

The Impact of Telemedicine in Improving Access to Healthcare Delivery Services in Owerri Municipal.

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Abstract:

Telemedicine is portrayed as the usage of electronic communication and information technologies to help huge separation clinical health care, patient and professional health related education, general health and health organization. It is on this background that this study seeks to investigate the impact of telemedicine in improving access to healthcare delivery services in Owerri Municipal. The main objective of this study is to assess the impact and challenges associated with the use of Telemedicine in Owerri Municipal. A survey research design was adopted, a simple random sampling technique was used to select 100 respondents from the population and a questionnaire was the instrument for data collection. Half of the respondents were males (50%) while the other half were females (50%). Majority of the respondents were Doctors (50%), Nurses (25%), Lab technicians (15%) and Pharmacists (5%). Distribution of the respondents based on their religion was, Christianity with 55 people (55%), Islam with 30 people (30%) and others with 15 people (15%). The study was conducted in Owerri Municipal Staff Clinic, Douglas Market, St. Paul's Catholic Church and the nearby streets. The data were analyzed using SPSS version 6.0. The results show that the effectiveness of Telemedicine in improving access to healthcare delivery

services in Owerri Municipal include but not limited to rapid and efficient communication; Alleviate imbalances in geographical allocation of resources; Decreases patient anxiety; Increases access to health facilities; Elimination of real - time interaction. There is need for basic training and familiarity with the computer and associated communication systems. The surveyed Medical Centers should embark on drastic development of Telemedicine in line with global trend in order to promote effective utilization of Tele-medical Services.

Key words: impact; telemedicine; healthcare delivery services; owerri municipal.

Introduction:

Telemedicine involves the use of telecommunications and computer technology in the delivery of health services to enable provider-patient and provider-provider consultation across geographic boundaries. It encompasses several different forms of information transmission (voice, sound, video, still picture, text), communication technologies (standard telephone lines, coaxial cable, satellite, microwave, digital wireless, ISDN, Internet), and user interfaces (desktop computers, laptop computers, personal digital assistants, Fax machines, telephones, mobile phones, videophones,

various stand alone systems and peripheries). These permit a range of activities, most prominent of which include: *store-and-forward applications*, which involve the asynchronous transmission of medical information, patient/provider communications and other data; *live audio graphic encounters*, which combine sound with still pictures; and perhaps, most noteworthy, *live two-way interactive video consultations*. There are also several potential uses. This is reflected in the prevailing terminology, with “telemedicine” often being used to describe clinical, patient care applications, and “telehealth” being used more broadly to describe both clinical *and* non-clinical applications in the way of education, administration, and research [1].

Prior to adoption into routine use, any new technology must end up being better than the methodology that it is proposed to supplant, that is, it must be more successful or more financially savvy than the alternative(s). Telemedicine is no exemption to this standard. There is developing acknowledgment that telemedicine frameworks require appraisal and the continuous collection of significant information for authoritative purposes before they can be considered for routine use for a huge scope. Besides, appraisal of telemedicine applications is expected to help buying and arranging choices and furthermore to screen and adjust the utilization of the technology when it is set up [2]. Telemedicine is the utilization of communication and information technologies to give or bolster clinical consideration a good ways off. Telehealth is portrayed as the usage of electronic communication and information technologies to help huge separation clinical health care, patient and professional health related education, general health and health organization [3].

In terms of service delivery methods, telemedicine can be classified into three forms: store-and-forward, remote patient monitoring, and real-time interactive services. Store-and forward telemedicine involves acquiring medical data (such as medical images and bio signals) and then transferring the data to a doctor or medical specialist across distance and time [4]. Remote monitoring is that the medical experts monitor a patient remotely by using wearable devices, digital video, or other devices. This method is mainly applied to manage chronic diseases, such as heart disease, diabetes mellitus, and asthma [5]. For the real-time interactive service, patients and doctors communicate through video conferencing [5]. For the most part,

patients need to go to the nearby telemedicine health centre for this service with the assistance of tele-experts. By giving simpler access to medical expertise, telemedicine can lessen the geographical variability of diagnosis, treatment, and clinical administration. The study led during 2009-2010 in remote areas of the Brazilian province of Minas Gerais shows that the tele-consultations can turn away 80.8% of referrals and 45.5% of transportation costs. Numerous different investigations likewise checked that telemedicine could significantly decrease the human services cost, abbreviate the waiting time, and improve the usage effectiveness of health resources [6].

Advanced information and communication technologies enable patients to get health services through the website or mobile applications. This motivates an increasing number of hospitals to devote attention to telemedicine services. For instance, the division of neonatal medication of Mayo Clinic offers infant telemedicine consultations to 6 outpatient centers, and almost 33% of the babies could stay in the nearby emergency clinic [7]. To give telemedicine services, the nonprofit hospital needs to confront an investment to recruit tele-specialists, and the system organizer needs to limit the total cost, which incorporates the hospital investment cost and patients' transportation cost and waiting cost. In this manner, regardless of whether the decrease of transportation cost and waiting cost can compensate for the investment turns into a significant issue for the system organizer.

In spite of the fact that telemedicine can avoid traveling and shorten the waiting time, the telemedicine service is certainly not a superior decision now and again. For patients with muddled illnesses, they cannot get relieved uniquely with the telemedicine services and still need retreatment from conventional offline outpatient. For instance, in general urological care, telemedicine can deter the in-person visits for almost 90% of patients, however just half of urological complaints could have been made do with telemedicine alone [8]. Notwithstanding, patients just realize the cure rate earlier likelihood of the telemedicine service. They do not know whether they can be cured or not before getting the telemedicine service. Hospitals can impact patients' choices by changing the online and offline service limit in the double channel service system. In this way, the market division of the telemedicine service and customary offline service is additionally changed. It is

on this background that this study seeks to investigate the impact of telemedicine in improving healthcare delivery services in Owerri Municipal [9].

Lawful confusions are raising another warning. Laws and a set code of rules and morals should be applied before telemedicine can be utilized regularly in different capacities. This by itself may take some time. Services and how experts get paid for them will all should be settled as telemedicine turns into a more familiar practice. This can end up being a troublesome assurance. At that point we have clinical risk and over reliance on this telemedicine framework. Because of the risk involved with what is reliable versus unreliable information and over reliance or over utilization of telemedicine can without much of a stretch get out of control until more uniformed systems and methods are placed into play [10].

As should be obvious telemedicine is not yet completely worked out where it tends to be used continually or deftly. Be that as it may, it can possibly be a colossal advantage for the world and every one of its civic establishments. There is no contending that the contributions it can make have unlimited prospects anyway additional time and effort will be expected to sort out telemedicine for it to be unquestionably acknowledged.

Materials and Methods:

Study Area:

The study were conducted in Owerri Municipal, Imo State, Nigeria. The urban setting with diverse socio-economic demographics and existing healthcare infrastructure presented an ideal context to study the potential and challenges of telemedicine implementation in underserved communities. Owerri also hosts two major tertiary hospitals and several smaller healthcare facilities, providing a range of healthcare services, making it suitable for sampling participants involved in diverse telemedicine applications.

Study Population:

The population of this study comprises inhabitants of Owerri municipal with the number 172,600. Owerri municipal is a local government area in Imo state, Nigeria with its headquarters in the city of Owerri. It covers an area of approximately 58 square kilometers.

Sample Size:

A simple random sampling technique was used to select 100 respondents from the population. This study aimed to achieve a balanced representation of diverse perspectives through its sampling strategy. Participants were recruited from five locations in Owerri Municipal: **Primary Healthcare Center (PHC):** Patients: 10 women attending antenatal or postnatal care clinics, ensuring a specific focus on a relevant group.

Staff: 10 healthcare personnel encompassing a range of roles within the center.

Churches: 20 attendees from two diverse churches to capture wider community perspectives.

Douglas Market: 20 randomly selected shoppers, acknowledging the limitations of convenience sampling in achieving full representativeness.

Hospitals: 20 staff members (doctors, nurses, etc.) across two hospitals, potentially stratified by roles for richer insights.

Random Encounters: 20 individuals encountered on the streets, serving as supplementary data with acknowledged potential for selection bias.

This approach balanced representativeness through diverse locations and participant types while remaining feasible within resource constraints. The total sample size of approximately 100 participants allowed for meaningful analysis without exceeding practical limitations.

Sampling Technique:

A combination of sampling techniques was employed to ensure a representative sample from the target population. For healthcare providers, a stratified random sampling technique was used, ensuring proportional representation from different healthcare facilities and specialties. For patients, purposive sampling was employed to recruit individuals from identified underserved communities who meet the inclusion criteria for receiving or potentially benefiting from telemedicine services for the chosen healthcare areas. Snowball sampling was employed to reach patients from specific communities or those with less frequent healthcare access.

Instrument for Data Collection:

The study made use of primary source of data. Concerning the primary source, questionnaire was used to gather the data. The questionnaire was a four-point

rating scale (Likert scale), starting from strongly agreed (SA), agreed (A), disagreed (d), and strongly disagreed (SD). The questionnaire was designed in such a way that every question in the questionnaire was related to the research questions and hypotheses of the study. Also, the result was used to answer the research questions and test the relevant hypothesis.

Validity:

The self-developed instrument was approved by the project supervisor and validated by two lecturers in the department of public health, Imo State University Owerri. The validators were requested to examine the specification and items of the instrument to justify the relevance of the contents in terms of their clarity, appropriateness of the language and its ability to elicit accurate information needed to enable the researchers answer the research questions. The validators made necessary modifications, corrections and suggestions that helped in improving the quality of the instrument.

Reliability of Instrument:

The reliability of the research instrument was determined. The Pearson Correlation Coefficient was used to determine the reliability of the instrument. A coefficient value of 0.68 indicated that the research instrument was relatively reliable. According to (Taber, 2017) the range of a reasonable reliability is between 0.67 and 0.87.

Method of Data Collection:

Quantitative Data: Electronic surveys were distributed to healthcare providers through online platforms and relevant professional networks. Paper surveys (questionnaires) were administered to patients at healthcare facilities within selected underserved communities. Medical records were accessed with written informed consent from patients and authorization from healthcare institutions.

Qualitative Data: Individual interviews and focus group discussions were conducted in private settings convenient for participants. Informed consent was obtained before each interview or discussion. All interviews and discussions were audio-recorded with participant consent for subsequent transcription and analysis.

Method of Data Analysis:

A mean score rating method was used to analyse the data based on the 2.5 acceptance region format to answer the research question, while to address the research hypothesis, the chi-square was used.

Ethical Consideration:

The study was approved by the Project Committee of the Department. Informed consent was obtained from all study participants before they were enrolled in the study. Permission was sought from the relevant authorities to carry out the study. Date to visit the place of study for questionnaire distribution was put in place in advance.

Results:

This section presents the results of the field study; it shows the descriptive information of the respondents, the results of each of the research questions and the test of hypothesis.

1. Demographic Information of the Respondents:

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	50	50.0	50.0	50.0
Valid Female	50	50.0	50.0	100.0
Total	100	100.0	100.0	

Table 1: Distribution of the Respondents based on their Gender.

The table above indicates the distribution of the respondents for this study based on the gender of the respondents. The table showed that the respondents for the study are equally distributed between male and women, as each of the sexes make up of 50% of the total respondents. This is to ensure gender balance in the responses that is sought for in the study.

	Frequency	Percent	Valid Percent	Cumulative Percent
Doctor	50	50.0	50.0	50.0
Nurses	25	25.0	25.0	75.0
Lab Techs.	15	15.0	15.0	90.0
Pharmacist	5	5.0	5.0	95.0
Total	100	100.0	100.0	

Table 2: Distribution of the Respondents based on their Status.

The tables 2 above revealed that majority of the respondents for this study are doctors as indicated by about 50 percent of the total respondents. The table also shows that about 25 percent of the respondents are nurses, 15 percent are lab technologists, while about 5 are pharmacists. This indicates that majority of the respondents are doctors.

	Frequency	Percent	Valid Percent	Cumulative Percent
1-10 years	20	20.0	20.0	20.0
11 -15 years	40	40.0	40.0	60.0
16-25 years	30	30.0	30.0	90.0
26 years & above	10	10.0	10.0	100.0
Total	100	100.0	100.0	

Table 3: Distribution of the Respondents based on their years of Experience.

The table 3 above indicates the distribution of the respondents based on their years of experience, the table shows that about 90 percent of the respondents used in this study have less than 16-25yrs experience. An indication that they are current with the happenings in the area.

	Frequency	Percent	Valid Percent	Cumulative Percent
Christianity	55	55.0	55.0	55.0
Valid Islam	30	30.0	30.0	85.0
Others	15	15.0	15.0	100.0
Total	100	100.0	100.0	

Table 4: Distribution of the Respondents based on their Religion.

The table 4 above displays the distribution of the respondents for this study based on their religion, the table indicates that majority of the respondents approximately 55 percent of them are Christians, while about 30 percent are Muslim. This shows that there is a significant number of the Muslims living in the state.

2. Answers from the Research Questions:

Research Question One: What is the effectiveness of telemedicine in improving healthcare delivery services in Owerri Municipal?

S/N	Decision	N	Mean	Std. Deviation	Decision
1	Rapid and efficient communication	100	2.6324	.36440	Accepted
2	Alleviate imbalances in geographical allocation of resources	100	2.6213	.78210	Accepted
3	Decreases patient anxiety	100	2.6544	.32454	Accepted
4	Increases access to health facilities	100	3.1234	.89893	Accepted
5	Elimination of real – time interaction	100	2.6453	1.20605	Accepted
	Valid N (listwise)	100			

Table 5: Responses of the respondents on the effectiveness of telemedicine in improving healthcare delivery services in Owerri Municipal.

From the responses of the respondents as indicated on table 5 above, it can be inferred that the effectiveness of telemedicine in improving health care delivery services in Owerri Municipal include but not limited to Rapid and efficient communication; Alleviate imbalances in geographical allocation of resources; Decreases patient anxiety; Increases access to health facilities; and Elimination of real – time interaction. All these are as agreed by the majority of the respondents.

Research Question Two: What are the various types of telemedicine available in Owerri North?

S/N	Decision	N	Mean	Std. Deviation	Decision
1	Tele-cardiology	100	2.6324	.36440	Accepted
2	Tele-dermatology	100	2.6213	.78210	Accepted
3	Tele-radiology	100	2.6544	.32454	Accepted
4	Tele-pharmacy	100	3.1234	.89893	Accepted
5	Tele-nursing	100	2.6453	1.20605	Accepted
	Valid N (listwise)	100			

Table 6: Responses of the respondents on the various types of telemedicine available in Owerri Municipal.

From the responses of the respondents as indicated on table 5 above, it can be inferred that the various types of telemedicine available in Nigeria include but not limited to Tele-cardiology; Tele-dermatology; Tele-radiology; Tele-pharmacy; and Tele- nursing. All these are as agreed by the majority of the respondents.

Research Question Three: What are the challenges associated with the use of Telemedicine in Owerri Municipal?

S/N	Decision	N	Mean	Std. Deviation	Decision
1	Poor internet facilities	100	2.6324	.36440	Accepted
2	Poor funding	100	2.6213	.78210	Accepted
3	Unfavorable government policy	100	2.6544	.32454	Accepted
4	Difficulty in retrieving record	⁹ 100	3.1234	.89893	Accepted
5	Difficult remote access	100	2.6453	1.20605	Accepted
Valid N (listwise)		100			

Table 7: Responses of the respondents on the challenges associated with the use of Telemedicine in Owerri Municipal.

From the responses of the respondents as indicated on table 5 above, it can be inferred that the challenges associated with the use of Telemedicine in Owerri Municipal include but not limited to Poor internet facilities; Poor funding; Unfavorable government policy; Difficulty in retrieving record; and Difficult remote access. All these are as agreed by the majority of the respondents.

3. Test of Hypothesis:

Ho1: There is no significant effect of telemedicine on the Nigerian health care system

Decision rule: Reject the null hypothesis if the Asymp level of significant is less than 0.05. Otherwise, do not reject the null hypothesis.

Test Statistics	
There is no significant effect of telemedicine on the Owerri Municipal health care system	
Chi-Square	23.876 ^a
Df	3
Asymp. Sig.	.030

Table 8: Test of hypothesis table one.

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 25.0.

Since the Asymp Sig. level of this the test is 0.030 which is far much lower than the 0.05 acceptance region, we therefore reject the null hypothesis and conclude that there is a significant effect of telemedicine on the Owerri Municipal health care system also a significant

impact of telemedicine in the improvement of access to healthcare delivery services.

Discussion:

This study focused on the impact of telemedicine in improving access to healthcare delivery services in Owerri Municipal. Studies primarily focus on developed nations, urban settings or specific telemedicine applications. This leaves a significant knowledge gap regarding the unique challenges and opportunities of implementing telemedicine within resource-constrained environments like Owerri. Based on this study, there was increased ante-natal care through telemedicine and other specific aspects of healthcare [11]. Nigerian study on increased ante-natal care attendance, which primarily addresses specific aspects of telemedicine or different things. This study addressed this gap by investigating the impact of telemedicine on access to healthcare services, patient satisfaction and health outcomes within underserved communities of Owerri Municipal. It utilized a mixed methods approach, focusing on chronic diseases management, maternal health and mental health services, to provide valuable insights into telemedicine implementation in resource-constrained African settings [12]. The study showed that Telemedicine includes but is not limited to rapid and efficient communication; Alleviate imbalances in geographical allocation of resources; decreases patient anxiety; increases access to health facilities; and elimination of real-time interaction [13]. It also includes Tele-cardiology; Tele-dermatology; Tele-radiology; Tele-pharmacy; and Tele-nursing [14]. some challenges faced with telemedicine in Owerri Municipal are poor internet facilities; poor funding; unfavourable government policy; difficulty in retrieving record; and difficult remote access [15].

Conclusion:

The main purpose of this study was to assess the impact of telemedicine in improving access to healthcare delivery services in Owerri Municipal were selected for the study. Three research questions guided the study with one research hypothesis.

In this study, a survey research design was adopted, the population comprises all health workers, market people, staff, members of St. Paul's Church and passersby, a simple random sampling technique was used to select 100 respondents from the population and a questionnaire was the instrument for data collection.

Relevant literatures were reviewed which guided the objectives and methodology of this study. As result of the field study and analysis of results, the following findings were made:

that the effectiveness of telemedicine in improving access to healthcare delivery services in Owerri Municipal include but not limited to rapid and efficient communication; Alleviate imbalances in geographical allocation of resources; Decreases patient anxiety; Increases access to health facilities; and Elimination of real - time interaction.

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