Knowledge, Attitudes and Practices of Pregnant Women Attending the Antenatal Clinic of Rivers State University Teaching Hospital, Nigeria towards the Coronavirus (COVID-19) Pandemic

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ABSTRACT

Background: COVID-19, a new respiratory infection was declared a global pandemic in 2020. Pregnant women are at risk because of their physiologic and immunologic changes. Preventive measures are essential as there is no definite cure. This study was therefore carried out to determine the knowledge, attitudes and practices of pregnant women attending antenatal clinic of Rivers State University Teaching hospital, Nigeria towards the COVID-19 pandemic.
Materials and Methods: This cross-sectional questionnaire-based study was conducted at the antenatal clinic of the hospital over 6weeks. Scores assessing knowledge, attitudes and practices were allocated and graded based on specific stratified demarcations.
Results: Two hundred and six respondents (81.4%) were assessed to have good knowledge. Fifty-one (20.2%) had overall good attitude while 67(26.5%) had good practice of preventive measures. The commonest symptoms of COVID-19 recalled were cough 169(27.8%), shortness of breath 153(25.1%) and fever 145(23.7%). Parity, mother's and spouse's level of education and occupation were significantly associated with knowledge levels while age of the mothers was associated with the attitude towards COVID-19 infection. Parity, mother's and spouse's level of education and occupation were significantly associated with the practice levels. There was an association of good knowledge and good attitude levels with good practice level (p>0.05).
Conclusion: Although pregnant women in Port Harcourt generally had good knowledge, majority of them had poor attitude and practice towards the pandemic. We therefore recommend strengthening public health education campaigns (including via antenatal clinic health talks, television and social media), providing evidence-based policies and debunking of wrong beliefs.

Keywords: COVID-19; Knowledge; Attitude; Practice; Pregnant women

INTRODUCTION

Covid-19, a new respiratory infection that first began in Wuhan province of China is caused by a novel coronavirus 2 (SARS-CoV 2). It causes severe acute respiratory syndrome which has rapidly spread all over the world, to over 110 countries including Nigeria thus prompting the World Health Organisation (WHO) to declare it a pandemic on March 11th, 2020.[1-3] This disease which is a problem of global concern, has led to serious global economic impact and has contributed significantly to increased mortality

including men, women and even children all around the world.[4]

Patients infected with Covid-19 are either asymptomatic or present with symptoms ranging from a common cold to a severe acute respiratory failure.[2,5] Symptoms also include fever, sore throat, new loss of taste/smell, progressive difficulty in breathing and features of hypoxia in severe cases.[1,5-7] Studies have also included vomiting, diarrhoea, neurologic features and features of renal impairment in the symptomatology of the disease.[1,6,7]

As there is still no definite cure, preventive measures are thus essential as the only method to protect people against this infection.[5,8]

Nigeria, the most densely populated country in Africa is of great concern with regards to this pandemic because of its' population of over 200million.[6] Pregnant women are considered to be more susceptible to developing severe cases or mortality with COVID-19 infection when compared with the general public because of the physiologic and immunologic changes of pregnancy.[5,9,10] Furthermore, the presence of comorbidities, high body mass index and higher maternal age are considered as risk factors for developing more severe infection in pregnant women.[5,11] Prevention of COVID-19 infection is therefore critical for pregnant women.

To prevent the spread of COVID-19 infection and its associated mortality, the World Health Organisation (WHO) has recommended preventive/safety measures including frequent hand washing with soap and water, physical/social distancing, the use of face mask in public, covering the mouth while coughing and avoiding touching the eyes, nose and mouth.[9,12]

Knowledge and attitude play key roles in the prevention of infectious diseases including COVID-19. Inadequate knowledge may lead to delay in the diagnosis of this highly infectious disease, spread of the disease with poor infection control practices.[13] This study is therefore being carried out in our centre to evaluate the knowledge, attitudes and practices of pregnant women attending the Antenatal clinic(ANC) in the Rivers State University Teaching Hospital (RSUTH) towards the COVID-19 pandemic. This study thus assesses how much pregnant women in Port Harcourt know about the disease, their attitude towards it as well as how well they practice the guidelines and recommendations that have been put in place.

MATERIALS AND METHODS

This study was a cross-sectional questionnaire-based study carried out in the Antenatal Clinic (ANC) of the Rivers State University Teaching Hospital (RSUTH) Nigeria over six weeks from 18th of January, 2021 to 5th of March, 2021. The ANC runs from Mondays to Fridays, 8am to 4pm with Consultants, Resident doctors and House Officers seeing an average of 60 patients each day.

The RSUTH, a tertiary hospital owned by the Rivers State Government, located in the down town area of the state, is a 375 bedded hospital which serves as a referral centre for all the government owned Primary Health Care facilities, general hospitals and private health facilities in the state as well as neighbouring states.

Prior to commencement of the study, the research team comprising the researchers and 3 research assistants (house officers) underwent a structured training conducted by the lead researcher on proper administration of the pre-tested and validated questionnaire. Strict COVID-19 safely protocols were adhered to with research assistants and participants wearing face mask and maintenance of physical distancing. Writing pens were provided for each participant which were not retrieved thereafter.

The proposed study was explicitly explained to the women attending ANC and informed consent was obtained before the questionnaire was administered. Ethical

approval (RSUTH/REC/2021047) was also obtained from the RSUTH Health Research Ethics Committee.

With a convenient sampling size of 253 participants, mothers attending ANC at RSUTH irrespective of their parity and who gave informed consent were randomly recruited for the study. Non-pregnant women and pregnant women who did not give consent were excluded from the study.

The research Proforma was administered to each recruited mother. The information obtained included their demographic characteristics and parity, questions assessing the participant's knowledge of COVID-19 including causes, symptoms, transmission and prevention. It also included questions assessing their attitude towards the preventive measures, willingness to take the COVID-19 test, willingness to receive the vaccine and have their children vaccinated when it is made available. Questions concerning their practice of the safety measures such as social/physical distancing, handwashing, use of hand sanitizers and face masks were also assessed. Scores assessing knowledge, attitudes and practices were allocated and graded based on specific stratified demarcations. A correct answer was assigned 1 point while an incorrect or 'I don't know' was assigned zero. Thirteen points were allocated to the section on knowledge. Mothers were determined to have good knowledge of the COVID-19 pandemic and safety measures if they had at least 70% and above (9-13) correct responses to the questions in the section on knowledge. Knowledge was said to be poor if the correct responses were less than 70% (<9). Seven points were allocated to the section on attitude, of which mothers were said to have good attitude if they had at least 70% and above (5-7) positive responses to the questions in this section. Attitude was poor if the positive responses were less than 70% (<5). Thirteen points were allocated to the section on the practice of the safety measures, of which mothers were said to have good practice if they had 70% and above (9-13) positive responses to the questions in this section. Practice was said to be poor if the positive responses were less than 70% (<9).

All the information obtained were entered into an excel spreadsheet and data analysed using SPSS version 23. Data was presented as frequency and percentages for categorical variables, and as means and standard deviations for continuous variables. All items used in assessing knowledge, attitudes and practices were first recoded, summed and then classified into Good and Poor respectively. Fishers' Exact and Chi-square tests (where indicated) were used in determining the association between socio-demographic characteristics and the outcome variables (Knowledge level, attitude level and practice level, respectively). Association between outcome variables were determined and its strength tested with Binary logistic regression. Test of Statistical significance was set at 95% confidence interval with P value <0.05.

RESULT
Sociodemographic characteristics of respondents

Of 253 respondents, age group 29-38years predominated 154(60.9%) with a mean age of 30.78 ± 4.71years. Most respondents were nulliparous 71(28.1%), married 249(98.4%) and resided in urban areas 235(92.9%). Majority attained tertiary education and were mainly artisan/business women/petty traders 126(49.8%). The husbands of the respondents had mainly tertiary education 173(68.4%) and were businessmen and petty traders 59(23.4%), Table I.

Knowledge of COVID-19 pandemic

Two hundred and fifty-one (99.2%) respondents had heard of COVID-19 with their source of information being mainly television 132(32.6%), radio 88(21.7%) and social media 78(19.3%). One hundred and sixty-six respondents knew the causative organism of COVID-19 being of viral origin and the mode of transmission being droplets

148(38.2%) and contact with infected surfaces 126(32.6%). One hundred and five (41.5%) respondents knew COVID-19 could be transmitted from mother to child and the mode of transmission being via droplets from infected mother after birth 44(17.3%), trans-placental 27(10.7%) and via breastmilk 21(8.3%). Only 61(24.2%) of respondents knew COVID-19 infected mother could breastfeed their babies, 176(69.6%) believed the infection can be treated while 231(91.3%) knew it can be prevented. Two hundred and forty-two (95.7%) knew it could lead to death and the population at risk of death being majorly the elderly 223(92.1%). Two hundred and six respondents (81.4%) were assessed to have good knowledge while 47(18.6%) had poor knowledge of COVID-19 infection, Table II.

Table I: Sociodemographic characteristics of respondents

Characteristics n=253 (%)	Frequency,
Age groups (years)	
19-28	82 (32.4)
29-38	154 (60.9)
≥ 39	17 (6.7)
Parity	
Nil	71 (28.1)
One	62 (24.5)
Two	63 (24.9)
Three or more	57 (22.5)
Marital status	
Single	4 (1.6)
Married	249 (98.4)
Area of residence	
Urban	235 (92.9)
Rural	18 (7.1)
Mother's level of education	
No formal education	8 (3.2)
Primary	6 (2.4)
Secondary	74 (29.2)
Tertiary	165 (65.2)
Mother's occupation	
Civil/Public servant	53 (20.9)
Artisan/Business/Trader	126 (49.8)
Health workers/Professional	27 (10.7)
Housewife/unemployed	47 (18.6)
Husband's level of education	
No formal education	6 (2.3)
Primary	10 (4.0)
Secondary	64 (25.3)
Tertiary	173 (68.4)
Husband's occupation	
Civil/public servant	57 (22.5)
Business/Trader	59 (23.4)
Health worker/professional	54 (21.3)
Artisan	43 (17.0)
Unemployed	40 (15.8)

Table II: Knowledge of COVID-19 pandemic

Variables n=253 (%)	Frequency,
Have you heard of COVID-19?	
Yes	251(99.2)
No	2(0.8)
What was your source of information? (n*=405)	
Television	132(32.6)
Radio	88(21.7)
Social media	78(19.3)
Health worker	56(13.8)
Friends	31(7.7)
Relatives	20(4.9)
What is the cause of COVID-19?	
Viral infection	166(65.6)
Bacterial infection	24(9.5)
Fungal infection	1(0.4)
Man-made organism	8(3.2)
5G network	10(4.0)
Don't know	44(17.3)
What is the mode of transmission of COVID-19? (n*=387)	
Droplets from air	148(38.2)
Contact with infected surfaces	126(32.6)
Blood products	19(4.9)
Hand to mouth	56(14.5)
Eye contact	17(4.4)
Sexual transmission	7(1.8)
Don't know	14(3.6)
Knowledge of COVID-19 symptoms	
Knowledge of 3 or more correct symptoms	118(46.6)
Knowledge of less than 3 correct symptoms	108(42.7)
Don't know	27(10.7)
Can COVID-19 be transmitted from mother to child?	
Yes	105(41.5)
No	15(5.9)
Don't know	133(52.6)
What is the mode of transmission from mother to child?	
Trans-placental	27(10.7)
Droplets from infected mother after birth	44(17.3)
Breast milk	21(8.3)
Don't know	161(63.7)
Can COVID-19 infected mother breastfeed her baby?	
Yes	61(24.2)
No	53(20.9)
Don't know	139(54.9)
Can COVID-19 be treated?	
Yes	176(69.6)
No	15(5.9)
Don't know	62(24.5)
Is COVID-19 preventable?	
Yes	231(91.3)
No	0(0.0)
Don't know	22(8.7)
Knowledge of the methods of prevention	
Knowledge of at least 2 methods	213(84.2)
Knowledge of 1 method	12(4.7)
Don't know	28(11.1)
Can COVID-19 lead to death?	
Yes	242(95.7)
No	1(0.3)
Don't know	10(4.0)
Which group of people are at risk of death?	
Children	4(1.7)
Young adults	6(2.5)
Middle age	9(3.7)
Old age	223(92.1)
What is physical distancing? (n*=408)	
Not talking or greeting people	13(5.4)
Not hugging or embracing	176(73.3)
Maintaining 2m distance away from people	219(91.3)

n= Multiple responses*

Attitudes of respondents to COVID-19 pandemic

Of the 253 respondents, 244(96.4%) protected themselves whereas only 44(17.4%) protected their children. Two hundred and twenty (87.7%) respondents admitted COVID-19 was real, 198(78.3%) were willing to take COVID-19 test and 212(87.2%) were willing to go to the hospital if sick with COVID-19 infection. Only 48(19.0%) were willing to take the vaccine when made available while 46(18.2%) would be willing to vaccinate their children. Fifty-one (20.2%) respondents had overall good attitude towards the COVID-19 pandemic whereas 202(79.8%) had poor attitude, Table III.

Table III: Attitudes of respondents to COVID-19 pandemic

Variables	Frequency, n=253(%)
Do you protect yourself?	
Yes	244 96.4)
No	9(3.6)
Do you protect your children?	
Yes	44(17.4)
No	209(82.6)
Is COVID-19 real?	
Yes	222(87.7)
No	31(12.3)
Are you willing to take COVID-19 test?	
Yes	198(78.3)
No	55(21.7)
What actions to take if you are sick with COVID-19 infection? n*=267	
Go to the hospital for treatment	212(87.2)
Self-medication	16(6.6)
Take herbs	9(3.7)
Go for prayers	25(10.3)
Do nothing	5(2.1)
Are you willing to take COVID-19 vaccine?	
Yes	48(19.0)
No	205(81.0)
Would you be willing to immunize your child?	
Yes	46(18.2)
No	207(81.8)

n*=Multiple responses

Practice of preventive measures

Two hundred and forty-three (96.0%) respondents wore face mask while only 100(41.2%) wore face mask all the time outside their homes and 31(12.3%) wore their children face mask. Majority, 155(57.6%) used fabric mask whereas only 62(23.1%) and 7(2.6%) used surgical and N95 mask respectively. Of 137 respondents who used cloth and fabric mask, 134(56.5%) washed their mask daily whereas of 7 who used N95 mask, 4(57.1%) changed their mask daily. Twenty-five

(58.1%) respondents did not wear face shield alone while 201(79.4%) did not shake hands. Although 218(86.2%) maintained physical distance, only 63(28.9%) maintained physical distance all the time. Hands were washed with soap and water by 242(95.7%) respondents with 113(46.9%) doing this at all times. Antibacterial hand sanitizers were used by 189(74.7%) respondents with 56(29.6%) using it all the time. Overall good practice of preventive measures was observed by 67(26.5%) respondents while 186(73.5%) had poor practice, Table IV.

Table IV: Practice of preventive methods

Variables	Frequency, n=253(%)
Do you wear face mask?	
Yes	243(96.0)
No	10(4.0)
How often do you wear face mask outside the home?	
All the time	100(41.2)
Most times	89(36.6)
Few hours daily	54(22.2)
Do your children wear face mask?	
Yes	31(12.3)
No	22(87.7)
What type of face mask is worn? n*=269	
Piece of cloth	45(16.7)
Fabric mask	155(57.6)
Surgical mask	62(23.1)
N95 mask	7(2.6)
Is fabric/cloth mask washed daily?	
Yes	134(56.5)
No	103(43.5)
Is N95 mask changed daily?	
Yes	4(57.1)
No	3(42.9)
Do you wear face shield?	
Yes	43(17.0)
No	210(83.0)
Do you wear face shield alone?	
Yes	18(41.9)
No	25(58.1)
Do you shake hands?	
Yes	52(20.6)
No	201(79.4)
Do you maintain physical distance?	
Yes	218(86.2)
No	35(13.8)
How often is physical distance observed?	
All the time	63(28.9)
Most times	11(52.3)
Few times	41(18.8)
Do you wash your hands with soup and water?	
Yes	242(95.7)
No	11(4.3)
How often are your hands washed with soup and water? (n=242)	
All the time	113(46.7)
Most times	77(31.8)
Few times	52(21.5)
Do you use antibacterial hand sanitizers?	
Yes	189(74.7)
No	4(25.3)
How often do you use antibacterial hand sanitizers?	
All the time	56(29.6)
Most times	91(48.1)
Few times	42(22,2)

n*=Multiple responses

Knowledge of symptoms of COVID-19 by respondents

The commonest symptoms of COVID-19 recalled by the respondents were cough 169(27.8%), shortness of breath 153(25.1%) and fever 145(23.7%) while the least was redness of the eyes 1(0.2%), Figure 1.
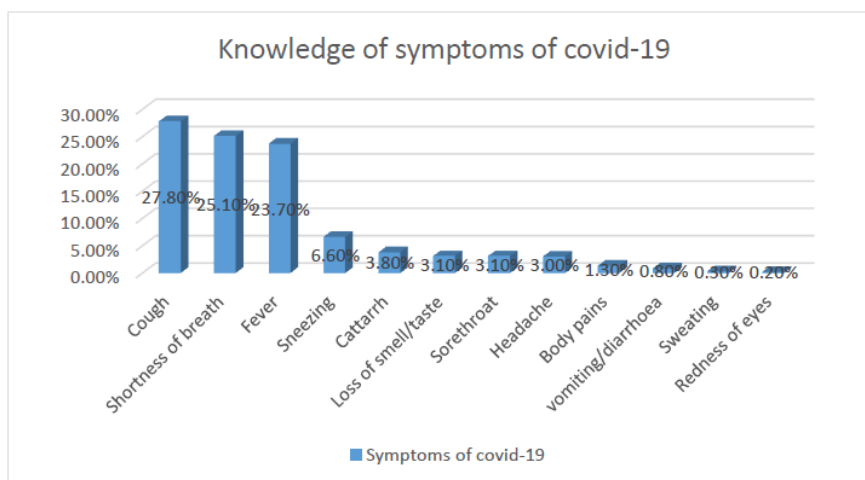

Figure 1: Knowledge of symptoms of covid-19 by respondents

Association of sociodemographic features with knowledge, attitudes and practices of pregnant women towards covid-19 pandemic

Parity, mother's level of education, mother's occupation, husband's level of education and husband's occupation were significantly associated with the knowledge of COVID-19 pandemic while age of the mothers was associated with the attitude towards COVID-19 pandemic. Parity, mother's level of education, mother's occupation, husband's level of education and husband's occupation were significantly associated with the practice towards COVID-19 infection prevention (P value < 0.05), Table V.

Table V: Association of sociodemographic features with knowledge, attitudes and practices of pregnant women towards COVID-19 pandemic

Socio-demographic variables	Knowledge level			Attitude level			Practice level		
	Good	Poor n=253(%)	P value	Good	Poor n=253(%)	p value	Good	Poor n=253(%)	P value
Age group (yrs)									
19-28	70(34.0)	12(25.5)		24(47.1)	58(28.7)		24(35.8)	58(31.2)	
29-38	123(59.7)	31(66.0)	0.524	23(45.1)	131(64.9)	0.029	42(62.7)	112(60.2)	0.123
≥39	13(6.3)	4(8.5)		4(7.8)	13(6.4)		1(1.5)	16(8.6)	
Parity									
Nil	55(26.7)	16(34.0)		13(25.5)	58(28.7)		25(37.3)	46(24.7)	
One	56(27.2)	6(12.8)	0.018	15(29.4)	47(23.3)	0.627	24(35.8)	38(20.4)	<0.001
Two	55(26.7)	8(17.0)		10(19.6)	53(26.2)		13(19.4)	50(26.9)	
Three or more	40(19.4)	17(36.2)		13(25.5)	44(21.8)		5(7.5)	52(28.0)	
Marital status									
Single	3(1.5)	1(2.1)	0.563	2(3.9)	2(1.0)	0.182	0(0.0)	4(2.2)	0.576
Married	203(98.5)	46(97.9)		49(96.1)	200(99.0)		67(100.0)	182(97.8)	
Area of residence									
Urban	192(93.2)	43(91.5)		48(94.1)	187(92.6)		60(89.6)	175(94.1)	
Rural	14(6.8)	4(8.5)	0.752	3(5.9)	15(7.4)	1.000	7(10.4)	11(5.9)	0.216
Mother's LOE									
Primary[+]	5(2.4)	9(19.1)		1(2.0)	13(6.4)		1(1.5)	13(7.0)	
Secondary	51(24.8)	23(48.9)	<0.001	17(33.3)	57(28.2)	0.455	12(17.9)	62(33.3)	0.006
Tertiary	150(72.8)	15(31.9)		33(64.7)	132(65.3)		54(80.6)	111(59.7)	
Mother's occupation									
CS/PS	48(23.3)	5(10.6)		15(29.8)	38(18.8)		15(22.4)	38(20.4)	
Artisan/business	93(45.0)	33(70.2)	<0.007	23(45.1)	103(51.0)	0.341	28(41.8)	98(52.7)	0.003
Health worker/prof	26(12.6)	1(2.1)		6(11.8)	21(10.4)		15(22.4)	12(6.5)	
Unemployed	39(18.9)	8(17.0)		7(13.7)	40(19.8)		9(13.4)	38(20.4)	
Husband's LOE									
Primary	9(4.4)	7(14.9)		2(3.9)	14(6.9)		2(3.0)	14(7.5)	
Secondary	46(22.3)	18(38.3)	0.001	12(23.5)	52(25.7)	0.748	7(10.4)	57(30.6)	0.001
Tertiary	151(73.3)	22(46.8)		37(72.5)	136(67.3)		58(86.6)	115(61.8)	
Husband's occupation									
CS/PS	45(21.8)	12(25.5)		10(19.6)	47(23.3)		12(17.9)	45(24.2)	
Business/trader	46(22.3)	13(27.7)		11(21.6)	48(23.8)		13(19.4)	46(24.7)	
Health worker/prof	54(26.6)	0(0.0)	<0.001	11(21.6)	43(21.3)	0.946	25(37.3)	29(15.6)	<0.001
Artisan	34(16.5)	9(19.1)		10(19.6)	33(16.3)		3(4.5)	40(21.5)	
Unemployed	27(13.1)	13(27.7)		9(17.6)	31(15.3)		14(20.9)	26(14.0)	

Yrs=Years; LOE=Level of education; CS=Civil servant; PS=Public servant; Prof=Professionals

Associations of knowledge, Attitude and Practice levels of pregnant women towards COVID-19 pandemic

There was an association of good knowledge and good attitude levels with good practice level (P value > 0.05), Table VI.

Table VI: Associations of knowledge, Attitude and Practice levels of pregnant women towards COVID-19 pandemic

Variables	Practice level		Chi-square	Odd's ratio	P value
	Good	Poor			(95% CI)
	n=253(%)				
Knowledge level					
Good	60(89.6)	146(78.5)	0.046	0.4(0.18-1.00)	0.051
Poor	7(10.4)	40(21.5)			
Attitude level					
Good	16(23.9)	35(18.8)	0.376	0.7(0.03-1.45)	0.377
Poor	51(76.1)	151(81.2)			

DISCUSSION

The commonest age group documented in the present study was 29-38year olds with a mean age of 30.78 ± 4.71years. This was comparable with similar age groups of 30-39years, 31-35years, 30-34years, 25-35years and 18-39years reported by Ejeh et al,[14] Anikwe et al,[15] Omozuwa et al,[16] Edet et al[17] and Reuben et al[18] respectively. This however contrast the lower age groups of 12-24years, 20-29years, 20-29years, 21-30years and < 25years documented by Sayedahmed et al,[19] Nicholas et al,[20] Hoque et al,[21] Ogbole et al[22] and Kamal et al[23] respectively. A predominantly high age group of > 50years was however observed by Ayinde et al.[24] These varying age group predominance could be attributed to different study populations and varying geographic locations.

Majority of respondents in the present study were urban residents as was also documented in Abakaliki[15,25] south-east and North-central Nigeria.[18] This is not surprising as all studies were carried out in health facilities located in urban areas of the states. Okello et al[26] on the contrary, reported predominance of rural dwellers. This difference could be due to different study population recruited.

Most respondents had tertiary level of education as was also observed in other cities in Nigeria,[6,15,17,18,22,27-29] India,[23] Uganda,[26] Chad[30] and China.[31] In contrast, secondary level of education predominated in Benin,[16] southern Nigeria.

The reason for the high predominance of secondary school leavers in Benin could not be ascertained as it is situated in the urban area where level of education is expected to be high.

There was an overall high knowledge of COVID-19 pandemic of 81.4% in the present study amongst pregnant women. This is not surprising as majority of the respondents had tertiary education and thus well read. This high knowledge level corroborates the 85.3%, 86.6% and 88.75% documented by Omozuwa et al,[16] Edet et al[17] and Ejeh et al[14] in Nigeria but lower than the over 90% and 90% reported by Anozie et al[25] and Zhong et al[31] in Abakaliki south-east Nigeria and China respectively. Lower knowledge levels of 78.7%, 60.7%, 30.47%, 75.3%, 43%, 68.3% and 21.9% were reported in Nigeria,[6,32,27] India,[23] South Africa,[21] Sudan[19] and Cameroon[20] respectively. This varying knowledge could be attributable to the varying study population and time of study in relation to when the pandemic began as well as difference in the questions asked in the various studies. High knowledge levels were also observed in other studies[14,33] in which the study population were health care workers. There is also the tendency that studies carried out much later after the pandemic began had a better knowledge level[25] than those carried out during the early months of the pandemic.[32] It is worthy of note however that the wide media coverage of COVID-19 by the federal, state

and local government in Nigeria as well as the strict control measures instituted by the government and its agencies may have contributed to the high knowledge level attained by respondents in the present study.

Majority (99.2%) of respondents had heard of COVID-19 in the present study. Similarly, 93.2% and 89.3% of respondents in Cameroon[20] and Yobe state,[33] north-east Nigeria respectively had heard of covid-19 while all (100%) respondents had heard of the virus in other parts of Nigeria.[14,33] Interestingly, the 100% of respondents who had heard of COVID-19 were all health care workers.

Commonest source of information in the present study was from television (32.6%) followed by radio (21.7%) and social media (19.3%). Television being the commonest source of information was also reported by Adesegun et al,[6] Anikwe et al,[15] Nicholas et al[20] and Okello et al.[26] In contrast, social media was the commonest source of information by Ejeh et al,[14] Reuben et al,[18] Sayedahmed et al[19] Habib et al[27] and Egbi et al.[28]

Close to 2/3rd (65.6%) of the respondents knew that COVID-19 was a viral disease. Much higher knowledge level was observed in Northern Nigeria[27] (73.1%), Cameroon[20](77.1%), Onitsha,[15] south-east Nigeria (88.0%), Oyo state,[24] south-west Nigeria (88.6%), north-central Nigeria[18](91.9%) and Abakaliki,[25] south-east Nigeria (98.4%). A lower knowledge level (60%) was however documented in Onitsha,[32] south-east Nigeria. This varying knowledge level could be attributed to the educational level of the study population as well as their professions. The high knowledge level observed in Abakaliki could be because the study population were only health care workers as compared to the present study which comprised of pregnant women.

Majority of the respondents in the present study identified transmission of COVID-19 infection via droplets from air (60.7%) and contact with infected surfaces (51.6%). Air droplets was similarly documented as the commonest mode of transmission in Nigeria[18,25,27,29,32] and India.[23] Contrary to the present study however, human and animal modes of transmission accounted for 38% and 32% respectively followed by air droplets (30%) in Abakaliki,[15] south-east Nigeria whereas in Cameroon,[20] 74.6% identified direct contact, 51.9% air droplets and 45.2% contact with infected surfaces.

Less than half (41.5%) of the respondents knew that COVID-19 could be transmitted to their babies as also documented in Singapore[34] (47%) and Yenagoa,[29] Nigeria (65.6%). This information is key to the attitude and practice of pregnant women towards the expected preventive measures.

The overall level of good attitude of respondents towards the covid-19 pandemic in the present study of 20.2% was similar to the 25% documented in South Africa[21] and 17.8% in Kano,[27] northern Nigeria. Similarly, low percentage of good attitude of 51.5% and 56.4% were reported in Uganda[26] and Onitsha,[32] south-east Nigeria respectively. The poor attitude of respondents in the present study may thus mitigate the efforts made by the government to curb the infection. Better percentages of 73.9%, 80.6% and 89.9% were however observed in India,[23] Port Harcourt,[17] southern Nigeria and Sudan[19] respectively. These variances could be attributed to the varying criteria for assessment, different cut-off values used, levels of education, varying age groups as well as varying study population. It is pertinent to note that although the respondents had good knowledge level of COVID-19, they exhibited poor attitude towards the disease. This therefore calls for more enlightenment campaigns among the populace.

More than 3/4th (87.7%) believed COVID-19 is real in the present study as also observed by other researchers.[6,14,33] In contrast, a study carried out among the general population in Kano,[27] northern Nigeria showed that 36% of the respondents

believed that covid-19 was a man-made virus.

Surprisingly, less than quarters (19%) of the respondents were willing to take the vaccine or allow their children to do same. This contrast the 70% of the general population including health workers in the study in Kano[27] who were willing to take the vaccine once made available. The reason for this wide disparity could also be attributed to the fact that a good number of the study population in the Kano[27] study were health workers. Special attention in relation to prevention, prompt diagnosis and management of COVID-19 is therefore important in order to protect pregnant women who are vulnerable and by extension, their unborn babies.

An overall good practice towards the prevention of COVID-19 in the present study of 26.5% was comparable to 25.96% documented in Kano,[27] northern Nigeria. Similarly, low practice levels of 48.3%, 48.5%, 53.6% and 58% were reported in Uganda,[26] Sudan[19] and Nigeria[32,17] respectively whereas good practice levels of 75.6% and 77.1% were documented in other parts of Nigeria.[6,16] These differences could be attributed to the varying cut-off percentages that define good and poor practice levels in the various studies, cultural differences as well as the educational status of the respondents. It is also surprising to note that although there was good knowledge of the disease condition, the practice level towards its prevention was very low. This could thus be responsible for the increasing number of cases in the country.

Although majority (96%) of respondents admitted to wearing face mask, only 39.5% wore face mask all the time outside their homes in the present study. Similarly, Egbi et al[28] in Bayelsa reported 43.5% among health workers while Mustapha et al[33] in Yobe state, Nigeria documented 35% among the general population. Slightly higher rates were reported by Omozuwa et al[16] in Benin 58.1% among pregnant women and 59.2%

by Ejeh et al[14] among the general population in 6 geo-political zones in Nigeria. Much higher rates of 79.5%, 87.5%, 88.6%, 98% and 99% were documented in other parts of Nigeria,[18,29,16] China[31] and India[23] respectively. This low usage of face mask in the present study could be attributed to non-availability, high cost of medical mask as well as the discomfort in the use of face mask especially in the tropics. This thus calls for more public enlightenment campaigns on the importance of the regular use of face mask in the prevention of the spread of COVID-19 and free distribution of face mask by the government.

Of the majority (95.7%) of respondents who admitted to washing their hands with soap and water in the present study, less than half (46.9%) did so all the time. Poor regular hand washing practice of 45.2% and 56% were also reported in Benin,[16] Nigeria and Sudan.[19] Good regular hand washing practice of 76.4%, 82%, 87.9%, 91.1%, 95.3% and 99% were however reported in other parts of Nigeria[25,29,33,28,24] and India[23] respectively. Interestingly, similar study carried out among health care workers in Yobe state,[33] Nigeria documented 100% hand washing practice. This is not surprising as the sample population being front-liners in the fight against COVID-19 pandemic are the most informed group in the society and as such expected to have better practice level.

Although almost 3/4th (74.7%) of respondents admitted to the use of alcohol-based hand sanitizers, only about a quarter (29.6%) did so all the time. Similar good practice (87.9%) was documented in Bayelsa[28] whereas poor practice was observed in Abakaliki[25] (67.4%) and Benin,[16] Nigeria (50.5%). This poor practice could be attributable to unavailability and high cost of these anti-bacterial sanitizers.

Physical distancing was maintained by more than 3/4th (86.2%) of respondents, although only about a quarter (28.9%) complied all the time. Poor physical

distancing of 56% and 54% were also practiced in other parts of Nigeria.[25,33]

The respondents in the present study recalled cough as the commonest symptom of COVID-19 infection followed by shortness of breath and fever. Similar observation was made by Reuben et al[18] in their study in north-central Nigeria. Fever was recalled as the commonest symptom in other parts of Nigeria[15,29] and Sudan[19] whereas cough was documented in Cameroon.[20] Contrary to these studies, Adesegun et al[6] in his cross-sectional study of the general population of literate Nigerians documented difficulty in breathing as the commonest symptom recalled followed by cough and fever.

Parity, level of education of mother and spouse as well as occupation of mother and spouse were significantly associated with the knowledge of COVID-19 in the present study. Edet et al[17] observed occupation and level of education to be significantly associated with knowledge of COVID-19 while age groups and occupation of respondents were significantly associated with knowledge as reported also by Adesegun et al.[6] In the present study, respondents and their spouses with tertiary level of education had significantly good knowledge level as compared to those with lower levels of education. This was in consonance with the study by Egbi et al[28] who documented a higher mean knowledge score among respondents with tertiary education than those with secondary level of education. Health workers and professionals in the present study had significantly good knowledge level than all other occupations. This was similar to the findings by Egbi et al[28] where nurses and doctors had significantly higher mean knowledge scores than the others thus corroborates with findings by Adesegun et al[6] in their multiple regression model which showed that respondents with medical related occupation were 6.5times more likely to have better knowledge than the unemployed. Respondent's age group,

marital status and area of residence were however not associated with knowledge of COVID-19 in the present study. Age was also not significantly associated with knowledge of COVID-19 as documented also by Edet et al.[17]

Age groups were significantly associated with the attitude of respondents towards COVID-19 in the present study as also observed by Adesegun et al[6] and Ejeh et al.[14] Although age was not significantly associated with the attitude of respondents as documented by Edet et al[17] in an earlier study in Port Harcourt, occupation and the level of education were. Okello et al[26] documented significant difference in the level of education in respect to the attitude of respondents whereas Kamal et al[23] documented age, level of education and place of residence being significantly associated with the attitudes of respondents.

Practice level of the respondents in the present study differed significantly with respect to parity, level of education and occupation of pregnant women and their spouses. Egbi et al[28] also reported that respondents with post-graduate and graduate degree had a significantly higher practice score compared with those with secondary level of education. Contrary to the present study, age was significantly associated with COVID-19 related practices as documented by Edet et al.[17] Kamal et al[23] observed that practice scores had a significant association with age and place of residence whereas Adesegun et al[6] in their study did not find any significant difference in the practice levels of respondents in respect to age, occupation, marital status, level of education and area of residence. Marital status was not significantly associated with knowledge, attitude and practice levels towards COVID-19 prevention in the present study as similarly observed by Edet et al.[17]

It is worthy of note that good practice level in the present study was associated with good knowledge and good attitude level although this association was not statistically significant. This therefore

denotes that good knowledge may not always influence good attitude and good practice as observed in the present study although knowledge is a prerequisite for forming positive attitude, behaviour and practice. Similar association in an earlier study among clients seeking care in primary health care facilities in all the 23 local government areas of Rivers State,[17] Nigeria was statistically significant. This difference could be attributable to the much larger sample size in the latter study as well as the much wider coverage. Similarly, Adesegun et al[6] reported that good attitude and practice grades had significantly higher knowledge scores. In addition, Reuben et al[18] also documented significant relationship between knowledge of covid-19, attitude and perception.

Limitation of this study is the small sample size and the fact that the study was carried out in only one centre.

CONCLUSION

Although majority of the pregnant women (81.4%) attending ANC at RSUTH had good knowledge of the Covid-19 infection, there was poor attitude and poor practice of preventive measures towards the pandemic. The commonest symptoms of COVID-19 recalled by the respondents were cough, shortness of breath and fever. Parity, mother's level of education, mother's occupation, husband's level of education and husband's occupation were significantly associated with the knowledge of COVID-19 infection while age of the mothers was associated with the attitude towards COVID-19 infection. Practice level of the respondents differed significantly with respect to parity, level of education and occupation of mothers and their spouses. Our findings suggest that good knowledge although required for the acquisition of positive attitudes, may not always influence good attitude and good practice. We thus recommend strengthening of public health education campaigns to the general public and at risk groups such as pregnant women (taking advantage of opportunities such as

health talks during ANC and via television, radio and social media), updates on preventive measures, provision of evidence-based policies and debunking of wrong beliefs.

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