

Clients' perspectives on prenatal care model enhanced with Zoom videoconferencing platform during Covid-19 pandemic.

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Abstract

Introduction: The three-month lockdown imposed on Nigerians during the COVID-19 pandemic made it difficult to continue the standard approach to prenatal care. This study examined the acceptability, benefits and challenges of Zoom application in the administration of antenatal care education in Ekiti state, southwestern Nigeria.

Methods: An online survey was conducted among 482 pregnant women out of 783 booked antenatal attendees who had compatible mobile device and enrolled in antenatal Zoom app meetings between April 2 and August 20, 2020.

Results: We found that 61.6% of participants in this study had access to compatible mobile phones, and 73.1% of them participated actively in the ANC Zoom online meetings during the period under review. The participants described such benefits of antenatal Zoom videoconferencing platform as improvement in access to direct information (82.5%), convenience (82.2%), ease of compliance with COVID-19 pandemic prevention and control protocols (79.6%), reduction in hospital waiting time (79.4%), and reduction in the cost and frequency of hospital visits (74.3%).

Conclusion: This study concludes that owing to the benefits of videoconferencing for the administration of antenatal care education, the Zoom app and similar technologies might become the new standard in the delivery of quality antenatal care services.

Keywords: Prenatal care, COVID-19 pandemic, Zoom app, videoconferencing.

1. Introduction

Citing the evidence that the standard approach to prenatal care, comprising 12 -14 visits per full-term pregnancy, is expensive, stressful to clients, and is not safer than the reduced model of prenatal care for low-risk women, the reduced model of care is considered an alternative to mitigating the spread of the coronavirus disease 2019 (COVID-19) pandemic among pregnant women^{1,2}. In the context of the present COVID-19 pandemic, there are concerns about the high risk of infection among pregnant women especially possible worse presentation and outcomes. Perhaps the concerns regarding the increased-frequency prenatal care model during the ongoing SARS-Cov-2 stemmed from the evidence that pregnant women are disproportionately affected by

respiratory infections. Further, maternal mortality occurred in approximately one third of pregnant women infected with SARS-CoV in the early 2000s³. Thus, the reduction in prenatal visits is encouraged by professional societies, including Royal College of Obstetricians & Gynaecologists and American College of Obstetricians and Gynaecologists, and telehealth prenatal follow-up is endorsed globally^{4,5,6,7}. The rise in the use of smartphones and mobile apps represents a new horizon for healthcare delivery systems worldwide, with major competitors making major innovations in online meetings with various security features^{8,9,10}. The effective use of smartphones has become an important tool for communication between doctors and patients^{11,12}. This has improved doctor-patient interactions through increased trust and confidence in health delivery.

Unfortunately, the rapid recommendation regarding telehealth follow-up for pregnant women during the current SARS-CoV-2 is made without addressing the nuances of care for vulnerable populations, including pregnant women⁷. This could compromise prenatal follow-up for some pregnant women due to difficulty with internet technology⁷, especially pregnant women in resource-constrained settings like ours. It is therefore imperative that appropriate data collection on the perspectives of pregnant women on prenatal care delivered via the Zoom video conferencing to explore the acceptance of this strategy to ensure that nuances of care for pregnant women are addressed. In response to the recommendations for reduced-face-face prenatal care model and telehealth follow-up for pregnant women, we have introduced telehealth into our prenatal care practice over the past six months.

The objective of this study was to evaluate the benefits, acceptability and applicability of telehealth prenatal follow-up via Zoom platform in our practice and whether this telehealth platform can be proposed as a new standard in antenatal care service in resource-constrained settings like ours.

2. Method

2.1 Study Site

We conducted an online survey among 482 out of 783 antenatal attendees who had compatible mobile devices, enrolled for antenatal care and participated in our online Zoom antenatal care meeting between 4th of April and 20th of August 20, 2020. The survey focused on the acceptability, benefits and challenges of use of Zoom teleconferencing mobile platform to obtain antenatal care information during the COVID-19 pandemic lockdown in Ekiti State, Nigeria. The participants in this study were drawn from two health facilities (one tertiary and one private specialist clinic), namely, Ekiti State University Teaching Hospital and Maternal-Child Specialists' Clinic, both strategically situated in Ado-Ekiti, the capital city of Ekiti State. These institutions have annual delivery rates of 1500 and 500, respectively. The facilities receive clients from the sixteen local governments of Ekiti State and from the adjoining states of Ondo, Osun, and Kogi in the southwestern and north-central regions of the Federal Republic of Nigeria. Ekiti State has a population of approximately 2.3 million.

Besides consenting to participate in the study, enrolment criteria included being currently pregnant and having a mobile telephone device. Those who had Android-, IOS-and Windows-supported devices were organized into a WhatsApp group named Maternal-Child ANC Online. The women were engaged in weekly Zoom meetings on Saturdays where antenatal education was delivered by the principal investigator. The ID number and password for each meeting were sent on the preceding Fridays. The topics covered included preconception care, early pregnancy events, high-risk pregnancy, delivery process, birth preparedness and complication readiness, drugs, and nutrition in pregnancy. The women also had access to the phone numbers of the labour room and the senior obstetricians at both hospitals. The patients were counselled to comply with the stay-at-home

directive of the federal government, observe the guidelines for COVID-19 prevention of the Nigeria Centre for Disease Control (NCDC) and contact the hospital when necessary. The 301 women who did not have compatible mobile devices were also monitored through text messages and phone calls by the labour ward, registrars, midwives and their managing obstetricians during this period.

2.2 Data collection Questionnaire designed on Google form with the link (<https://docs.google.com/forms/d/e/1FAIpQLSeIkoMHkVn--6RppLjiYvIMmYd6tCXsLJfFEUQ-1-KDawxFlg/viewform>) was sent to four hundred and eighty-two (482) registered pregnant women's mobile phones directly by antenatal clinic staff in the form of short message service (SMS) and WhatsApp messages. The women were invited to participate in the survey on their laptops, mobile phone, iPad, and other digital devices by clicking on the link.

Relevant questions were asked to collect and collate data on sociodemographic and obstetric information, benefits and challenges of the use Zoom app to participate in the videoconference meetings during the COVID-19 lockdown in Ekiti State, Southwest Nigeria.

2.3 Data analysis

Descriptive statistics and consensus scoring were used to assess the level of usage of Zoom application, binary logistic regression was used to examine the associations between the variables. The significance level was 0.05, and data analysis was conducted using SPSS 26.0 (SPSS, Inc., Chicago, IL) for Windows.

2.4 Ethical Approval

The Research and Ethics committee of the Ekiti State University Teaching Hospital approved this study on 8th December, 2020 with registration number EKSUTH/A67/2020/12/003.

3. Result

Four hundred eighty-two (482) registered pregnant women were sent a link to a Google form containing the questions. Four hundred fifty-three (453) entries were returned, representing 94% of the pregnant women who were sent the link

Demographic Variables	Frequency	Percentage
Age		
18-24	47	10.4
25-29	105	23.2
30-34	196	43.3
35-39	105	23.2
Total	453	100.0
Marital Status		
Married	443	97.8
Widowed	10	2.2
Total	453	100.0
Occupation		
Employed	180	39.7
Not Employed	45	9.9
Self-Employed	228	50.3
Total	453	100.0
Religion		
Christian	423	93.4
Muslim	30	6.6
Total	453	100.0
Level of Education		
Tertiary	276	60.9
Postgraduate	177	39.1
Total	453	100.0
Husband's Level of Education		
Tertiary	190	41.9
Postgraduate	263	58.1
Total	453	100.0
Husband's Occupation		
Employed	209	46.1
Self-Employed	244	53.9
Total	453	100.0
Parity		
None	328	72.4
1	107	23.6
2	9	2.0
3	9	2.0
Total	453	100.0
Gestational Age		
<16	179	39.5
17-26	114	25.2
27-35	112	24.7
36+	48	10.6
Total	453	100.0
Gravidity		
1	229	50.6
2	102	22.5
3	95	21.0
4	18	4.0
5	9	2.0
Total	453	100

Table 1: Sociodemographic distribution of the respondents

Table 1 presents the data collated on respondents' sociodemographic characteristics. The table revealed that the mean age of the respondents was 29 years. A total of 10.4% were within the age range of 18-24 years, 23.2% and 43.2% were within the age ranges of 25-29 and 30-34, respectively,

and 23.2% were within the age range of 35-39 years. The above empirical evidence demonstrated that the sampled respondents were within the child-bearing age range. Few of the women were married before age 24, and most expected to achieve their desired family size by age 35. The majority of our respondents (60.9%) had tertiary education, while 39.1% had postgraduate certificates; 50% of them were self-employed, 39.7% were employed, and 9.9% were not employed. The fact that the respondents had formal education revealed a high level of literacy among pregnant women in Ekiti state. The high level of literacy among the pregnant women and their husbands and their high rate of employment imply high acceptance of mobile technology and the ability to afford a mobile phone; these factors made the women in our sample well suited to provide relevant information on the use of mobile health applications to obtain antenatal care information during the COVID 19 pandemic lockdown in Ekiti state.

The majority of the pregnant women (64.7%) registered before 26 weeks of gestation, with 39.5% registering before 16 weeks, allowing them to benefit from antenatal care engagement from an early stage.

The majority (72.4%) of our respondents were primigravidae. They may therefore be enthusiastic about receiving information.

Benefits	1	2	3	4	5	Mean	Std. Deviation	Consensus	Cons (%)	Dissension	Dis (%)
It reduces the hospital waiting time	0	0	59	253	141	4.1810	0.6400	0.7941	79.4	0.2059	20.6
It reduces cost	0	21	103	226	103	3.8609	0.9244	0.7432	74.3	0.2568	25.7
It is more convenient	0	21	45	303	84	3.9470	0.8371	0.8221	82.2	0.1779	17.8
It improves access to information	0	0	48	189	116	4.1501	0.5833	0.8247	82.5	0.1753	17.5
It is efficient	0	0	75	321	57	3.9603	0.5389	0.8696	87.0	0.1304	13.0
It ensures strict adherence to COVID-19 guidelines as stipulated by the government	0	12	9	272	160	4.2539	0.7404	0.7955	79.6	0.2045	20.4

Table 2: Benefits expressed by respondents who participated in Zoom Meetings during the COVID-19 Pandemic

Table 2 revealed that 73.1% of the pregnant women in this study participated actively in the antenatal care Zoom meetings during the COVID-19 pandemic. Majority of the respondents believed that they had access to direct information and were able to comply with prevention and control protocols of COVID-19 pandemic as stipulated by the federal government. It also reduced the cost and frequency of hospital visits.

Challenges	1	2	3	4	5	Mean	Std. Deviation	Consensus	Cons (%)	Dissension	Dis (%)
Non availability of network	9	20	0	226	198	4.3333	0.74172	0.7452	75	0.2548	25
Data Consumption	0	0	103	172	178	4.1486	0.76932	0.7326	73	0.2674	27
It is not applicable in an environment where there is no internet	12	0	18	208	215	4.3554	0.79236	0.7246	72	0.2754	28
No access to Android phone	77	0	226	103	47	3.0949	1.14725	0.6199	62	0.3801	38
No money to buy airtime	18	67	0	216	152	3.3907	0.89719	0.4938	49	0.5062	51

Table 3: Challenges of using antenatal zoom teleconferencing platform during COVID 19 Pandemic

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	-.249	.252	.973	1	.324	.780	.476	1.278
Gravidity	-2.362	.469	25.316	1	.000	.094	.038	.236
Parity	2.814	.385	53.434	1	.000	16.669	7.839	35.443
Marital Status	-9.017	4236.712	.000	1	.998	.000	.000	.
Occupation	-1.809	.287	39.757	1	.000	.164	.093	.288
Religion	20.679	6158.091	.000	1	.997	4.23	.000	.
Education	-.008	.655	.000	1	.990	.992	.275	3.578
Phone Type	18.509	4798.034	.000	1	.997	109222618.13	.000	.
Location	-16.166	5131.853	.000	1	.997	.000	.000	.
No Children	-1.486	.603	6.068	1	.014	.226	.069	.738
Gestational Age	2.368	.368	41.477	1	.000	10.672	5.192	21.936
Complication	-1.377	.929	2.197	1	.138	.252	.041	1.559
Husband's Education	.266	.535	.248	1	.619	1.305	.457	3.722
Husband's Occupation	-1.809	.301	36.169	1	.000	.164	.091	.295
Constant	11.319	13573.379	.000	1	.999	82346.7		

Nagelkerke R Square .715

Table 4. Logistic regression analysis on the influence of sociodemographic characteristics on the rate of respondents' participation in antenatal care zoom meetings.

Given that the rate of participation in ANC Zoom meetings during the COVID-19 pandemic was a dichotomous variable (Yes or No), a binary logistic regression model was used to examine the factors found to have significantly influence it. All 453 cases were included in the analysis.

As shown in Table 4, the Nagelkerke R squared value shows that approximately 72% of the variation in the outcome variable is explained by this logistic model. The overall accuracy of this model in predicting a subject's rate of participation in ANC Zoom meetings (with a predicted probability of 0.5 or greater) is 88.1%. This observation was also supported by the magnitude of the sensitivity compared to the specificity value, with a sensitivity of $304/331 = 91.8\%$ and a specificity of $95/122 = 77.9\%$. The positive predictive value (PPV) was calculated as $304/331 = 91.8\%$ and the negative predictive value (NPV) as $95/122 = 77.9\%$. The

binary logistic regression showed that access to antenatal care information via Zoom meetings was significantly associated with gravidity, parity, occupation, number of children, gestational age, and husband's occupation, which are important factors enhancing pregnant women's participation in ANC Zoom meetings in Ekiti state, with *P*-values of .000, .000, .000, .014, .000 and .000, respectively. The Wald estimates, which indicate the importance of the contribution of each variable in the model, were 53.4 for parity, followed by 41.5 for gestational age, 39.8 for occupation, 36.2 for husband's occupation, 25.3 for gravidity and 6.1 for number of children, in order of importance. The higher the value of the Wald estimate, the more important the variable.

4. Discussion

The stay-at-home order issued by the Nigeria Centre for Disease Control (NCDC) offered an opportunity for healthcare providers to discover other globally acceptable means of reaching out to their patients in real time without security or confidentiality breaches⁸. This study showed that the majority of our antenatal clinic attendees, even in resource-constrained settings, have access to mobile phones. It is also instructive to note that while 61.6% of them had Android-, IOS- and Windows-supported smartphones. This means that all the respondents in this study could send and receive instant messages, send and receive images and pictures, and participate in real-time videoconferencing. The factors limiting their use of these applications include fluctuations in signal strength, lack of access outside of network coverage areas, and an occasional lack of funds to purchase airtime and data.

The latest social media trends point to social networking services and mobile tools, such as Zoom and WhatsApp, as viable media platforms for sharing and discussing clinical cases and medical and health education^{13,14,15,16,17,18}. In this study, we investigated the use of Zoom videoconferencing app in antenatal care administration during the COVID-19 pandemic lockdown in Ekiti state. The study provided further evidence of the positive role of the Zoom application in the delivery of ANC education to our antenatal clients in the comfort of their homes during the COVID-19 lockdown.

Fluctuations and low signal strengths, regardless of the network provider, were identified as problems by those surveyed, with a consensus rate of 75%. The occasional unaffordability of airtime subscriptions (49%), the high rate of data consumption (73%), and non-functionality in environments with no internet connectivity (72%) were also identified as limitations to the use of this mobile health app for ANC administration. This result is in keeping with the findings of Kaliyadan *et al.*¹⁹, who identified internet connectivity issues, the lack of adequate follow-up for some case discussions, and variable image quality as the major limitations to the use of WhatsApp for healthcare delivery.

The binary logistic regression results revealed that the use of mobile health applications to provide antenatal care via Zoom meetings was significantly associated with gravidity, parity, occupation, number of children, gestational age and husband's occupation.

5. Conclusion

The use of Zoom technology for the administration of antenatal care was beneficial to respondents in this study. These results suggest that Zoom app is becoming a fast-growing videoconferencing platform that may replace many physical meetings, including antenatal classes, for antenatal education. Although there are initial considerations that may limit its universal application, particularly in resource-limited environments, this approach may become a new standard in

the efforts of the government to prevent and curtail the spread of COVID-19 without compromising quality and accessible antenatal education. This application is also a proactive tool for preventing future emerging and re-emerging infectious diseases. To the best of our knowledge, this study is the first to research on the applicability of Zoom technology in the administration of antenatal care, at least in our environment. However, we believe that owing to the inherent benefit of video conferencing in advancing virtual communication with respect to the administration of antenatal care education and in improving clients' confidence and satisfaction, Zoom app and similar technologies may become new standards in the delivery of quality antenatal care services and will gain widespread acceptance in the near future.

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