expectant mothers is in keeping with the findings of Gureje and colleagues during a trial of a psychosocial intervention against perinatal depression in southwestern Nigeria [46]. Gureje and colleagues reported that the prevalence of perinatal depression among women aged less than 20 years was 18.8%, compared to 6.9% among those that were aged 20 years and over. A similar difference was found by the same team of researchers, who reported that the prevalence estimates of depression among pregnant teenagers aged 14-17 years and those aged 18-20 years were 27.9% and 16.4% respectively [46]. The finding that antenatal depression was more prevalent among the younger women in the rural setting, according to this study, could also be because, in some rural areas of northern Nigeria, wives are expected to be dutiful to a large extended family of their spouses, such as preparing the family meal, among others. These could ultimately predispose the younger rural pregnant women to depression. Thompson and Ajayi have also reported a significantly higher prevalence of antenatal depression among the younger respondents in a previous Nigerian study [6].

Although no significant association was found between the family type and antenatal

depression in both the urban and rural settings of this study, the prevalence of antenatal depression was slightly higher among women from polygamous homes among the urban respondents. But among the rural respondents, the prevalence of antenatal depression was over 6 times higher among respondents from monogamous homes when compared with those from polygamous families. This could be attributed to the acceptance of polygamy as a normal way of life among rural women. In addition, the polygamous family setting, if cordial and successful, could be a source of support to some pregnant women in rural settings. Contrary to what was obtained in this study, Fatoye and colleagues reported that southwestern Nigerian women from polygamous homes were significantly more likely to suffer from antenatal depression [45]. However, the cited study was conducted among pregnant women from a semi-urban area, where polygamy is becoming less popular with the advent of modernization.

In the urban setting, the prevalence of antenatal depression was negligibly higher among women with low levels of education. While in the rural setting, the prevalence of antenatal depression was much higher among those with a higher level of education. These findings suggest that education does not have a clear association with antenatal depression among the participating women. This could be understood because of the high level of ignorance about mental health in society, and even then, most educated individuals are not exempted from the pervasive unawareness about mental health problems and how to address them. However, Thompson and Ajayi have reported that having no formal education was a risk factor for antenatal depression [6]. In this study, no significant association was found between employment status and antenatal depression. Among the urban respondents, an almost similar prevalence of antenatal depression was found among employed and unemployed women. This could be due to different reasons. Being employed has its advantages and disadvantages to mental health, some of the advantages include the acquisition of a source of livelihood and the creation of a social network. But employed women could be at risk of excessive work stress, abuse at the place of work and so on. Therefore, the net effect of being employed on the mental health of pregnant women could be difficult to ascertain. On the other hand, the prevalence of antenatal depression among employed rural women was twice what was obtained among the

unemployed. This could be related to the fact that the employed rural women were more likely to work in small establishments, where the monthly allowance might be low. Apart from workplace exploitation, employed rural women could be faced with stigma from a society, where the morality of women working outside homes is often questioned.

According to the findings of this study, the association between psychoactive substance use and antenatal depression was insignificant. This could be because the predominant psychoactive substance consumed by both the urban and rural respondents was kola nut. Kola nut is known to be rich in caffeine, which is a central nervous system stimulant, therefore less likely to be associated with the onset of depressive symptoms.

Association between Clinical/Obstetric Variables and Antenatal Depression among the Urban and Rural Respondents: In the urban sample of this study, the prevalence of antenatal depression was found to be lower (8.1%) among primigravida when compared with multigravida (16.8%). While in the rural setting, the prevalence estimates of antenatal depression among the primigravida and multigravida were 34.6 and 32.8% respectively. This finding could be related to the fact that the urban primigravida were more likely to be older and more educated than their rural counterparts. Also, the urban primigravida were likely not to have dependent children when compared with the urban multigravid women, this could be associated with less stress and lower antenatal depression prevalence among the former group of women. The higher prevalence of antenatal depression among the urban multigravid respondents could also be explained by the fact that the demands of work, because of larger family size, might put the urban multigravid women at higher risk of antenatal depression. So, it is not surprising that in the rural sample, the prevalence of antenatal depression was higher among primigravid women. In this study, no significant association was found between antenatal depression and gravidity, even when both the urban and the rural samples of pregnant women were combined. This implies that there is no significant difference in the prevalence of antenatal depression between the primigravid and multigravid pregnant women in this study. This finding could be because both groups of pregnant women were predisposed to different peculiar factors which could be associated with depression in

pregnancy. For instance, the multigravid women were more likely to have been exposed to previous pregnancy complications, while the primigravid women were more likely to be dealing with fears, worries and uncertainties due to their lack of experience with pregnancy and its outcome. Therefore, these could be the reasons why there is no significant difference in the prevalence of depression between primigravid and multigravid women. Consistent with this study's findings, Husain and colleagues have concluded that based on the findings of their study also, there was no significant association between parity and antenatal depression [47].

The prevalence of antenatal depression, in this study, was found to be lower among women in the second trimester in both the urban and rural settings- 12.1 versus 15.4% and 28.6 versus 33.6% respectively. This suggests that the prevalence of antenatal depression increases as the pregnancy progresses. This could be related to the hormonal changes of advancing pregnancy and or excessive concern about the outcome of the pregnancy. Bennet and colleagues made a finding of a similar trend, in which the prevalence of antenatal depression in their study across the 1st and 3rd trimesters was 7.4% and 12.0% respectively [48]. However, Thompson and Ajayi made an opposite finding, the prevalence declining as the pregnancy advances [6]. Therefore, the relationship between the trimester of pregnancy and antenatal depression is still a subject for further research.

History of previous pregnancy complications, such as vaginal bleeding and caesarian delivery, were significantly associated with an increased risk of antenatal depression among urban women. This could be related to the fear and sense of hopelessness among urban pregnant women when they remember their experiences. Adewuya and colleagues have also reported that pregnancy complication was associated with antenatal depression among a sample of pregnant women in southwestern Nigeria [4]. In both settings, patients with anaemia in pregnancy were found to have a higher prevalence of antenatal depression. In addition, among the rural respondent's anaemia in pregnancy was found to be an independent predictor of antenatal depression. This could be attributed to the fact that anaemia is often associated with deficiencies of some micronutrients, such as folic acid and vitamins, which are essential for optimal brain functions, and emotional regulation inclusive. Another way

to explain this finding could be that the relationship between anaemia and depression might be bidirectional, in the sense that depressed women are more likely to engage in habits, such as poor food or supplement intake, that promote the onset of anaemia. On the other hand, anaemia could negatively affect the functions of the emotion centres in the brain, leading to depression. In addition, both anaemia in pregnancy and depression were said to be more common among women from low socioeconomic classes [26,49]. Therefore, it should not be surprising that the two conditions were significantly associated with each other in this study. Consistent with the finding of this study, Sheeba as well as Yilmaz and colleagues, have also reported significant associations between anaemia in pregnancy and antenatal depression [50,51]. In this study, insignificant associations were found between maternal obesity and antenatal depression among both urban and rural pregnant women. Nevertheless, the prevalence of antenatal depression was slightly higher among obese urban women. This could be related to the fact that awareness of the health risks associated with obesity and cosmetic concern could be more common among urban women. This suggestion is supported by the finding that the prevalence of antenatal depression was much higher among the non-obese rural respondents in this study. Elsewhere in the West African sub-region, among Ghanaian and Ivorian pregnant women, it was reported that there was a positive correlation between maternal weight and depressive symptoms [12]. Molyneaux and colleagues, as well as Schulette and colleagues, have also reported that maternal obesity is associated with antenatal depression and other mental disorders [52,53]. The findings of the aforementioned studies contradicted what was found in this study. This could be because, in some of the studies, pre-pregnancy obesity was considered, while in this study relatively early pregnancy obesity was used. This suggests the need for similar studies in our settings, where the participants will have their obesity status assessed before or in a very early pregnancy state.

History of a pre-existing chronic medical disorder, such as hypertension and diabetes mellitus, is significantly associated with antenatal depression among both the urban and rural respondents in this study. Logistic regression has revealed that urban and rural pregnant women with a history of a chronic medical disorder were respectively 5.0 and 3.3 times more likely to

experience depressive symptoms. This finding could be related to the fact that a history of a chronic disorder, on its own, is a major stressor especially when it is coupled with hormonal and other physiological changes of pregnancy. This significant association implies that psychological disorders, especially depression, should be searched for and appropriately managed among pregnant women who have a history of a background medical condition. The finding that pre-existing medical problems among pregnant women could put them at risk of developing antenatal depression is not unprecedented. Among pregnant women in Abeokuta, Nigeria, having a background medical condition is a significant risk factor for antenatal depression [6]. In other parts of the world, Brown and colleagues have made a similar finding [54]. Two other studies were even more specific as to the type of chronic disorders, pre-existing hypertension and diabetic mellitus, which were found to increase the risk of antenatal depression [1,55].

Strength:

1. Unlike the majority of the existing studies on antenatal depression, which were conducted at a single location, this study was conducted among urban and rural pregnant women. The importance of this comparative approach to a maternal mental health condition cannot be overemphasized in a country like Nigeria, where over half of the population is rural.
2. Both the urban and rural health centers, where the study was conducted, had qualified health record personnel and good records kept, these enabled the clinical information obtained from the respondents' files (with the respondents' permissions) to be reliable.
3. The adoption of the systematic random sampling method also helped in strengthening this study, as the sampling technique eliminated a clustered selection.
4. Data collection was done simultaneously.
5. All the instruments used in this study have been validated in this environment.
6. The sample size was determined using the local Nigerian prevalence of antenatal depression, this helped in preventing the under or over-estimating the optimal sample size.
7. The response rate was high (98%).

Limitations:

1. The cross-sectional design implies that this study cannot establish a causal relationship between antenatal depression and its associated factors.
2. Although the booking weight and height were used in this study, body mass index is still an unreliable measure of obesity, especially among late booking cases.

General Recommendations based on study findings:

1. Governments should ensure that mental health is actively integrated into the primary level of health care.
2. Advocacy for early antenatal care should be intensified. This could lead to early detection, treatment and prevention of pregnancy complications, which are often associated with mental disorders.
3. Pregnant women who have a history of pre-existing chronic medical conditions should be closely monitored and appropriately treated.

Specific Recommendations:

1. Routine screening and appropriate management of antenatal depression among pregnant women, especially during antenatal care should be performed by their clinicians.
2. There is a need for training of antenatal clinicians on how to detect, treat and refer pregnant women with psychological distress.
3. Pregnant women with a history of previous pregnancy complications should be counselled and offered counselling/psychotherapeutic treatment to decrease their vulnerability to antenatal depression.
4. It is recommended that women undergo a pre-pregnancy assessment of some baseline parameters like weight and height.

5. CONCLUSION

The prevalence of depression in pregnancy was significantly higher among women who reside in rural areas. History of a background medical condition and anaemia in pregnancy was found to be significantly associated with antenatal depression among the urban and rural respondents. These imply that anaemia in pregnancy and background medical problems are predisposing factors for depression in pregnancy. Anaemia in pregnancy should be

prevented and treated as early as possible if it occurs. Previous pregnancy complications, such as vaginal bleeding and pregnancy-induced hypertension, in the course of the current pregnancy, are significantly associated with antenatal depression among urban pregnant women.

Ethical Approval and Consent: Ethical clearance was obtained from the Health Research Ethics Committee (HREC) of Aminu Kano Teaching Hospital. Participation was voluntary with informed consent and those found to be depressed were treated.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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