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■ Original Article

Knowledge and perceived benefits of telemedicine adoption and online medical consultation among healthcare professionals at Ade-Oyo Maternity Hospital, Ibadan, Oyo State

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ABSTRACT

Background: Healthcare professionals' adoption of telemedicine is mainly influenced by their knowledge and perception of its benefits. This study was aimed at investigating the knowledge and perceived benefits of telemedicine and online medical consultation among healthcare professionals.

Materials & methods: A cross-sectional survey conducted among health professionals at Adeoyo Maternity Hospital, Ibadan, Nigeria. Data was collected from 250 respondents using a semi-structured questionnaire through a multi-stage sampling technique. SPSS version 26.0 was used for analysis. Spearman rho correlation was used to check the association between knowledge and perceived benefit at p-value ≤ 0.05 .

Results: Respondents mean age was 38.7 ± 9.2 years. 34.4% had at least 16 years of experience, 34.0% had master's degree. The mean knowledge score was 9.9 ± 1.7 , 91.6% had good knowledge. Level of education, years of experience and ownership and efficiency in use of computer were the major factors influencing knowledge on telemedicine and online consultation. Knowledge of telemedicine and online consultation was positively with perceived benefit ($p=0.024$, $r_s=0.142$).

Conclusions: Knowledge is a significant determinant of perceived benefit of telemedicine and online consultation.

Keywords: telemedicine, online medical consultation, knowledge, perceived benefit, healthcare professionals

INTRODUCTION

Telemedicine has emerged as a potentially clinically appropriate, cost-effective means of supporting patients and providers in the changing healthcare system [1]. Telemedicine is a healthcare service that uses information and communication technologies to provide remote

healthcare services, where distance is a significant factor [2]. Studies have shown limited knowledge of telemedicine technology, especially in low-and middle-income countries [3]. But recent advancements in information technology have led to changes in the level of knowledge among healthcare professionals. Telemedicine has the potential to significantly reduce human service costs, shorten waiting

times, and improve the effectiveness of healthcare resources [4]. It has been asserted that the likelihood of telemedicine adoption was mainly influenced by perceived usefulness and benefits of telemedicine technology among individual professional [5]. Telemedicine can improve communication and collaboration between physicians and doctors, as they can easily consult each other and share their experiences, and the potential to help in rapidly improving access and utilization of a wide range of healthcare services and facilities in Nigeria [6].

A study among healthcare professionals in Nigeria revealed that only 34.1% had good knowledge of telemedicine [7], and 82.5% had never attended any formal training on the subject [8]. This lack of training and knowledge has led to hesitancy in adopting the technology [9]. Adequate knowledge about the benefits and capabilities of telemedicine can enhance willingness to adapt and change attitudes towards telemedicine interventions [10]. Proper understanding of telemedicine technology, particularly by physicians, is critical for successful implementation and deployment, and greater knowledge leads to more positive attitudes and increased confidence in using the technology [11]. Telemedicine has immense potential for developing countries [12], especially those in the African region including Nigeria. A study revealed that majority of professional from all specialties perceived telemedicine is a viable approach for providing medical care services to patients [13]. According to a study more than 90% of participants believed that telemedicine could save time, money and efforts [14]. Consequently, this can save the lives and time of patients and money for the healthcare system technology.

Telemedicine also enables private healthcare specialists to practice and will enhance the patient experience [15]. Patients will no longer have to stand in long queues, and physicians will be able to access patient information more conveniently and efficiently with electronic files, eliminating overall wait times. Furthermore, remote appointments allow doctors to devote less time to each patient, allowing them to treat more patients [16]. The availability of telemedicine can discourage patients from self-medicating since they can easily access physicians and other practitioners for accurate information. This technology is especially beneficial during preoperative and postoperative assessments as it reduces patient hospital visits and lowers the cost of care [17]. Thus, it is essential to uncover potential evidence of telemedicine benefits to promote its use among healthcare providers.

It is also essential for healthcare professionals to gain experience and understanding of telemedicine, its benefits, uncertainties, and legal requirements to successfully implement it in their professional work [18]. However, this study aimed to investigate the knowledge and perceived benefits of telemedicine and online medical consultation among healthcare professionals.

MATERIALS & METHODS

Study Design

This study used a cross-sectional design to investigate among healthcare professionals.

Study Area

Adeoyo Maternity Teaching Hospital, Yemetu, Ibadan, Nigeria established in 1928 is a government owned specialized service hospital in Nigeria. It is located in Ibadan North Local Government Area of Oyo State. The hospital was originally designed and functioned as a secondary health institution but was upgraded to the level of a tertiary health institution in June 2004. The hospital has 200 female nurses/midwives and 20 female doctors. It offers obstetrics, pediatrics, medical, surgical, emergency and out-patient services to patients. It also serves as a referral center for many primary health centers and private clinics within Ibadan and environs. The antenatal clinic experiences rapid influx of clients with as many as about 4,000 monthly and 12,000-50,000 annually. Adeoyo is a Yoruba word, which means "crown of Oyo". The hospital has been very famous for the high rate of delivery it records. This it owes partly to the affordability of the health care services provided especially to the low and middle economic class as well as its central location in the Ibadan community [19].

Study Population

In this study, health professionals like doctors, nurses, pharmacists, physiotherapists, medical laboratory scientists, radiologists, dermatologists, laboratory technicians in the institution were engaged in this study

Eligibility Criteria

Health professionals that were included in this study were those with various levels of experience, connected with telemedicine service and willing to partake in the study

Sample Size Calculation

The data obtained from the hospital records revealed that total number of health professionals was 514 professionals. This constituted the population of this study.

Table 1. Calculating proportional allocation

| Profession | Total | Distribution process | Allocated proportion |
|-------------------------------|------------|------------------------|----------------------|
| Physiotherapists | 37 | $(37/514) \times 250$ | 18 |
| Physicians | 69 | $(69/514) \times 250$ | 34 |
| Nurses/midwives | 268 | $(268/514) \times 250$ | 130 |
| Dermatologist | 17 | $(17/514) \times 250$ | 8 |
| Medical laboratory scientists | 31 | $(31/514) \times 250$ | 15 |
| Laboratory technicians | 42 | $(42/514) \times 250$ | 20 |
| Pharmacists | 26 | $(26/514) \times 250$ | 13 |
| Radiologists | 24 | $(24/514) \times 250$ | 12 |
| Total | 514 | | 250 |

Yamane's approach [20] was used to determine the sample size, as follows: $n = N / (1 + Ne^2)$, where n is minimum sample size, N is the population size, and e is the margin of error (taken as 5.0%). Thus, $n = 514 / (1 + 514 \times 0.05^2) = 124.9 \approx 225$. To compensate for non-response, this was increased by 10.0%, $n = 225 / (1 - 10) = 250$.

Sampling Technique

A multi-stage sampling technique was employed.

1. **Stage 1:** One tertiary healthcare facility was selected from the two tertiary healthcare facility using simple random sampling.
2. **Stage 2:** Proportionate sampling was then used to determine the number of health professionals to be selected from each professional category.
3. **Stage 3:** Respondents from the professional categories was randomly recruited until the desired sample size for that category is achieved.

Formula for calculating proportional allocation is, as follows: $(n/N) \times X$, where n is number of sub sample (occupation), N is total number of study population, and X is calculated sample size (250) (**Table 1**).

Instrument for Data Collection

The study was carried out with the aid of semi-structured interviewer administered questionnaire among different health professionals in Adeoyo Maternal Teaching Hospital, Nigeria. Questions were arranged in a logical order starting with biographical information and questions was grouped into sections based on the research problem, hypothesis and aims and objectives of the study. As such, questions were in section, which included Socio-demographic characteristics, knowledge, level of acceptability, perceived benefits and perceived barrier of telemedicine and online medical consultation among health professionals in tertiary health care facility in Ibadan. However, a Cronbach's alpha of 0.831 was obtained, which shows its reliable.

Data Analysis

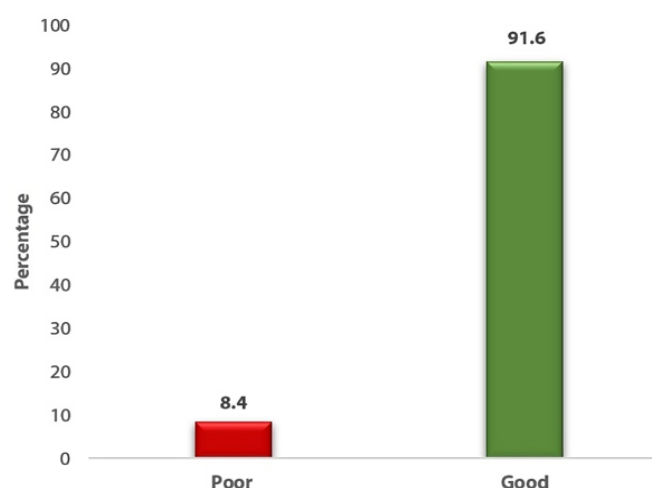
For data processing and analysis, SPSS version 26.0 was used. Data was checked for completeness and consistency. Frequency distribution tables was used to describe most of the findings and graphs were plotted for some accordingly; and other descriptive summaries was calculated. The knowledge was scored on a 13-point scale, which a point ≤ 6.5 and > 6.5 is considered poor and good knowledge, respectively. At bivariate level, relationships were done to find out whether any independent variables were related to the dependent variable. This was done using cross tabulation analysis through the use of Chi-square tests/Fishers exact to find out the strength of association between the categorical variables and determine the predicting and influencing factors using logistic regression analysis. Also, spearman rho correlation was done to check association between knowledge and perceived benefit, which all statistical tests were performed with 0.05 level of significance

Ethical Considerations

Study participants was given verbal and written information about the study in English. An information sheet was attached to each questionnaire describing the objective and relevance of the study and included information of confidentiality, voluntary participation and the right to withdraw from the study at any time before handing in the questionnaire. Written informed consent was obtained by each study participant. Completed questionnaires was kept confidential in sealed envelopes. Questionnaires and consent sheets were only handled by the investigator and assistants during data collection and later stored in a locked cabinet, only accessible for the investigator during analysis. Questionnaires and consent forms are to be destroyed after thesis defense. All participants were informed that participation in this study was voluntary and that they could withdraw from the study at any time without and consequences.

Table 2. Respondents' socio-demographic characteristics (n=250)

| Variable | Frequency (n) | Percentage (%) |
|--|---------------|----------------|
| Sex | | |
| Male | 104 | 41.6 |
| Female | 146 | 58.4 |
| Age | | |
| Up to 30 | 59 | 23.6 |
| 31-40 | 85 | 34.0 |
| 41-50 | 60 | 24.0 |
| 51 & above | 46 | 18.4 |
| Highest level of education | | |
| Diploma | 28 | 11.2 |
| Bachelor's degree | 137 | 54.8 |
| Masters | 85 | 34.0 |
| Marital status | | |
| Single | 79 | 31.6 |
| Married | 166 | 66.4 |
| Separated | 5 | 2.0 |
| Occupation | | |
| Nurses/midwives | 130 | 52.0 |
| Medical laboratory scientists | 35 | 14.0 |
| Physicians | 34 | 13.6 |
| Physiotherapists | 18 | 7.2 |
| Pharmacists | 13 | 5.2 |
| Radiologists | 12 | 4.8 |
| Dermatologist | 8 | 3.2 |
| Years of experience | | |
| Up to 5 | 79 | 31.6 |
| 6-10 | 50 | 20.0 |
| 11-15 | 35 | 14.0 |
| 16 & above | 86 | 34.4 |
| Average monthly income | | |
| 100,000-200,000 | 130 | 52.0 |
| 200,001-300,000 | 70 | 28.0 |
| 300,001 & above | 50 | 20.0 |
| Own a personal computer | | |
| Yes | 217 | 86.8 |
| No | 33 | 13.2 |
| Efficiency in use of computers, the Internet, & software | | |
| Excellent | 76 | 30.4 |
| Fair | 161 | 64.4 |
| Not efficient | 13 | 5.2 |
| Application frequently used | | |
| WhatsApp | 243 | 97.2 |
| Zoom | 147 | 58.8 |
| Microsoft Team | 39 | 15.6 |
| Email | 237 | 94.8 |
| Skype | 89 | 35.6 |
| Facetime | 67 | 26.8 |
| Go to webinar | 44 | 18.0 |

**Figure 1.** Respondent's level of knowledge on telemedicine & online medical consultation (Source: Field study)

RESULTS

Socio-Demographic Characteristics of Respondents

250 respondents were engaged in this study with 41.6% being male with mean age of 38.7 ± 9.2 years, which some (34.0%) were between the ages of 31-40 years old. More than half (54.8%) had a bachelor's degree. Many (66.4%) were married, many (61.2%) of the respondents were nurses/midwives, with some of them (34.4%) having at least 16 years of experience and 51.2% had an average monthly income of 100,000 naira to less than 200,000 naira. Majority (86.8%) owned a personal computer, while some (30.4%) were excellent in the use of computers, the Internet, and software. When asked which applications they frequently used, least used software was Microsoft Teams (15.6%) (Table 2).

Knowledge of Telemedicine & Online Medical Consultation

The mean knowledge score was 9.9 ± 1.7 on a 13-point scale, where majority (91.6%) had good knowledge, and few (8.4%) had poor knowledge on telemedicine and online consultation (Figure 1).

All of the respondents were aware of telemedicine technology and online medical consultation, which respondents' sources of information on telemedicine and online medical consultation included media (43.2%), the Internet (75.2%), conferences and seminars (55.2%), and professional partners (60.4%) (Table 3).

Majority (91.2%) of the respondents had the knowledge that face-to-face interaction of patient and doctors was possible, 4.8% did not know that patients could use the Internet to search their symptoms and conditions, and 98.8% knew that

Table 3. Knowledge of telemedicine & online medical consultation (n=250)

| Variable | Frequency | Percentage |
|--|-----------|------------|
| Aware of telemedicine technology & online medical consultation | | |
| Yes | 250 | 100 |
| No | 0 | 0.0 |
| Sources of information on telemedicine & online medical consultation | | |
| Media | 108 | 43.2 |
| The Internet | 188 | 75.2 |
| Conferences & seminars | 138 | 55.2 |
| Professional partners | 151 | 60.4 |

Table 4. Knowledge of telemedicine & online medical consultation (n=250) (DK: Do not know)

| Variable | Yes: n (%) | No: n (%) | DK: n (%) |
|---|------------|------------|------------|
| Face to face interaction of patient & doctors is possible | 228 (91.2) | 22 (8.8) | 0 (0.0) |
| Patients using the Internet to search their symptoms & conditions | 33 (13.2) | 205 (82.0) | 12 (4.8) |
| Provides health care services, where distance is a problem | 247 (98.8) | 1 (0.4) | 2 (0.8) |
| Direct full consultation of patients through the Internet & with other professional | 228 (91.2) | 1 (0.4) | 21 (8.4) |
| Patients can be tested through telemedicine | 194 (77.6) | 14 (5.6) | 42 (16.8) |
| Follow-up of patients through the Internet or calls | 247 (98.8) | 3 (1.2) | 0 (0.0) |
| Surgical procedure through the Internet, where patient gets to do it him/herself | 22 (8.8) | 228 (91.2) | 0 (0.0) |
| Patients' management with drugs can be done | 248 (99.2) | 2 (0.8) | 0 (0.0) |
| Provide medical information & services to patients or clients | 250 (100) | 0 (0.0) | 0 (0.0) |
| Electronic medical record of patients' registration can be maintained through telemedicine | 249 (99.6) | 1 (0.4) | 0 (0.0) |
| There was a high usage of telemedicine & online medical consultation pre-COVID-19 | 188 (75.2) | 38 (15.2) | 24 (9.6) |
| There was a high usage of telemedicine & online medical consultation during COVID-19 | 69 (27.6) | 123 (49.2) | 58 (23.2) |
| There is a drastic reduction in usage of telemedicine & online medical consultation post-Covid-19 | 28 (11.2) | 101 (40.4) | 121 (48.4) |

telemedicine and online medical consultation provided health care services, where distance was a problem. Majority (91.2%) mentioned direct full consultation of patients through the Internet and with other professionals, 16.8% did not know that patients could be tested through telemedicine, 98.8% knew of follow-up of patients through the Internet or calls, 91.2% said telemedicine and online medical consultation provided surgical procedure through the Internet, where the patient cannot do it him/herself and 99.2% knew that patients' management with drugs could be done.

Also, all respondents had knowledge of provision of medical information and services to patients or clients could be done through telemedicine and online consultation, 0.4% had no knowledge that electronic medical record of patients' registration could be maintained through telemedicine. Some (23.2%) did not know that there was a high usage of telemedicine and online medical consultation during COVID-19, 75.2% knew that there was a high usage of telemedicine and online medical consultation pre-COVID-19 and almost half (48.8%) did not know that there was a drastic reduction in the usage of telemedicine and online medical consultation post-COVID-19 (**Table 4**).

Perceived Benefits of Telemedicine & Online Medical Consultation

Some (30.4%) of the respondents agreed that telemedicine and online medical consultation would enhance access to health care services, 71.2% strongly agreed that telemedicine and online medical consultation was a viable approach for providing medical care services to patients to improve quality care, a few (2.8%) strongly disagreed that using the telemedicine system and online medical consultation can save time for healthcare services and one-fifth (20.0%) disagreed that using the telemedicine system and online medical consultation can save money for healthcare services. Some (37.6%) agreed that telemedicine system and online medical consultation can save lots of effort in healthcare delivery, 42.4% strongly agreed that telemedicine can be used to monitor chronic patients from home, and 5.2% were undecided if access to telemedicine system treatment and online consultation had the potential to minimize emergencies.

Also, half (50.4%) of the respondents strongly agreed that patient information could be easily accessed through telemedicine technology, almost half (48.8%) agreed that telemedicine and online medical consultation allowed for easy collaboration among health professionals, 32.0% of the

Table 5. Perceived benefits of telemedicine & online medical consultation (n=250)

| Variable | SA: n (%) | A: n (%) | U: n (%) | D: n (%) | SD: n (%) |
|---|------------|------------|-----------|-----------|-----------|
| Telemedicine & online medical consultation would enhance access to health care services | 174 (69.6) | 76 (30.4) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| It is a viable approach for providing medical care services to patients to improve quality care | 178 (71.2) | 72 (28.8) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Using of telemedicine system & online medical consultation can save time for healthcare services | 140 (56.0) | 79 (31.6) | 14 (5.6) | 10 (4.0) | 7 (2.8) |
| Using telemedicine system & online medical consultation can save money for healthcare services | 76 (30.4) | 44 (17.6) | 43 (17.2) | 50 (20.0) | 37 (14.8) |
| Telemedicine system & online medical consultation can save lots of effort in healthcare delivery | 145 (58.0) | 94 (37.6) | 6 (2.4) | 4 (1.6) | 1 (0.4) |
| Telemedicine can be used to monitor chronic patients from home | 106 (42.4) | 80 (32.0) | 34 (13.6) | 18 (7.2) | 12 (4.8) |
| Access to telemedicine system treatment & online consultation has potential to minimize emergencies | 121 (48.4) | 94 (37.6) | 13 (5.2) | 17 (6.8) | 5 (2.0) |
| Patient information can be easily accessed through telemedicine technology | 126 (50.4) | 121 (48.4) | 3 (1.2) | 0 (0.0) | 0 (0.0) |
| It allows for easy collaboration among health professionals | 128 (51.2) | 122 (48.8) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Telemedicine & online medical consultation will improve patient satisfaction | 112 (44.8) | 49 (19.6) | 80 (32.0) | 5 (2.0) | 4 (1.6) |
| Telemedicine & online medical consultation are beneficial in health care delivery in Nigeria | 198 (79.2) | 52 (20.8) | 0 (0.0) | 0 (0.0) | 0 (0.0) |

Note. SA: Strongly agree; A: Agree; U: Undecided; D: Disagree; & SD: Strongly disagree

respondents were undecided if telemedicine and online medical consultation would improve patient satisfaction and one-fifth (20.8%) agreed that telemedicine and online medical consultation were beneficial in health care delivery in Nigeria (**Table 5**).

Factors Influencing Knowledge of Telemedicine & Online Medical Consultation

Logistic regression analysis revealed that respondents who had a bachelor's and master's degree were 15.0 and 19.0 times more likely to have good knowledge of telemedicine and online medical consultation as compared to those who had diploma (odds ratio [OR]=15.00, confidence interval [CI]:

6.175-63.488, $p < 0.001$; OR=19.80, CI: 4.287-52.483, $p < 0.001$, respectively).

Also, the result from this study showed that respondents have had between 11-15 years of experience are 72.3% less likely to have good knowledge on telemedicine and online consultation as compared to those who had spent just five years or less (OR=0.277, CI: 0.088-0.873, $p = 0.028$), those who own a computer were 6.4 times more likely to have good knowledge compared to those who do not have (OR=6.406, CI: 2.448-16.767, $p < 0.001$) and finally those who are not efficient in use of computers, the Internet and software are 86.3% less likely have good knowledge compared to those with excellent efficiency in use of computers, the Internet, and software (OR=0.137, CI: 0.024-0.774, $p = 0.024$) (**Table 6**).

Table 6. Factors influencing knowledge of telemedicine & online medical consultation

| Variables | Level of knowledge | | Odds ratio | 95% confidence interval | | p-value |
|----------------------------|--------------------|-------------|------------|-------------------------|-------------|----------|
| | Poor: n (%) | Good: n (%) | | Lower bound | Upper bound | |
| Highest level of education | | | | | | |
| Diploma (reference) | 12 (42.9) | 16 (57.1) | - | - | - | - |
| Bachelor's degree | 5 (3.6) | 132 (96.4) | 15.000 | 6.175 | 63.488 | <0.001** |
| Masters | 4 (4.7) | 81 (95.3) | 19.800 | 4.287 | 52.483 | <0.001** |
| Year of experience | | | | | | |
| Up to 5 (reference) | 6 (7.6) | 73 (92.4) | - | - | - | - |
| 6-10 | 4 (8.0) | 46 (92.0) | 0.945 | 0.253 | 3.531 | 0.933 |
| 11-15 | 8 (22.9) | 27 (77.1) | 0.277 | 0.088 | 0.873 | 0.028** |
| 16 & above | 3 (3.5) | 83 (96.5) | 2.274 | 0.549 | 9.418 | 0.257 |
| Own a personal computer | | | | | | |
| No (reference) | 12 (5.5) | 205 (94.5) | - | - | - | - |
| Yes | 9 (27.3) | 24 (72.7) | 6.406 | 2.448 | 16.767 | <0.001** |

Note. **Statistically significant ($p < 0.05$)

Table 6 (continued). Factors influencing knowledge of telemedicine & online medical consultation

| Variables | Level of knowledge | | Odds ratio | 95% confidence interval | | p-value |
|--|--------------------|-------------|------------|-------------------------|-------------|---------|
| | Poor: n (%) | Good: n (%) | | Lower bound | Upper bound | |
| Efficiency in use of computers, the Internet, & software | | | | | | |
| Excellent (reference) | 3 (3.9) | 73 (96.1) | - | - | - | - |
| Fair | 15 (9.3) | 146 (90.7) | 0.400 | 0.112 | 1.426 | 0.158 |
| Not efficient | 3 (23.1) | 10 (76.9) | 0.137 | 0.024 | 0.774 | 0.024 |

Note. **Statistically significant ($p < 0.05$)

Table 7. Association between knowledge & perceived benefit of telemedicine & online consultation

| Variable | Perceived benefits | |
|-----------|--------------------|---------|
| Knowledge | r_s | 0.142 |
| | p-value | 0.024** |

Note. r_s : Spearman's rank correlation coefficient & **statistically significance

Association Between Knowledge & Perceived Benefit of Telemedicine & Online Medical Consultation

Spearman Rho analysis show a significant association between knowledge and perceived benefit of telemedicine and online consultation. Knowledge of telemedicine and online consultation has positive effect on perceived benefit ($p=0.024$, $r_s=0.142$) showing healthcare professionals will see more benefit in telemedicine and online consultation if they have adequate knowledge on it (**Table 7**).

DISCUSSION

The mean age of healthcare professionals was 38.7 ± 9.2 years close to 41 ± 9.9 years recorded by another study could be because both studies were conducted in south-western part of the country.

Some of the respondent were male in contrast to a study, where there were more male than female, which this could be as a result of demography difference [21]. All the healthcare professionals are literate as literacy is a requirement for healthcare profession. In this study 66.4% were married close to 60.0% recorded in another study, which the slight difference could be as a result of variation in population [22]. Also, many of the study respondents were nurses/midwives, which is because they form the highest population in any healthcare facility settings, some had at least 16 years of experience, which makes them a good target population because their experience on the job will help to know the feasibility of telemedicine and possible challenges to face at implementation.

Majority owned a personal computer as the technology evolution as made personal computer a must as it aids communication and service rendering, where some were excellent in the use of computers, the Internet, and software.

Information and communication technology is valuable for exchange of valid information for diagnosis, treatment, and prevention of diseases, which is why respondents when asked on most frequently used application, most mentioned the likes of WhatsApp, Zoom, Microsoft Team, email, and others [23].

All the healthcare professionals in this study were aware of telemedicine technology and online medical consultation similar to a study, which they had heard mostly through the Internet, conferences and seminars and professional partners [24]. Majority had good knowledge on telemedicine and online consultation as compared to another study, where healthcare professionals had limited knowledge, which could be attributed to time of study being older of about seven years and recently the evolution of technology is rapidly increasing the knowledge of everyone in all sectors and operationalizing technology in their respective profession [14]. However, in a more recent study, majority had good knowledge similar to another study [25]. Majority of the healthcare professionals had the knowledge that face to face interaction of patient and doctors was possible but a previous study that shows many of clinicians were unwilling to accept a reduction in face-to-face consultations [26]. As a result of the increase in knowledge on telemedicine, and due to their efficiency in computer and information technology, majority knew that telemedicine and online medical consultation provided health care services, where distance was a problem and due to the Internet inter/intra professional consultation could be done even for surgery and follow-up could be done on patients' drug management since patient registration could be maintained. Some did not know that there was a high usage of telemedicine and online medical consultation during COVID-19, which for a period of time during the COVID-19 pandemic, teleconsultations were the predominant modality for health care delivery [27]. As we consider the sustainability of telemedicine services, resolution of access issues will be necessary to assure equitable care [28], and almost half did not know that there was a drastic reduction in the usage of telemedicine and

online medical consultation post-COVID-19 as some of them had gotten use to the mode of service utilization.

Integrating telehealth systems with other electronic health systems makes remote care easier and improves patients care, which our study also corroborate the findings, where some agreed that telemedicine and online medical consultation would enhance access to health care services [29], 71.2% strongly agreed that telemedicine and online medical consultation was a viable approach for providing medical care services to patients to improve quality care while in another study, 57.9% did not perceive the quality of care provided as excellent as traditional care, which could be due to geographical variation [30].

Telemedicine has the potential to increase access to health care services, reduce health care costs, and sustain the continuity of care, which according to our study a many agreed that using the telemedicine system and online medical consultation can save time and money for healthcare services [31]. Some agreed that telemedicine system and online medical consultation can save lots of effort and can be used to monitor chronic patients from home, which will have great potential to minimize emergencies. Also, half of the healthcare professionals strongly agreed that patient information could be easily accessed through telemedicine technology, which another study stated that real-time access to patient data enables both physicians and patients to examine medical records at any time, thereby leading to improved health outcomes [32]. Almost half agreed that telemedicine and online medical consultation allowed for easy collaboration among health professionals, which another study recorded a higher proportion but agreed that telemedicine will help to transfer information across sectoral boundaries [33]. Some (32.0%) of the respondents were undecided if telemedicine and online medical consultation would improve patient satisfaction, which another study revealed that 69.0% of the healthcare professionals were satisfied with the management received using telemedicine and agreed that telemedicine and online medical consultation were beneficial in health care delivery in Nigeria [34].

There was statistical significance association between highest level of education and knowledge of telemedicine and online medical consultation as revealed that healthcare professionals who had a bachelor's and master's degree were 15.0 and 19.0 times more likely to have good knowledge of telemedicine and online medical consultation as compared to those who had diploma, which according to another study that supported this study stated that

healthcare professionals with less education were significantly less likely have good knowledge [35].

The result from this study showed that respondents have had between 11-15 years of experience are 72.3% less likely to have good knowledge on telemedicine and online consultation as compared to those who had spent just five years or less, which could be because the older ones are used to the face-to-face service rendering while the younger ones are more technologically inclined. Those who own a computer were 6.4 times more likely to have good knowledge compared to those who do not have and those who are not efficient in the use of computers, the Internet, and software are 86.3% less likely have good knowledge, which almost everyone has access to computer and access to computer is important to the successful implementation of telemedicine [36].

CONCLUSIONS

This study revealed that majority had good knowledge on telemedicine and online consultation, which professional partners played a role in their awareness. However, level of education, years of experience and ownership and efficiency in use of computer were the major factors influencing the healthcare professionals' knowledge on telemedicine and online consultation. Based on the findings of the research, it seems necessary to introduce telemedicine at an early point in the education of medical students and to deepen this knowledge and healthcare professionals they should be informed about developing legislation and regulatory developments in telemedicine through conferences and seminars.

Limitations

Some important limitations should be kept in mind when interpreting the results of the present study. This study was limited to Nigeria; hence, the findings may not be generalizable to the populations of other countries. Furthermore, the cross-sectional design of this study does not allow for drawing concrete conclusions establishing causation between variables, hence, outcomes could be influenced by confounding variables that were not examined.

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13/479/44580 and LCU-REC/22/171, respectively. Written informed consents were obtained from the participants.

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