

# Prevalence and predictors of depression, anxiety, and stress symptoms among pregnant women during COVID-19-related lockdown in Abakaliki, Nigeria

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## Abstract

### Background

Several studies have been published on the topic of COVID-19 and pregnancy over recent months. However, few studies have evaluated the impact of this pandemic on maternal mental health, particularly in low-resource settings.

### Aim

To determine the prevalence and predictors of COVID-19-related depression, anxiety and stress symptoms among pregnant women.

### Methods

This was a cross-sectional study that involved 456 pregnant women attending prenatal care at Abakaliki, Nigeria, during the COVID-19 lockdown. These patients were screened for psychological morbidities using the Depression Anxiety and Stress Scale-21 (DASS-21).

### Results

Severe and extremely severe depression were reported in 7.2% (n=33) and 6.4% (n=29) of participants, respectively. Analysis also revealed that 3.3% (n=15) and 7.7% (n=35) of women had severe and extremely severe anxiety, respectively. In total, 23% (n=105) of the participating women had severe stress while 16.7% (n=76) reported extremely severe stress. Multiparity (2–4) and occupation, such as trading and farming, were predictors of depression whereas grand-multiparity, urban residence, and trading, were identified as predictors of anxiety and stress.

### Conclusion

Symptoms of depression, anxiety and stress were relatively common among pregnant women during the COVID-19 lockdown in Abakaliki, Nigeria. There is a clear need to integrate screening for depression, anxiety and stress, in existing antenatal care programs so as to identify and prevent long-term adverse psychological outcomes related to the COVID-19 pandemic.

**Key Words;** Pregnant women, depression, anxiety, stress, COVID-19 pandemic

## Introduction

In December 2019, a series of pneumonia cases caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in Wuhan, China<sup>1</sup>. This infection has spread to over 110 countries, including Nigeria, prompting the World Health Organization (WHO) to declare a pandemic on 11 March 2020. The Nigeria Centre for Disease Control announced the first confirmed case of coronavirus disease in Nigeria on 27 February 2020; since then, many confirmed cases have been reported in all of the States across the country<sup>2</sup>. By 24 August 2020, there had been 52,548 confirmed cases and 1004 deaths from SARS-CoV-2 infection in Nigeria<sup>2</sup>.

Under normal circumstances, approximately 10% of pregnant women suffer from mental disorders, particularly depression<sup>3</sup> when calculated on a global basis although this figure has been reported to be higher (16%) in developing nations<sup>4</sup>. The prevalence of such disorders may have been aggravated during the coronavirus disease 2019 (COVID-19) pandemic because pregnant women may have experienced restricted access to mental health services. The mental health impact of the COVID-19 pandemic on childbearing women is a major public health challenge and requires appropriate and timely health care support to avert adverse health outcomes; at present, this issue is a significantly under-

represented research area<sup>5</sup>.

Information relating to the potential long-term physical and psychological impacts of the COVID-19 pandemic on pregnant women and the fetus have yet to be fully elucidated. However, studies on the psychological effects of the SARS outbreak in 2003 on the experience of pregnant women showed that in addition to physical health implications, these women experienced high levels of depression, anxiety and stress with regards to potential infection<sup>6</sup>. Anxiety over the pregnant woman's own health and that of the fetus may have detrimental effects on maternal and fetal well-being<sup>7</sup>.

Anxiety is common during and after pregnancy as women anticipate and adjust to motherhood, especially in those women and couples who have previously experienced adverse pregnancy outcomes, such as miscarriage and perinatal death<sup>8,9</sup>. The COVID-19 pandemic has resulted in fear, anxiety and concern in many nations as a result of the pandemic itself<sup>10,11</sup>, but also due to the restrictive public health measures implemented to reduce community transmission. Border closures, travel bans, quarantine measures, and physical distancing have resulted in increased levels of isolation and reduced access to, and interaction with, social supports and networks<sup>12,13</sup>. This is likely to result in increased levels of stress, anxiety, loneliness and depression, particularly for pregnant women who will have an added level

of concern about their own health and the protection of their unborn baby. Empirical evidence suggests that prenatal stress is related to higher rates of adverse birth outcomes, such as preterm delivery, low birth weight, and a high rate of caesarean section<sup>14</sup>.

In order to prevent transmission of COVID-19, measures and guidelines were altered in the management of many patients, including pregnant women. This particular group of patients is likely to be affected by the significant changes in the management of pregnancy, labour, birth and postnatal care provided by health services including a reduction in face-to-face appointments and increased use of telemedicine<sup>9</sup>. Studies have shown that lockdown is creating significant stress on pregnant women with consequential effects on the maternity providers (obstetricians, midwives, nurses and allied health professionals) caring for them<sup>15</sup>. In Nigeria, the psychological impact of these measures on pregnant women has yet to be described.

The objectives of this study were to determine the prevalence and associated factors of depression, anxiety and stress among pregnant women attending for prenatal care in a tertiary health institution in Abakaliki during the COVID-19 lockdown in Nigeria.

## Materials and methods

### *Study design, period and setting*

This was a cross-sectional study conducted from 1 March 2020 to 31 July 2020 at the antenatal clinic of Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria. This hospital manages approximately 4500 deliveries annually and receives referral from all parts of the state and the neighbouring states of Benue, Enugu, Cross River and Abia, as well as any other part of the country<sup>16</sup>.

### *Study participants and criteria*

The study participants were pregnant women in all trimesters of gestation attending for prenatal care at the study facility during the study period. Women who gave consent to participate in the study were included. Those with a history of psychiatric illness, or conditions that limit their ability to understand the study questions, were excluded.

### *Sampling technique and recruitment*

A total sampling method was used in the study and consecutive pregnant women who were attending for antenatal care were approached to participate in the study. Due to the lack of data on the prevalence of depression, anxiety and stress symptoms among our pregnant population, we decided to use a total sampling method. The sampling was performed by acquiring the attendance register of pregnant women attending for prenatal care during weekdays as the women presented. All pregnant women attending for prenatal care at the study facility were informed about the study and were asked to participate in the study. After consultation with a doctor, a questionnaire was offered to all eligible women in the attendance register. The women completed the questionnaire and returned it to the researchers or research assistants for analysis.

### *Sample size determination*

It was important that we determined the adequate sample size for each condition (depression, anxiety and stress). Taking the prevalence ( $p$ ) of depression among pregnant women to be 13.5%, as based on a study reported by Taubman-Ben-

Ari et al.,<sup>7</sup> the sample size required was 208 considering a precision of 5% and a design effect of 1.5 using OpenEpi software<sup>17</sup>. If estimated considering the prevalence of stress ( $p=29.8\%$ ) and anxiety ( $p=24.1\%$ ), the sample size, with the other assumptions remaining constant, were 315 and 288, respectively. Considering the largest value of the three, 315, and assuming that approximately 10% of questionnaires will have incomplete responses, the sample size was estimated to be 346.5. However, to increase the power of the study, we recruited 456 pregnant women.

### *Data collection and analysis*

Data were collected using a self-administered structured questionnaire. The questionnaire had two components: sociodemographic characteristics and the Depression Anxiety and Stress Scale-21 (DASS-21).

The sociodemographic variables collected were age, parity, marital status (single, married, divorced or widowed), area of residence (rural or urban), educational level attainment (no formal education, primary, secondary or tertiary), occupation (housewife, farmer, trader, artisan, or civil servant), and the semester of gestation.

The DASS-21 is a self-reporting questionnaire that features 21 items; 7 items per subscale of depression, anxiety and stress<sup>18</sup>. This questionnaire has been used in different populations to assess depression, anxiety, and stress symptoms, in the ongoing COVID-19 pandemic<sup>10,11,14</sup>. In completing the DASS-21, each individual was required to indicate the presence of a symptom over the previous week. Each item was scored from 0 ("did not apply to me at all over the past week") to 3 ("applied to me very much or most of the time over the past week"). In this tool, a 4-point severity scale was used to assess the state of the participants in the three subscales over the previous week. Each score was multiplied by 2 and the final scores were assessed against the DASS severity ratings (Table 1).

The survey questionnaire, and the consent form in English, were translated into Igbo language, and then back-translated to English to check for semantic equivalence. The reliability of the questionnaire was checked by conducting a pre-test among pregnant women in the antenatal clinic; this was undertaken in 5% of the sample size. Using the pre-test data, we were able to investigate the understandability, clarity and organization of the questionnaire. The reliability test yielded a Cronbach's alpha value of 0.896.

All returned questionnaires were checked manually for completeness and consistency of responses. The collected data were entered and analysed using SPSS version 22 (IBM Corp. Amork, New York, USA). Continuous variables are presented as means  $\pm$  standard deviations (SDs) while categorical variables are summarized as numbers and percentages. Multivariate logistic regression analysis, presented with odds ratios (OR) and 95% confidence intervals (CI), was used to identify sociodemographic factors associated with psychological morbidities.  $P$  values  $<0.05$  were considered to be statistically significant.

### **Ethical considerations**

This study was approved by the Research and Ethics Committee of the Alex Ekwueme Federal University Teaching Hospital, Abakaliki. Informed consent was taken from the study participants after informing the study participants with regards to the objectives, expected outcomes and benefits of the study. All responses remained confidential.

**Results**

In total, 456 women participated in this study. The mean age of the participants was 27 ± 12.6 years; the age range

**Table 1. Depression Anxiety and Stress Scale severity ratings**

Severity	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	≥28	≥20	≥34

**Table 2. Sociodemographic characteristics of the participants (N=456)**

Variable	Frequency (%)
Age, years	
18–27	160 (35.1)
28–37	197 (43.2)
38–45	99 (21.7)
Mean age, years ± SD	
Parity	
0	95 (20.8)
1	107 (23.5)
2–4	165 (36.2)
≥5	89 (19.5)
Marital status	
Single	25 (5.5)
Married	401 (87.9)
Divorced	13 (2.9)
Widowed	17 (3.7)
Area of residence	
Rural	177 (38.8)
Urban	279 (61.2)
Educational qualification	
No formal education	31 (6.8)
Primary	66 (14.5)
Secondary	224 (49.1)
Tertiary	135 (29.6)
Occupation	
Housewife	81 (17.8)
Farmer	101 (22.1)
Trader	175 (38.4)
Artisan	36 (7.9)
Civil servant	63 (13.8)
Semester of gestation	
1st trimester	88 (19.3)
2nd trimester	209 (45.8)
3rd trimester	159 (34.9)

was 18–45 years, and the modal age was 28–37 years. The majority of the participants were married (87.9%), parity (para) 2–4 (36.2%), resided in urban areas (61.2%), had received secondary education (49.1%), were traders (38.4%), and were in the 2nd trimester of gestation (45.8%) (Table 2).

Table 3 shows the prevalence of various psychological states of the study cohorts. DASS-21 assessment showed that depression was reported in 45.2% (n=206) of participants: 31.6% (n=144) had mild-to-moderate depression, 7.2% (n=33) had severe depression, and 6.4% (n=29) had extremely severe depression. We also found that 37.5% (n=171) of the women surveyed reported anxiety symptoms. Of these, mild-to-moderate anxiety was reported by 26.5% (n=121) of participants. Severe and extremely severe anxiety were reported by 3.3% (n=15) and 7.7% (n=35) of the study participants, respectively. Of the 456 participants, 56.8% (n=259) reported stress symptoms. Analysis also showed that 17.1% (n=78) of women reported mild-to-moderate

stress symptoms; 23% (n=105) and 16.7% (n=76) reported severe and extremely severe stress, respectively.

**Table 3. Psychological outcomes of the participants (N=456), as determined by the DASS-21**

Psychological category	Frequency (%)
Depression	
Normal	250 (54.8)
Mild	83 (18.2)
Moderate	61 (13.4)
Severe	33 (7.2)
Extremely severe	29 (6.4)
Anxiety	
Normal	285 (62.5)
Mild	67 (14.7)
Moderate	54 (11.8)
Severe	15 (3.3)
Extremely severe	35 (7.7)
Stress	
Normal	197 (43.2)
Mild	25 (5.5)
Moderate	53 (11.6)
Severe	105 (23.0)
Extremely severe	76 (16.7)

Table 4 depicts multivariable logistic regression for predictors of depression, anxiety and stress among the participants. The sociodemographic characteristics of the participants had variable effects on the development of psychological symptoms relating to depression, anxiety and stress. Women aged between 38–45 years were three times more likely to develop depression when compared to those between 18 and 27 years (OR=3.1, 95% CI: 0.06–0.19, P<0.001). Other factors that were significantly associated with depression among pregnant women during COVID-19 lockdown were being para 2–4 (OR=1.9, 95% CI: 1.16–3.31, P=0.011), and having an occupation that required physical contact, such as being a farmer (OR=1.9, 95% CI: 1.01–3.52, P=0.047), trader (OR=3.4, 95% CI: 0.24–0.71, P=0.001), or an artisan (OR=5.1, 95% CI: 0.05–0.36, P<0.001). Factors that were significantly associated with a lower risk of depression among the participants were being aged 18–27 years (OR=0.6, 95% CI: 0.37–0.9, P=0.016), para 1 (OR=0.5, 95% CI: 0.31–0.94, P=0.028), divorced (OR=0.2, 95% CI: 0.05–0.93, P=0.04), and working as a civil servant (OR=0.5, 95% CI: 2.23–13.6, P<0.001).

Variables that were significantly associated with anxiety included an age of 38–45 years (OR=2.2, 95% CI: 0.1–0.3, P<0.001), para 5 and above (OR=4.1, 95% CI: 0.07–0.26, P<0.001), urban residence (OR=2.6, 95% CI: 0.39–0.87, P=0.008), tertiary education (OR=3.8, 95% CI: 0.12–0.39, P=0.001), and working as a trader (OR=4.2, 95% CI: 0.12–0.39, P<0.001).

Higher parity (≥5), urban residence, and being in the 3rd trimester of gestation were all significantly associated with the risk of developing stress symptoms. Grand-multiparous women were nearly six times more likely to report stress symptoms when compared to nulliparous participants (OR=5.9, 95% CI: 2.99–11.9, P<0.001). Furthermore, participants who lived in urban centres were three times more likely to report stress symptoms when compared with those living in rural areas (OR=3.3, 95% CI: 0.18–0.39, P<0.001). Stress was almost twice as high in women in their 3rd trimester of pregnancy when compared to those in their 1st trimester (OR=1.9, 95% CI: 1.05–3.29, P=0.034).

**Table 4. Multivariable logistic regression analysis showing the predictors of depression, anxiety and stress, among the participants**

Variable	Depression		Anxiety		Stress	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Age, years						
18-27	1.00		1.00		1.00	
28-37	0.6 (0.37-0.9)	0.016	1.0 (0.64-1.61)	0.946	1.5 (0.95-2.22)	0.081
38-45	3.1 (0.06-0.19)	<0.001	2.2 (0.10-0.30)	<0.001	0.9 (0.51-1.44)	0.559
Parity						
0	1.00		1.00		1.00	
1	0.5 (0.31-0.94)	0.028	0.7 (0.39-1.27)	0.245	1.5 (0.31-2.81)	0.501
2-4	1.9 (1.16-3.31)	0.011	1.8 (0.98-3.14)	0.055	0.4 (0.79-2.37)	0.051
≥5	0.7 (0.38-1.21)	0.185	4.1 (0.07-0.26)	<0.001	5.9 (2.99-11.9)	<0.001
Marital status						
Single	1.00		1.00		1.00	
Married	0.5 (0.17-1.23)	0.112	0.8 (0.34-1.91)	0.622	0.2 (0.08-0.52)	<0.001
Divorced	0.2 (0.05-0.93)	0.04	0.5 (0.14-1.8)	0.393	0.5 (0.12-2.15)	0.355
Widowed	0.5 (0.11-1.85)	0.274	0.4 (0.12-1.49)	0.179	1.0 (0.24-4.37)	0.972
Area of residence						
Rural	1.00		1.00		1.00	
Urban	0.8 (0.53-1.13)	0.179	2.6 (0.39-0.87)	0.008	3.3 (0.18-0.39)	<0.001
Educational qualification						
No formal education	1.00		1.00		1.00	
Primary	2.2 (0.89-5.19)	0.087	2.3 (0.95-5.41)	0.065	0.7 (0.29-1.94)	0.547
Secondary	0.9 (0.42-1.88)	0.758	1.6 (0.73-3.32)	0.248	0.2 (0.09-0.47)	0.421
Tertiary	1.3 (0.6-2.89)	0.484	3.8 (1.67-8.43)	0.001	0.1 (0.08-3.46)	0.301
Occupation						
Housewife	1.00		1.00		1.00	
Farmer	1.9 (1.01-3.52)	0.047	0.9 (0.43-1.73)	0.689	0.6 (0.34-1.11)	0.108
Trader	3.4 (0.24-0.71)	0.001	4.2 (0.12-0.39)	<0.001	0.1 (0.07-4.21)	0.089
Artisan	5.1 (0.05-0.36)	<0.001	0.3 (1.59-1.7)	0.061	1.4 (3.43-1.5)	0.355
Civil servant	0.5 (2.23-13.6)	<0.001	1.7 (0.71-4.13)	0.229	1.5 (3.04-3.29)	0.246
Semester of gestation						
1st trimester	1.00		1.00		1.00	
2nd trimester	0.7 (0.42-1.17)	0.173	1.5 (0.83-2.69)	0.179	1.2 (0.85-5.54)	0.361
3rd trimester	1.1 (0.65-1.88)	0.710	0.2 (0.09-1.29)	0.074	1.9 (1.05-3.29)	0.034

Similarly, over half (56.8%) of the participants reported stress symptoms. High parity (≥5), urban residence and being in 3rd trimester gestation were significantly associated with risk of developing stress symptoms. This is not surprising as women in these groups need social support to lighten the burden of pregnancy. Social distancing has resulted in inadequate social support for many pregnant women as they are separated from their loved ones, whom they rely on for support during this critical phase. While social support helps pregnant women to relieve stress, inadequate social support is one of the significant risk factors for extreme stress and depression among pregnant women.

Occupations requiring physical contacts, such as being a farmer, were associated with adverse mental health. In the present study, pregnant mothers who were farmers and residing in rural areas were at high risk of developing COVID-19-related depression, anxiety and stress. This is probably because the lockdown limited the ability of the rural population to procure essential services such as transportation to access emergency healthcare services that might not be available in the local communities. In addition, poor or a lack of palliative support during the

**Discussion**

Several studies on COVID-19 and pregnancy have been published recently. However, very few studies have evaluated the impact of this pandemic on maternal mental health, particularly in a low-resource setting. In this study, we evaluated the prevalence of depression, anxiety, and stress, among pregnant women during COVID-19 lockdown.

We found high levels of depression (45.2%) among our study participants. Pregnant women who were between the ages of 38 and 45 years, para 2-4, and those who had occupations that required physical contact, such as trading, were more likely to be affected. Over one-third (37.5%) of the pregnant women surveyed reported COVID-19-related anxiety. Similar findings were reported by Taubman-Ben-Ari et al. in Israel where a significant number of pregnant women reported COVID-19-related anxiety; the greatest concern was related to being in public places or taking public transport<sup>7</sup>. This was followed by anxieties relating to the health of others, either the fetus or family members, and then the possibility of the pregnant woman herself being infected, and anxiety relating to delivery. Although the same anxieties were shared by pregnant women experiencing diverse sociodemographic variables, the COVID-19 lockdown had resulted in low economic activity and difficulty accessing transportation in the event of emergency. These conditions are likely to make a pregnant woman feel less secure and therefore feel more anxious and distressed in the face of the current crisis.

lockdown period for rural households (for many of which women are the breadwinners), might be responsible for adverse psychological morbidities among pregnant women in rural settings. Therefore, training village healthcare workers on how to screen and detect psychological morbidities among at-risk pregnant women would aid timely referral for treatment and help to prevent prolonged adverse mental outcomes resulting from the COVID-19 pandemic<sup>22</sup>.

The long-term mental health outcome of COVID-19 is not yet known and it may take months to become completely evident. To provide adequate support to pregnant women in developing countries, in which only a minimal mental health service is available, there is a need to integrate screening for anxiety, stress and depression among the existing antenatal care programs. A detailed mental health crisis program should also be developed by introducing innovative strategies such as tele-consultation services to provide psychological assistance, for example cognitive behaviour therapy, to pregnant mothers in order to deal with secondary mental health challenges related with COVID-19.<sup>23</sup> There is a need for further research to investigate the impact of the COVID-19 pandemic on pregnant women and their babies, particularly in developing countries where mental health care is poorly developed. Culture-sensitive intervention programs should be put in place and taught to healthcare workers, such as nurses and midwives, for the early intervention of pregnant women suffering from COVID-19-related psychological distress.

Although pregnancy is a time of joy for most women, some women experience a range of negative emotions during pregnancy, thus leading to anxiety and depression<sup>19</sup>. Maternal mental health problems are associated with short-term and long-term risks for the affected mothers' overall health and function, as well as the physical, cognitive and psychological development, of the child<sup>20</sup>. Certain conditions, such as extreme stress, emergencies and conflict situations, and natural disasters, can inflate the risks of perinatal mental health morbidity<sup>21</sup>. Therefore, it is plausible that pregnant women are vulnerable to mental ill-health during the COVID-19 pandemic.

This study has a limitation that needs to be considered: this was a single-centre study that cannot be considered to be representative of the population of pregnant women across the whole of Nigeria during the lockdown period. A multicentre study would have improved the generalization of the study findings. Despite this limitation, this is a timely study and reflects the psychological distress of pregnant women in the face of the spread of COVID-19.

In conclusion, a significant proportion of pregnant women had psychological symptoms of depression, anxiety and stress, during COVID-19-related lockdown in Nigeria. There is a need to pay special attention to vulnerable populations, such as pregnant women, so as to prevent long term adverse psychological outcomes that may arise from the COVID-19 pandemic.

### Conflict of interest

The authors have no conflicts of interest to declare.

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