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Master's Thesis

IMPACT OF TELEMEDICINE ON HEALTHCARE

Master of Science in Nursing

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ABSTRACT

Telemedicine allows health care professionals to evaluate, diagnose and treat patients at a distance using telecommunications technology. The approach has been through a striking evolution in the last decade and it is becoming an increasingly important part of the American healthcare infrastructure. According to numerous authors, telemedicine areas of practice allow medical care to be provided remotely through video conferencing facilities. Following this trend, today, several medical services, including primary care consultations and psychotherapy services are provided using telemedicine. Based on this background, this study focuses on understanding the impact of telemedicine on healthcare using access, as an area of interest. The central thesis is that telemedicine use has had a positive impact on the health sector. The aim of this project is to investigate the impact of telemedicine on the healthcare sector, attention will be made to understand its impact on healthcare access. The research questions underpinning this investigation are focused on understanding how telemedicine affects different aspects of healthcare access, including the convenience of accessing care, cost of accessing care, geographical distribution of healthcare services, and improvements in service capacity building. The research study was conducted using the mixed methods research approach, which contains qualitative and quantitative aspects of investigation into the analysis. The central thesis underpinning this study was that telemedicine had a positive impact on healthcare. Convenience, cost, service capabilities, and geographical distribution of health services emerged as key variables explaining access to health services. Broadly, the findings of the investigation confirmed the thesis by demonstrating a positive impact of telemedicine on all four areas mentioned above. Nonetheless, the current investigation concerning the impact of telemedicine on healthcare is marred by institutional, economic, and attitudinal factors affecting implementation. Given that many countries grapple with limited access to healthcare services for a majority of the population, underserved populations, such as people with disabilities and minorities, could enjoy increased access to healthcare services by using telemedicine. Patients who are geographically isolated from a majority of the population, such as the elderly, military officers, and prisoners, are also likely to benefit from an increased access to healthcare services through telemedicine use, as described in this paper. In summary future research studies should focus on evaluating the effectiveness of telemedicine use using qualitative means of data collection. Researchers need to pay more attention to informant selection because there is insufficient evidence showing the use of larger control trials in investigating the impact of telemedicine in the health care sector. Given that internet access and resource limitations have been identified as some of the major impediments to the minimization of health inequalities through telemedicine, governments should increase internet access and technological literacy among populations to enhance their acceptance of telemedicine.

1. Introduction

1.1 Background

Telemedicine refers to a relatively new area of healthcare practice where technological tools are used to aid in service delivery. Based on the technological background supporting its use, digital devices, such as computers and smartphones, are commonly used to help in the coordination of healthcare services provided through telemedicine (Spencer et al., 2020). According to Tye et al. (2020), this area of practice allows medical care to be provided remotely through video conferencing facilities. Following this trend, today, several medical services, including primary care consultations and psychotherapy services are provided using telemedicine (Spencer et al., 2020). Some healthcare service centers also provide emergency and physical therapy services using the same approach (Tye et al., 2020). The growth in the use of telemedicine is partly facilitated by two main factors. The first one is the need to maintain physical distance between healthcare service providers and the second one is the inability of healthcare personnel to be physically present where a medical service is needed. In this regard, there has been a rapid rate of adoption in several areas of healthcare practice.

1.2 Research Problem

As the adoption of telemedicine continues to gain pace, the healthcare sector continues to grapple with problems relating to accessibility and convenience of adopting such technologies due to persistent health inequalities. The World Health Organization (2022) says several challenges still existing in the realization of a world free of health inequalities. The problem has been compounded by low levels of healthcare access and availability in some parts of the world (Deeb et al., 2021). Notably, sub-Saharan Africa and South Asia have reported the lowest rates of healthcare access in the world and account for a majority of 50% of the world's population that lacks access to essential health services (World Health Organization, 2022). Other parts of the world have made significant progress in increasing the availability of basic healthcare services. For example, many countries have made it possible for their citizens to have immunization and family planning services (Deeb et al., 2021). This statement means that as some nations are making progress in one aspect of sector performance, others are still struggling with basic needs, such as expanding healthcare access.

The current weaknesses associated with the limited adoption of technology tools has contributed to the heightened rates of health inequalities around the world. This is why they exist in several areas, including the delivery of healthcare services using telemedicine across different demographic groups (Hoi et al., 2021). For example, the low levels of healthcare coverage among underserved populations have continued to persist despite the adoption of telemedicine in the health

sector. The existence of these gaps in service provision underscores the importance of understanding whether existing technological tools, such as telemedicine, are achieving their intended goals, or not.

1.3 Research Gap

The impact of technology on the health sector has been a common topic of discussion among pundits, observers, and analysts alike. Their discussions on the topic have been marred by the presence of conflicting opinions regarding the net effect of technology use on the healthcare field. For example, a group of researchers led by authors, such as Abbatemarco et al. (2021) and Hoi et al. (2021), view telemedicine as a positive addition to the healthcare field. However, another group of scholars opposes its adoption in the clinical setting because it is complex to adopt (Wade & Smith, 2017). Consequently, there are varying opinions regarding the influence of telemedicine on the healthcare field but few researchers have focused on assessing its impact on healthcare access among underserved populations. The impact of telemedicine on healthcare access cannot be overlooked because part of the original intentions of its adoption was to expand healthcare access (Abbatemarco et al., 2021). Based on this background, this study focuses on understanding the impact of telemedicine on healthcare using access, as an area of interest. The central thesis is that telemedicine use has had a positive impact on the health sector.

1.4 Importance of Research

It is important to minimize health inequalities to maximize the potential of healthcare service delivery. Failing to do so prevents people from achieving their full potential. It also means that underserved and underprivileged populations will be unable to live a dignified life in the same manner as their counterparts who have resources do. The findings developed from this study will contribute towards the development of a healthy and productive population because a minimization of health inequalities would contribute to this goal. Learning how technology can minimize health inequalities will also play a significant role in helping communities to break intergenerational cycles of poverty, which have prevented them from gaining access to quality healthcare services due to a lack of resources. The findings of this investigation will also enhance the adoption of universal health coverage as a global policy intended to minimize health inequalities around the world. Overall, the findings of the study will help to understand the impact of technology on the provision of healthcare services.

1.5 Aim

The aim of this project is to investigate the impact of telemedicine on the healthcare sector. However, given that the field is broad, attention, will be made to understand its impact on healthcare access. This focus of the investigation stems from the original intentions of implementing

telemedicine in the healthcare sector, which was to make it possible to provide healthcare services remotely (Spencer et al., 2020). Underserved communities are the most affected populations due to a limited lack of healthcare access. Therefore, the current analysis is focused on assessing the impact of telemedicine on the minimization of healthcare inequalities using this population as the target audience. From this background, the research questions underpinning this investigation are focused on understanding how telemedicine affects different aspects of healthcare access, including the convenience of accessing care, cost of accessing care, geographical distribution of healthcare services, and improvements in service capacity building.

1.6 Research Questions

1. How has telemedicine influenced the convenience of accessing healthcare services among underserved populations?
2. What is the impact of telemedicine use on the cost of accessing healthcare among underserved populations?
3. How has telemedicine use affected the geographical distribution of healthcare services among underserved populations?
4. In what ways has telemedicine affected the service capacity of healthcare centers in underserved communities?

1.7 Research Methodology

The research study was conducted using the mixed methods research approach, which contains qualitative and quantitative aspects of investigation into the analysis. Data was collected using primary and secondary means, whereby the latter was obtained from published sources of data, including, books, journals, and credible websites, while primary data was obtained using surveys. Quantitative data was analyzed using the Statistical Packages for the Social Sciences (SPSS), while qualitative data was assessed using the content analysis method.

2. Literature Review

In this literature review, what is already known about the impact of telemedicine on the healthcare sector will be explored to understand what other researchers have said about the topic of discussion. To recap, the aim of this study is to understand the impact of telemedicine on the healthcare sector. The evidence gathered from this literature review focuses on this area of assessment and shows that there are two sets of studies underpinning current evidence. The first one is defined by the positive impact of telemedicine and the second one is composed of its negative impacts on the health sector.

2.1 Positive Impact of Telemedicine

The volume of literature that has mentioned factors driving the uptake of telemedicine in the healthcare sector has steadily grown in the last decade. Most of the studies that have assessed the impact of telemedicine in the healthcare sector have focused on highlighting its advantages. For example, an investigation done by Ning et al. (2021) to find out the impact of telemedicine use in the otolaryngology setting found that it had a positive impact on quality, and patient satisfaction. Hoi et al. (2021) also conducted a similar investigation to understand the impact of telemedicine on the otolaryngology setting and found that it had a high level of promise for use in the post-pandemic setting because of its cost-saving nature. Other researchers have focused on investigating the impact of telemedicine use on the healthcare practice by investigating its impact on clinical outcomes and healthcare costs. For example, a study by Jiménez-Marrero et al. (2020) suggested that telemedicine use shows promise in the treatment of heart failure. Patients with ventricular ejection fraction were also expected to benefit from telemedicine use.

Some researchers have also highlighted the benefits of telemedicine to the healthcare sector by conducting studies to understand its impact on disease management. For example, Tourkmani et al. (2021) completed an investigation to understand the impact of telemedicine use on patients who had Type II Diabetes and established that it had high efficacy levels in glycemic control. Therefore, the technique was hailed as an alternative tool for substituting in-patient diabetic care (Tourkmani et al., 2021). Frielitz et al. (2020) also arrived at a similar conclusion about the benefits of telemedicine to the healthcare field after investigating the impact that its use would have on children with Type I Diabetes. Walters et al. (2021) also investigated the impact of telemedicine use on the healthcare sector by highlighting its advantages to the pediatric sector.

Collectively, their recommendations emphasized the need for government agencies to develop health policies that supported telemedicine use in their health systems (Tourkmani et al., 2021).

Attention is drawn to the areas of financial compensation and information privacy as core considerations for this policy proposal.

Some of the studies mentioned above have investigated the impact of telemedicine on the healthcare sector from a human resource perspective. In fact, most of them have expressed concern that a significant number of healthcare professionals may lack the skills or expertise needed in telemedicine use (Tourkmani et al., 2021; Frielitz et al., 2020). For example, Nakashima et al. (2021) argued that few residents had undergone formal training in the use of telemedicine and 57% of them were unskilled in its use. Regardless of these concerns, scholars have continued to report the growing number of healthcare centers that are embracing telemedicine (Tourkmani et al., 2021; Frielitz et al., 2020). For example, those who specialize in the areas of family therapy have reported an increased use in the number of residents applying for telemedicine use (Nakashima et al., 2021). The educational curriculum underpinning technology use has also improved because of the information coming from healthcare institutions regarding the impact that telemedicine is having on healthcare professionals (Nakashima et al., 2021). Therefore, the impact of telemedicine use on health workers has formed a significant proportion of research on this subject area.

Cost advantages have also been linked with telemedicine use in the healthcare sector. From this area of analysis, Riew et al. (2021) say that traditionally, technology use in the healthcare industry has been linked with increased cost savings, high levels of efficiency, and enhanced operational synergies - all of which collectively lower the cost of service provision (Morisada et al., 2021). Another area of cost savings that has emerged from the use of telemedicine is the reduction in the number of staff involved in the provision of healthcare services. Indeed, healthcare service providers have reported increased cost savings due to the elimination of additional staff, such as front office desk officers, because of the use of telemedicine. This action has led to a reduction in overheads.

Still centered on the cost benefits of adopting telemedicine on the healthcare sector, researchers have also pointed out that its use acts as an additional revenue source for healthcare staff. They say so because some healthcare professionals use it to provide supplementary care to patients as an additional revenue source (Wade & Smith, 2017). Therefore, the use of telemedicine offers several benefits to patients and healthcare personnel alike. As secondary considerations of the cost-saving nature of telemedicine, researchers have also mentioned the elimination of the need for physical movements of healthcare personnel and reduction in the time patients spend in hospitals as other sources of the income generation associated with telemedicine use (Abbatemarco et al., 2021).

This statement means that telemedicine offers healthcare workers with an additional source of revenue, thereby motivating them to work harder.

2.2 Negative Impact of Telemedicine

Before the COVID-19 pandemic was reported, telemedicine use was notably introduced in various healthcare facilities to provide health services in remote areas. Additionally, its implementation in the healthcare sector was limited to a few fields of the discipline. For example, for most parts of the 1990s, the use of telemedicine in the health sector was confined to specific areas of practice, including cardiology, dermatology, and pulmonology (Tye et al., 2020). Researchers, such as Iyer et al. (2022), affirmed its efficacy in spine surgery thereafter. Resistance to new technology has been highlighted as a significant reason for the slow adoption of telemedicine in some countries (Hoi et al., 2021). This problem has been exacerbated by the existence of a history of lack of trust between patients and healthcare professionals in some healthcare settings.

Uncertainties regarding insurance coverage have also negatively affected the willingness for some countries to adopt telemedicine. This problem is notably acute in countries, whose populations primarily pay for medical costs using insurance plans (World Health Organization, 2022). Such is the case in the United States where private insurance is the main mode of healthcare payment for a majority of the citizens. In these contexts of telemedicine implementation, the existence of unclear policies regarding compensation and reimbursements of associated costs has slowed down its adoption. Therefore, there is a limited scope of medical insurance coverage associated with telemedicine use because some insurance service providers do not recognize it as part of the list of certified medical services eligible for reimbursement.

Quality concerns have also emerged among reasons for the slow adoption of telemedicine in the health sector. They are driven by patients who believe there is a disparity between the quality of services they would receive through telemedicine and in-patient services (Riew et al., 2021). For example, there are growing concerns regarding the quality of engagement between patients and healthcare service providers using telemedicine (Riew et al., 2021). The consensus is that telemedicine use creates an impersonal connection with patients, thereby causing discomfort to both parties. Relative to these discussions, critics also claim telemedicine use limits interactions between patients and healthcare service providers (Morisada et al., 2021). Although these concerns have largely existed for a long time, heightened risks of COVID-19 infections, due to hospital visits, has largely minimized most of them. Overall, these findings show that, although telemedicine has its advantages to patients and health care service providers, its adoption is still challenged by skeptics.

2.3 Hypotheses

Based on the findings highlighted above, we can develop three hypotheses that may emerge from the present investigation. They are outlined below

H1. Telemedicine use has had a positive impact on the minimization of health inequalities among underserved populations

Ho. Telemedicine use has neither had a positive nor negative impact on health inequalities among underserved populations

H2. Telemedicine use has had a positive impact on the minimization of health inequalities among underserved populations

Based on the three hypotheses deduced above, H1 is selected as the baseline hypotheses because the extant literature has demonstrated the positive impact of telemedicine on different facets of the healthcare practice.

2.4 Summary

This literature review has revealed that there is a central focus among researchers to highlight the benefits and drawbacks of telemedicine use in different areas of practice. Therefore, there is little focus on assessment to evaluate whether its use has achieved original and intended goals, or not. In this respect, the present investigation focuses on one aspect of healthcare service delivery – access. The goal is to provide grounds for strengthening the gains made so far in telemedicine adoption and minimize the effects of some of the challenges that impede its adoption.

3. Methodology

3.1 Research design

This investigative piece was based on the adoption of a mixed methods research framework. It integrates qualitative and quantitative aspects of inquiry into a research investigation (Wade & Smith, 2017). This blended framework of analysis was used because the research study was exploratory. Stated differently, it sought to find out the impact of telemedicine use on the health sector. Using one research design in the assessment would have limited the analysis to aspects of healthcare practice that could be analyzed by it (Stokes, 2017). However, the mixed methods research framework provided the freedom to evaluate both qualitative and quantitative impacts of telemedicine use on the healthcare field.

3.2 Data Collection

As sources of primary research, 107 respondents working for three healthcare facilities that served underprivileged communities in the city took part in the study. The respondents were obtained using the simple random sampling method to minimize the possibility of bias in the study (Patten & Newhart, 2017). They were recruited from three healthcare facilities, which used telemedicine to provide healthcare services. Therefore, it was assumed that the respondents were knowledgeable about telemedicine use in their practice. Primary Data was obtained using the survey method whereby respondents completed online questionnaires, which sampled their views on the impact of telemedicine on the healthcare field.

In designing the questionnaire, the researcher merged two sets of findings to have a broad-based understanding of the respondents' views on the research topic. The first one was the demographic characteristics of the respondents, including their age, gender, experience working with telemedicine, and educational qualifications. These were the main bases for understanding their professional and personal backgrounds. This set of data was important in contextualizing information that was to be collected in the second set of findings, which probed the informants' views about the impact of telemedicine on the healthcare sector. In this review, the researcher used indicators of healthcare access developed by the World Health Organization (2022) to assess the impact that telemedicine had on the sector.

The aforementioned approach of assessment led to the identification of cost, convenience, geographical distribution, and service capacity of health centers, as the main indicators of healthcare access. Again, the focus of the investigation was on assessing the impact of telemedicine on the healthcare sector by evaluating its impact on patients who have traditionally lacked access to healthcare services. Therefore, the questions posed to the respondents were in respect to their

understanding of the impact of telemedicine on underserved communities. The four areas of healthcare access highlighted above formed four key sections of the questionnaire – Parts B, C, D, and E (see appendix 1). Three statements probed each concept mentioned above to understand the informants' views on healthcare access.

Alternatively, secondary data was collected from reputable databases, including PubMed and Medline. The investigation was confined to analyzing research articles published within the last five years (from 2017-2022). The aim was to enhance their relevance to the current healthcare environment. By implementing this strategy, 11 articles emerged as core pieces of literature that anchored the review.

3.3 Data Analysis

As highlighted above, data was collected in two phases: primary and secondary research. Both sets of information were also analyzed differently with the content analysis method used to examine secondary data and the Statistical Packages for Social Sciences (SPSS) used to analyze primary data. In the latter part of the analysis, the researcher conducted descriptive and inferential analyses to understand relationships among variables. The SPSS technique was selected for use because of its history in analyzing data relating to social sciences (Patten & Newhart, 2017). Therefore, combined with the content analysis method, it gave the researcher a solid basis for anchoring the findings.

3.4 Research Ethics

Evaluating the ethical implications of a study is important in safeguarding its integrity. Given that the current study sampled the views of healthcare workers, the researcher obtained permission from hospital administrators before asking them to take part in the investigation. Therefore, the informants had institutional approval to take part in the study. Additionally, their participation in the investigation was voluntary because none of them was coerced or incentivized to participate in it. However, the researcher furnished them with details relating to the investigation before making such a decision. These facts were captured in the informed consent form that they were supposed to sign to confirm their participation in the study (see appendix 2). In the final stage of publication, the information derived from the respondents were presented anonymously to maintain confidentiality. All the data obtained was also stored in a computer and safeguarded using a password that was only privy to the researcher. At the end of the investigation, the data will be destroyed.

3.5 Limitations of Study

Given that the present study used self-reported data, it is assumed that the information provided by the respondents was factual and accurate. It is also assumed that they provided this information truthfully and it was a true representation of their understanding of the impact of telemedicine on the healthcare sector. Additionally, the findings derived from this investigation are indicative, in the sense that they do not represent the actual situation characterizing the impact of telemedicine in the health sector. Instead, they convey possible effects that could be witnessed in various healthcare sectors.

4. Discussion of Results

The response rate for the study was 100% meaning that all informants submitted complete questionnaires. A majority of them said they had use telemedicine in the past year but none of the residents had undergone formal training to support its use. These pieces of information were captured in the first section of the questionnaire – demographic findings – and the details are provided below.

4.1 Demographic Findings

As highlighted in this paper, the first part of the questionnaire sought to sample the demographic characteristics of the respondents. This probe captured their ages, experience using telemedicine, educational backgrounds, and gender.

Gender Findings: The respondents' gender was the first demographic variable sampled in the study. According to Table 4.1 below, an almost even number of male and female respondents took part in the study because 50.5% of them were female, while 49.5% of them were male. These findings mean no gender bias affected the process of participation or analysis of findings.

Table 4.1 Gender Findings (Source: Developed by Author)

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	53	49.5	49.5	49.5
	Female	54	50.5	50.5	100.0
	Total	107	100.0	100.0	

Age Findings: The respondents' ages were also sampled in the investigation to investigate the impact that generational differences among health professionals would have on their perceptions of telemedicine. According to Table 4.2 below, most of the respondents were between the ages of 18 and 25 years, meaning that a large percentage of them were young people. This fact is further cemented by the significant percentage of those who were between the ages of 26-35 years because they formed the second largest group of informants.

Table 4.2 Age Findings (Source: Developed by Author)

What is your Age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	54	50.5	50.5	50.5
	26-35	26	24.3	24.3	74.8
	36-45	15	14.0	14.0	88.8

46-55	1	.9	.9	89.7
56-65	9	8.4	8.4	98.1
Older than 65	2	1.9	1.9	100.0
Total	107	100.0	100.0	

Educational Background Findings: The educational backgrounds of the respondents were also analyzed as part of the demographic analysis. According to the findings of Table 4.3 below, most of the participants (34.6%) had acquired basic diploma. Those who had advanced diploma formed the second largest group of respondents at 30.8% of the total sample. These statistics suggest that up to 65% of the total sample of respondents had diploma certification in their respective fields of practice.

Table 4.3 Education qualifications findings (Source: Developed by Author)

What is your highest education qualification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	37	34.6	34.6	34.6
	Advanced Diploma	33	30.8	30.8	65.4
	Undergraduate	20	18.7	18.7	84.1
	Masters	17	15.9	15.9	100.0
	Total	107	100.0	100.0	

Work Experience: The informant's experience using telemedicine was the last demographic variable captured in the questionnaire. According to the findings of Table 4.4 below, most of them (41.1%) had less than 1 year work experience in using telemedicine. This finding means that a majority of them had a relatively minimal experience with telemedicine use.

Table 4.4 Work experience findings (Source: Developed by Author)

How long have you used telemedicine?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	44	41.1	41.1	41.1
	1-2 Years	7	6.5	6.5	47.7
	3-4 Years	18	16.8	16.8	64.5
	5-6 Years	27	25.2	25.2	89.7
	More than 7 years	11	10.3	10.3	100.0
	Total	107	100.0	100.0	

4.2 Descriptive Analysis Findings

Parts B, C, D, and E of the questionnaire sought to investigate the respondents' views of the impact of telemedicine on healthcare access by focusing on four main issues: cost, service capacity, geographical dispersion of services, and convenience of accessing health services. A descriptive analysis was done to analyze the respondents' views and it was established that they had positive views of the impact of telemedicine on all the above-mentioned areas of healthcare access. Table 4.5 below shows that the average mean for the responses pertaining to the convenience of accessing healthcare services was 1.87 meaning that they "strongly agreed" that telemedicine use had helped improve the convenience of underserved populations in accessing health services.

Table 4.5 Impact of telemedicine on convenience of accessing healthcare services (Source: Developed by Author)

Statistics

Convenience of accessing healthcare services

N	Valid	107
	Missing	0
Mean		1.87
Std. Error of Mean		.087
Median		2.00
Mode		1
Std. Deviation		.902
Variance		.813
Skewness		.893
Std. Error of Skewness		.234
Kurtosis		.460
Std. Error of Kurtosis		.463
Sum		200

Table 4.6 below also shows that the informants held largely positive views about the impact of telemedicine on the cost of accessing healthcare because the mean was 2.73. This figure means that most informants "agreed" with the view that telemedicine use helped to reduce healthcare costs among underserved populations.

Table 4.6 Impact of telemedicine on healthcare cost (Source: Developed by Author)

Statistics

Healthcare costs

N	Valid	107
	Missing	0
Mean		2.73

Std. Error of Mean	.136
Median	3.00
Mode	1
Std. Deviation	1.405
Variance	1.973
Skewness	-.086
Std. Error of Skewness	.234
Kurtosis	-1.483
Std. Error of Kurtosis	.463
Sum	292

Table 4.7 below also affirms the positive impact that telemedicine had on the healthcare sector because it showed that the informants held largely positive views about the effects of telemedicine use on the increased geographical dispersion of healthcare services. The cumulative mean for this variable was 1.5, meaning that most informants “strongly agreed” with the view that telemedicine use helped to expand the geographical dispersion of healthcare services.

Table 4.7 Impact of telemedicine on the geographical dispersion of healthcare services (Source: Developed by Author)

Statistics

Geographical dispersion of healthcare services

N	Valid	107
	Missing	0
Mean		1.50
Std. Error of Mean		.080
Median		1.00
Mode		1
Std. Deviation		.828
Variance		.686
Skewness		2.501
Std. Error of Skewness		.234
Kurtosis		7.690
Std. Error of Kurtosis		.463
Sum		160

The last variable influencing healthcare access that appeared in the questionnaire was service capacity. Table 4.8 below shows that most informants believed that telemedicine use helped to expand the service capacity of hospitals servicing underprivileged communities. This finding was

supported by the 1.9 cumulative mean for the three statements underpinning this variable. The aforementioned mean shows that most of the respondents “strongly agreed” with the view that telemedicine use helped to expand the service capacity of hospitals.

Table 4.8 Impact of telemedicine on the service capacity of healthcare centers (Source: Developed by Author)

Statistics

Service Capacity

N	Valid	107
	Missing	0
Mean		1.90
Std. Error of Mean		.112
Median		2.00
Mode		1
Std. Deviation		1.157
Variance		1.338
Skewness		1.359
Std. Error of Skewness		.234
Kurtosis		1.037
Std. Error of Kurtosis		.463
Sum		203

4.3 Inferential Analysis Findings

The inferential analysis was aimed at investigating the effects of demographic variables on the informants’ responses. The justification for including demographic findings in the analysis stems from studies that have shown variation of views in the adoption of telemedicine on various demographic groups, such as age and race (Gmunder et al., 2021; Hoi et al., 2021). For example, a study by Walters et al. (2021) suggested that white people were more likely to use telemedicine compared to African-American and Hispanics because of income disparities and access to resources. However, other researchers have found no significant differences in the adoption of telemedicine across different demographic groups, including gender, age, and education qualifications (Gmunder et al., 2021). Based on these conflicting opinions regarding the impact of demographic variables on the views of healthcare professionals, the current study demonstrated that age, gender, work experience, and years using telemedicine did not have an effect on the respondents’ views, as detailed below.

Impact of Gender on Findings: According to the findings of Table 4.9 below, gender differences among informants did not affect their views on telemedicine because none of the four

variables impacting healthcare access (convenience, healthcare cost, geographical distribution of health services, and service capacity) had a significance value lower than $p < 0.05$.

Table 4.9 Impact of gender differences on respondents' views (Source: Developed by Author)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Convenience	Between Groups	1.798	1	1.798	2.237	.138
	Within Groups	84.370	105	.804		
	Total	86.168	106			
Healthcare Cost	Between Groups	3.279	1	3.279	1.672	.199
	Within Groups	205.862	105	1.961		
	Total	209.140	106			
Geographical Distribution	Between Groups	.525	1	.525	.763	.384
	Within Groups	72.223	105	.688		
	Total	72.748	106			
Service Capacity	Between Groups	3.338	1	3.338	2.530	.115
	Within Groups	138.531	105	1.319		
	Total	141.869	106			

Impact of Age on Findings: According to the findings of Table 4.10 below, age differences among the informants did not affect the findings of the study. Again, this is because none of the four variables impacting access (convenience, healthcare cost, geographical distribution of health services, and service capacity) had a significance value lower than $p < 0.05$.

Table 4.10 Impact of age differences on respondents' views (Source: Developed by Author)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Convenience	Between Groups	3.349	5	.670	.817	.540
	Within Groups	82.819	101	.820		
	Total	86.168	106			
Healthcare Cost	Between Groups	1.757	5	.351	.171	.973
	Within Groups	207.383	101	2.053		
	Total	209.140	106			
Geographical	Between Groups	1.512	5	.302	.429	.828

Geographical Distribution	Within Groups	71.235	101	.705		
	Total	72.748	106			
Service Capacity	Between Groups	6.486	5	1.297	.968	.441
	Within Groups	135.383	101	1.340		
	Total	141.869	106			

Impact of Education Qualifications on Findings: According to the findings of Table 4.11 below, differences in educational qualifications among the informants did not affect the findings of the study because none of the four variables impacting access had a significance value lower than $p < 0.05$.

Table 4.11 Impact of educational differences on respondents' views (Source: Developed by Author)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Convenience	Between Groups	3.098	3	1.033	1.280	.285
	Within Groups	83.071	103	.807		
	Total	86.168	106			
Healthcare Cost	Between Groups	10.176	3	3.392	1.756	.160
	Within Groups	198.965	103	1.932		
	Total	209.140	106			
Geographical Distribution	Between Groups	.862	3	.287	.412	.745
	Within Groups	71.886	103	.698		
	Total	72.748	106			
Service Capacity	Between Groups	2.094	3	.698	.514	.673
	Within Groups	139.775	103	1.357		
	Total	141.869	106			

Impact of Work Experience on Findings: According to the findings of Table 4.12 below, differences in work experiences among the informants did not affect their views on telemedicine. Again, this is because none of the four variables impacting access (convenience, healthcare cost, geographical distribution of health services, and service capacity) had a significance value lower than $p < 0.05$.

Table 4.12 Impact of work experiences on respondents' views (Source: Developed by Author)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Convenience	Between Groups	2.943	4	.736	.902	.466
	Within Groups	83.225	102	.816		
	Total	86.168	106			
Healthcare Cost	Between Groups	4.585	4	1.146	.572	.684
	Within Groups	204.555	102	2.005		
	Total	209.140	106			
Geographical Distribution	Between Groups	2.917	4	.729	1.065	.378
	Within Groups	69.831	102	.685		
	Total	72.748	106			
Service Capacity	Between Groups	4.476	4	1.119	.831	.509
	Within Groups	137.394	102	1.347		
	Total	141.869	106			

4.4 Secondary Research Findings

As highlighted in this paper, secondary data formed the second set of findings for the present study. Particularly, the Model for Assessment of Telemedicine, which sets out criteria for evaluating telemedicine effectiveness emerged as the main framework for understanding the impact of telemedicine on the health sector (Wade & Smith, 2017). This framework mentions safety, clinical effectiveness, and cost concerns as the main considerations for the evaluation process (Wade & Smith, 2017). The secondary literature analysis also revealed that the interest around telemedicine is widely understood in the scholarly field because of the abundance of literature showing its benefits to the healthcare sector (Hoi et al., 2021; Wade & Smith, 2017). However, the main challenge affecting its adoption is the need to adapt to different organizational workflows. This requirement exists in addition to the need to have a high-speed internet connection and access to computers as basic needs for users.

The extant literature has shown that most people from underprivileged backgrounds have a low access to computers and high-speed internet connectivity. Additionally, they have a lower level of knowledge use in technology, relative to other populations (Tye et al., 2020). Stakeholders who believe that the adoption of telemedicine will improve service delivery at various levels of performance have championed its use in the healthcare sector (Spencer et al., 2020). Several areas of healthcare service delivery, such as quality, cost, and patient engagement records, have registered

positive performance as a result of adopting telemedicine (Deeb et al., 2021). In this regard, the existing body of evidence on telemedicine use shows that it has had a positive impact in several healthcare service areas, including increased efficiency, cost-savings, and provision of timely services (Tye et al., 2020). However, healthcare access is one area that continues to lag behind. The problem is particularly acute for underserved populations, such as minorities and immigrants (World Health Organization, 2022). Differences in income and education levels have exacerbated this problem by limiting access to quality health services (Deeb et al., 2021). Consequently, people who have low education and income suffer the most. The existence of these limitations means that the number of people who can gain access to healthcare services is restricted.

Overall, the findings that have emerged from this secondary analysis demonstrate that telemedicine accentuates healthcare disparities that have existed due to technological use. This statement means that telemedicine use has had a neutral effect on healthcare disparities. In this regard, the first hypothesis underpinning this investigation is confirmed and the second one is rejected. Therefore, the null hypothesis, which claimed that telemedicine use has had neither a positive or negative impact on healthcare access is confirmed. Therefore, the current evidence modifies the literature by showing that telemedicine use amplifies health inequalities that have existed among communities. In this regard, more efforts need to be directed towards minimizing these inequalities outside of prism of simple technology use.

5. Conclusion

The central thesis underpinning this study was that telemedicine had a positive impact on healthcare. The investigation was underpinned by four research questions, which focused on understanding its impact on the healthcare sector by focusing on access. Convenience, cost, service capabilities, and geographical distribution of health services emerged as key variables explaining access to health services. Broadly, the findings of the investigation confirmed the thesis by demonstrating a positive impact of telemedicine on all four areas mentioned above. Nonetheless, the current investigation concerning the impact of telemedicine on healthcare is marred by institutional, economic, and attitudinal factors affecting implementation. Given that many countries grapple with limited access to healthcare services for a majority of the population, underserved populations, such as people with disabilities and minorities, could enjoy increased access to healthcare services by using telemedicine. Patients who are geographically isolated from a majority of the population, such as the elderly, military officers, and prisoners, are also likely to benefit from an increased access to healthcare services through telemedicine use, as described in this paper.

5.1 Recommendations

Future research studies should focus on evaluating the effectiveness of telemedicine use using qualitative means of data collection. This recommendation stems from existing evidence, which shows a gap in the use of qualitative methods to undertake such types of investigation (Wade & Smith, 2017). Researchers also need to pay more attention to informant selection because there is insufficient evidence showing the use of larger control trials in investigating the impact of telemedicine in the health care sector (Wade & Smith, 2017). Given that internet access and resource limitations have been identified as some of the major impediments to the minimization of health inequalities through telemedicine, governments should increase internet access and technological literacy among populations to enhance their acceptance of telemedicine. Doing so will make it possible to harness the potential of telemedicine use in the health sector.

The current situation where telemedicine use is implemented by communities or countries that understand it, will only lead to the exclusion of others and the process will compound existing health inequalities. Therefore, national policies supporting inclusion should be fostered to improve healthcare access. The above-mentioned policy proposals ought to be supported by the launch of educational programs in underprivileged and underserved communities to increase awareness of technology use and its benefits to their overall health. Such messaging could be integrated into existing outreach programs to make them resonate well with the local population. Its “shock value” will also reduce when such messages are augmented into existing campaigns (Spencer et al., 2020).

Relative to this assertion, education will also be pivotal in improving literacy about health insurance coverage relating to telemedicine use.

Critical to the above discussions is the need to create more awareness about the health disparities that persist today and the role that technology can play in minimizing them. Taking deliberate steps to highlight such problems, such as developing a health equity task force, will play a key role in proving that the issue should be taken seriously. Additionally, recognizing the problem at multiple layers of decision-making, including the program, state, and federal levels are important in sustaining efforts to close health inequities that exist today.

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Appendix

Appendix 1 - Questionnaire

Dear Participant,

Thank you for finding time to participate in this study. We aim to investigate the impact of telemedicine on the healthcare sector with a focus on access to medical services. This survey is structured into two key parts – the first one collects demographic data, while the second section samples your views on different aspects of healthcare access. The questions posed below seek to explore these areas in detail.

Please, tick on the appropriate boxes as you deem fit.

Part A – Demographic Data

1. What is your gender?

Male Female

2. How old are you?

18-25 Years 26-35 Years 36-45 Years

46-55 Years Older than 55 years

3. Please, state your highest education qualification

High School Diploma Undergraduate Degree

Master's Degree PhD

4. How long have you used telemedicine?

Less than 1 year 1-2 Years 3-4 Years

5-6 Years More than 6 years

Part B – Convenience of Accessing Healthcare Services

1. Telemedicine use has helped to minimize interactions with non-clinical staff, thereby improving the convenience of accessing healthcare services

Strongly Agree Agree Neither Agree nor Disagree

Disagree Strongly Disagree

2. Telemedicine use has reduced patient wait times in the healthcare setting

Strongly Agree Agree Neither Agree nor Disagree

Disagree Strongly Disagree

3. Telemedicine use has improved communications between healthcare service providers and patients, thereby minimizing the need for frequent hospital visits

Strongly Agree Agree Neither Agree nor Disagree

Disagree Strongly Disagree

Part C - Cost Of Accessing Healthcare Services

1. Telemedicine use has enhanced cost transparency, thereby making it more affordable for patients to pay for healthcare services

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

2. Telemedicine use has enabled patients from low-income backgrounds to gain access to affordable healthcare services

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

3. Telemedicine has increased operational efficiency, thereby making it possible for healthcare service providers to provide affordable services

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

Part D - Geographical Distribution of Healthcare Services

1. Telemedicine use has made it possible for underserved patients to gain access to timely healthcare services in their local communities

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

2. Telemedicine use has increased the geographical dispersion of healthcare centers catering to underserved populations

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

3. Telemedicine use has made it possible for more patients from underprivileged backgrounds to gain access to quality healthcare services in their communities

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

Part E - Service Capacity of Healthcare Centers

1. The use of telemedicine has minimized capacity constraints in the healthcare setting

- Strongly Agree Agree Neither Agree nor Disagree
 Disagree Strongly Disagree

2. Telemedicine use has increased treatment options for patients from underprivileged communities

- Strongly Agree Agree Neither Agree nor Disagree

Disagree Strongly Disagree

3. Telemedicine use has made it possible for health centers serving underprivileged communities to increase their capacity to attend to more patients

Strongly Agree Agree Neither Agree nor Disagree

Disagree Strongly Disagree

***** End *****

Thank you for participating in the study!

Appendix 2 - Informed Consent Form

You are being invited to take part in a study aimed at understanding the impact of telemedicine use in the healthcare sector. By conducting the study, we aim to determine the impact of telemedicine on health inequalities, as a unique segment of the healthcare field. Particularly, the focus of the investigation will be on its impact on underserved populations, who suffer the most from health inequalities.

We believe that your experience working as healthcare professional who has used telemedicine in practice would help us to understand the impact of its use on the health sector. Due to current COVID-19 regulations, you will be expected to complete an online survey, which is estimated take about 30 minutes to complete, after which the results will be emailed back to us. We are conducting this study to fulfill academic goals and not to examine the record of telemedicine use in your institution.

Your participation in the study will be voluntary - meaning that you are at liberty to take part in it, or not. You are also free to withdraw from the investigation at any time without any repercussions. Kindly, also note that the views you present in the interviews will be published anonymously. This means that they will not bear any personal identifiable markers, such as names, ages, or positions held in the health sector.

The pieces of information collected from the surveys will be analyzed electronically and a copy of the findings stored in a computer and secured with a password that will only be privy to the researcher. After completion of the research investigation, the information will be destroyed to protect the confidentiality of the participants.