An Assessment of the Provision of Telehealth Services by Zambian Mobile Service Providers: *A case study of Library and Information Science Students at The University of Zambia.*

By

Khondowe Welani (14084741), Mbewe Susan (14101653),
Mwila Gabriel (14160081), and Sinkala Natasha (12151742)

Supervised by MRS MWILA CHITUNDU CHISUNKA

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

LUSAKA

JULY, 2018

Copyright Declaration

APPROVAL

This report of Khondowe Welani, Mbewe Susan, Mwila Gabriel, and Sinkala Natasha, has been approved as a partial fulfilment of the requirements for the award of the degree of Bachelor of Arts in Library and Information Science by the University of Zambia

Signed: **Date:**

………………………….   ……………………………

Abstract

Economic development of African countries has reached the level where the government can begin a strategic reform of health systems to create a modern health care delivery system, meeting the world standards of health care. Zambia, being one of these countries, made a decision to implement telehealth services. The Ministry of Health in conjunction with various stakeholders like Zambian mobile service providers developed strategies using information and communications technologies (ICTs) to transform healthcare so as to alleviate the delivery of health care. However, Zambia is still a developing nation, therefore they are some challenges. The aim of this research was to assess the provision of telehealth services by Zambian mobile services providers. Special focus was directed to user awareness, usage of telehealth services, fields of healthcare where telehealth is being applied, the measures that providers are taking to improve the service, and the barriers faced. A target group of 100 LIS students from University of Zambia was selected since the students are from almost all corners of the country and are ICT literate. A well-structured questionnaire was used to collect data. With regards to awareness 57 percent of the target population were aware of telehealth services provided in Zambia. The results indicated that telehealth services were applied particularly in six fields namely counselling, chronic health, cholera, fitness, parenting and sexual health. Out of 70% were found to be users of the telehealth services provided by Zambian mobile service providers and out of those 70, 15 % were frequent users, frequent being once or twice a week. The majority expressed that the measures being taken to provide telehealth services in communities without infrastructure needed for offering telehealth were not sufficient due to poor advertising, services provided by the MSPs are not marketed well enough, poor network, intended benefactors are not reached due to lack of infrastructure and low levels of awareness. The biggest barrier in the provision of health was found to be lack of awareness followed by lack of policies and legal frameworks. Ultimately, the paper assessed that telehealth provision by Zambian mobile service providers is fully functional or operational and the scope of improving the service in wide enough despite the challenges involved.

Keywords: Telehealth, healthcare, Zambia, Service

Contents

List of Figures

List of Tables

1. INTRODUCTION

Mobile Service Providers defined as "companies that offer transmission services to users of wireless devices through radio frequency signals" by Rouse (2018, p. 2) have become key players in modern society which is information centered. They offer a wide range of products and services all in support of easier communication and accessibility to information. Among those services are telehealth services. Telehealth, as defined by Marcoux & Vogenberg (2016, p. 567) is "the remote delivery of health care to a patient through technology." The use of Information and Communication Technologies (ICTs) by Mobile Service Providers to deliver health care at a distance eliminates geographic constraints and delivers patients to the right care, at the right time, regardless of location. Furthermore, Mobile Service Providers, through telehealth, have enhanced the provision of health care in that patients get greater access to health care providers at lower costs and higher quality care. (Calgary Scientific , 2017) For instance, the use of short message service (SMS) has shown to be a simple and efficient option to improve health service delivery, resulting in health benefits for the patients who receive them (Guy, et al., 2012). The service (telehealth) is provided in various modalities such as Live video (synchronous), Store-and-forward (asynchronous), Remote patient monitoring (RPM) and Mobile health (mHealth). The focus of this paper was to assess the provision of telehealth services by mobile service providers in Zambia.

1.1 Background to the problem

The first manual phone in Zambia (then Northern Rhodesia), can be traced back to the year 1913 when it was first installed in the city of Livingstone (Habeenzu, 2010). This was essentially the birth of the telecommunication industry as we have come to know it today in Zambia. Since then the network system has been growing though at a slow pace. Most of the infrastructure that supported networking was along the line of rail from Livingstone to Ndola in the Copperbelt. Many rural areas away from the line of rail remained unconnected and the network coverage became weaker as one moves away from the line of rail (Ministry of Transport, Works, Supply and Communication, 2009).

However, the major transformation and advances of the telecommunication industry came in 1994 when the telecommunication act was enacted, establishing the Communication Authority of Zambia and dividing the Zambia postal telecommunication corporation (PTC) into the Zambia Postal service corporate (ZAMPOST) and the Zambia telecommunication company

Limited (ZAMTEL) (Mulavu, 2007). ZAMPOST managed the postal services and ZAMTEL managed the telecommunication services.

Ever since, one of the most significant outcomes of the 1994 Act has been the accelerated development of the mobile telephony. Zambia has made great improvements in widening access to the telecommunication service in the mobile service segment of the market with eighty percent (80%) of the Zambian population within the range of the mobile signal in 2009 (Habeenzu, 2010).

As of 2016, there were three cellular mobile service providers in Zambia. The licensing of the first mobile service provider came in 1994 when ZAMTEL was allowed to provide mobile cellular service to the public. MTN (previously called TELECEL) entered the market after being duly licensed as a mobile cellular service provider. Airtel (initially known as ZAMCEL) finalised its entry into the Zambian telecommunication market as the third mobile cellular provider. As at the end of September 2015, there were 10.9 million mobile service phone subscribers representing a mobile penetration rate of about 70 percent. MTN had the largest subscriber base with the market share of 46 percent, followed by Airtel with 40 percent and ZAMTEL with the least market share of 14 percent (Zambia Information and Communications Technology Authority (ZICTA), 2016). The figure below illustrates mobile market shares by subscription from 2007 to 2015.
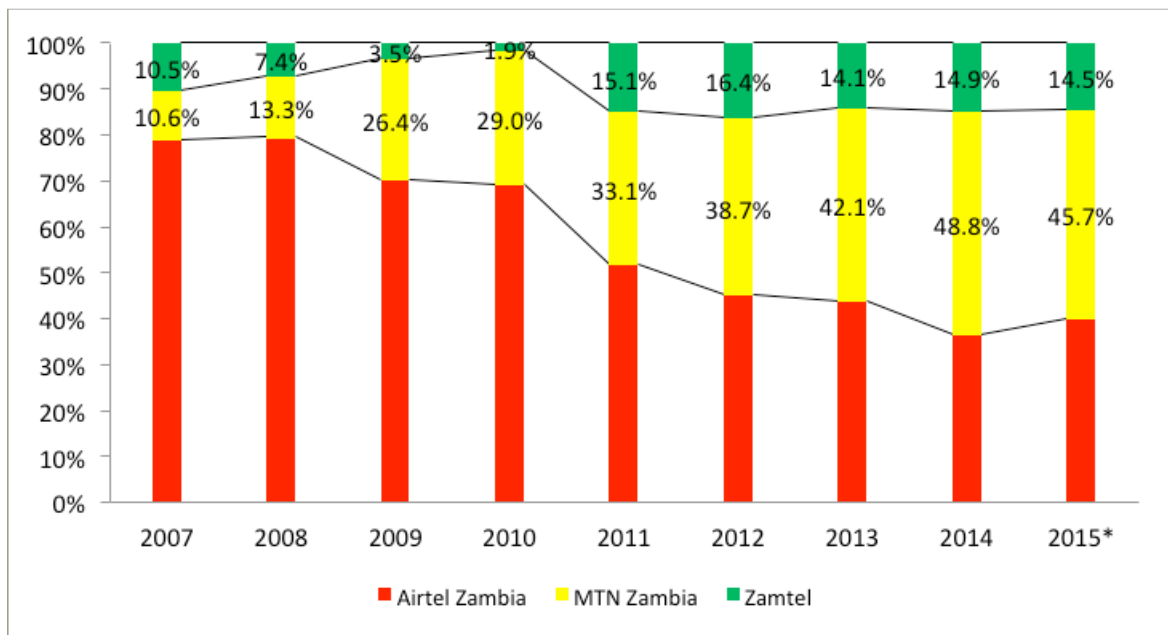

Figure 1: Mobile market shares by subscription; 2007-2015

Source: Quarterly Submissions by Operators, ZICTA - *As at September 2015

The major stride in the telecom industry has been the improvement in the delivery of mobile phones services and the introduction of cheap SMS and phone calling services. The majority of the people owning a phone in Zambia mostly use SMS' or phone calls to communicate with others. The 2015 ICT survey report conducted by ZICTA revealed that around 64.5 percent of the households in the country have access to mobile phones determined by at least one member of the household owning a mobile phone. The majority of the households that have access to mobile phones are located in the urban areas accounting for 53.7 percent of the households with mobile phones. Further, 84.8 percent of the household in the urban areas have access to mobile phones while only 50.4 percent of the households in rural areas own mobile phones (ZICTA, 2015)

Figure 2: Ownership of smartphones using mobile phone owners by region:2015
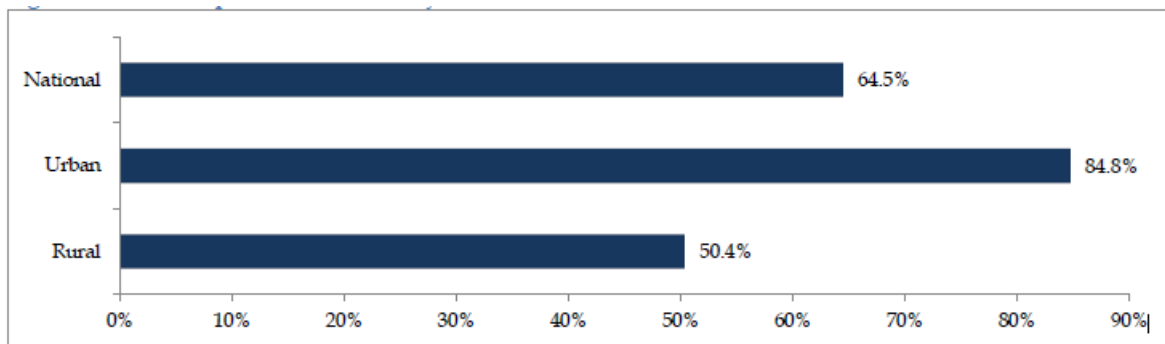
The telecom industry in 2015 showed that close to 92.8 percent of the mobile network coverage was among individuals and coverage was reported to be relatively higher in urban areas than in rural areas (ZICTA, 2015). The service which individual used were making phone calls and sending SMS

The world keeps evolving and health care costs increase, governments and private sector keep seeking technological interventions. The need to adopt ICT's in health service provision took a stride when National Aeronautics and Space Administration (NASA) first introduced telehealth in 1925. Telehealth involves the use of telecommunication technologies in order to enhance health care services, public health and education delivery. NASA started by diagnosing a patient through the radio, and envisioned a device that would allow for the video examination of a patient over a distance. After that many of the health deliverers' in America copied the idea and started providing telehealth to patients in order to cut down the amount of expenses and time in having doctor – patient contact. Eventually the rest of the world, Zambia included, adopted the idea of providing telehealth services.

Zambia like other devloping countries is charaterised by urban and rural demographic structure.The urban areas mostly have access to basic infrastructure like telephonies, electricity treated water, etc. Hence the question here is not availabitlity, but rather the quality of service provided and the number of people able to make meaningful use of the infrastructure. Advances in telecommunication industry have brought about various innovations among these innovations is telehealth i.e. the use of telecommunications to enhance health care. In Zambia the telehealth services were introduced by the Ministry of Health (MoH) in 2003, but the undertaking was expensive. In 2004 a memorandum was signed and in 2007 the project was fully underway. The project was established to address some of the inefficiencies faced in the health sector such as low numbers of qualified personnel, insufficient funding and many more. It is thus difficult to distribute expertise fairly. Worse off to people living in the poorest parts of the nation that have craggy natural terrain and limited telecommunications infrastructure. The lack of such basic services makes it difficult for medical personnel to settle in these areas, which leads to a serious shortage of medical personnel.

The high penetration rate has also enabled the telecom industry to adopt the provision of mhealth via one-to- one phone calls, USSDs and text messages. For instance, to access mhealth services on Zamtel, a customer is required to dial 7100 and talk to a doctor on the other side who will answer the customer's query. On MTN and Airtel a customer can simply dial *570# and *535# respectively to access the mhealth services (ZICTA, 2015).

1.2 Problem Statement

The Ministry of Health developed, among others strategies, the National Health Strategy Plan of the 2011-2015 and the eHealth strategy of 2004-2016 to guide priority setting and deployment of the resources in the health sector. The Ministry of Health aimed at the Information and communication Technologies (ICTs) in transforming healthcare delivery by enabling information access and supporting healthcare operation, management, and decision making. The Ministry of Health engaged various stakeholders and cooperating partners (CPs) to bring to light the importance of ICTs in the health sector. However, Zambia is still a developing nation, and most of its people still live in rural areas and those who live in urban areas have less information about the usage of ICTs.

The mission to enhance medical service delivery via ICTs will stall if the low levels of awareness perpetuate even after the development of the aforementioned strategies. This will not alleviate the current overcrowding situation in the health centres and the challenge of

geographical barriers between patients and the medical practitioners will still be there. Furthermore, the delivery of medical information to citizens will also be hampered.

A need therefore arises to assess the provision of telehealth services by stakeholders, particularly the mobile service providers in the country. To do this, the paper will focus on the user awareness, the usage of telehealth services, the fields of healthcare where telehealth is being applied, the measures that providers are taking to improve the service, and the barriers faced.

1.3 Research Objectives

1.3.1 General objective
The general objective of this study is to assess the provision of telehealth services by Zambian mobile service provider.

1.3.2 Specific objectives
1.To determine the level of Library and Information Science (LIS) student's awareness of telehealth services.

2.To identify the fields of health care where telehealth is being applied.

3.To investigate the usage of telehealth services by LIS student's.

4.To analyse the measures being taken by mobile service providers to provide telehealth services in communities without the infrastructure needed for offering telehealth.

5.To identify the existing barriers in the provision of telehealth services.

1.4 Research Questions

1. What is the level of LIS student's awareness of telehealth services?
2. What fields of health care is telehealth being applied?
3. Are LIS students using telehealth services?
4. What measures are mobile service providers taking to provide telehealth services in communities without the infrastructure needed for offering telehealth?
5. Are there existing barriers in the provision of telehealth? If yes, what are they?

1.5 Significance of the Study

This research is intended to determine the level of awareness among University of Zambia students about the provision of health service via SMSs and USSD codes. It is regarded that this research would stimulate a greater improvement of telehealth services, not only by mobile service providers but also by the stakeholders and the Zambian government, particularly the ministry of health.

1.6 Ethics

When undertaking this research, ethical consideration will highly be observed, the respondents will not be forced to take part in the research, therefore this research will be based on voluntary participation of respondents. This is because according to chapter 1 section III on fundamental rights and freedoms of the laws of Zambia (constitution), it is a fundamental and constitutional right for every person to decline participation in any activities including research. This research will ensure that there is privacy and confidentiality of the information received, in that it will avoid using real names of respondents, but instead replace them with aliases. In order to assure the respondents that this research is primarily based on academic work, a research consent will be obtained from the library and information department at the University of Zambia. In order to protect both the researchers and participants, the respondents will be sensitized on the purpose of the study and the intended usage. Furthermore, works done by other scholars will be acknowledged during the course of this research. Some of the challenges that may be encountered during this research may include; the researchers not always being on time to conduct interviews and hand out questionnaires due to transportation constraints and academic commitments. Another possible challenge would be language barriers and facing illiterate respondents.

1.7 Definitions of Key

I.   **Mobile health (mHealth)**. This is the use of mobile communication devices to support public health care and practice

II. **Mobile Service Provider:** A mobile service provider (MSP) is a company that offers transmission services to users of wireless devices (smartphones and tablet PCs) through radio frequency (RF) signals rather than through end-to-end wire communication. (Rouse, 2018)

III. **Telehealth:** the federal Health Resources and Services Administration (HRSA) defines telehealth as the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration.

2. LITERATURE REVIEW

The vastness of the subject of telehealth cannot be overemphasised in this review. It has been applied in various fields using various technological devises in order to curb the challenges being faced in the medical sphere. This review will be guided by the following themes:

2.0 The level of awareness of telehealth services.

A study by Cloutier, et al., (2008) focused on an aspect of telehealth (Video Conferencing). Rural physicians in Ontario, whose practice included children, were surveyed on their awareness, attitudes and use of tele-mental health services for children and young people in their region. Of 95 rural physicians, 70 completed and returned the telehealth section of the survey (74% response rate). The survey comprised 14 questions. Only 27% of respondents were aware of the available videoconferencing services. The proportion of physicians who reported having referred patients for the various mental health services through videoconferencing was 0–24%. The proportion of physicians who reported that they *would* refer patients through videoconferencing was 55–92%. Reduced travel time and care provided closer to home were seen as the primary benefits of referring patients to mental health services through videoconferencing. Unclear referral patterns and technology compromises were seen as limitations of referring patients to videoconferencing. Access to rural populations and improved access to patients were seen as benefits to practice, and undeveloped remuneration procedures as the primary limitation. Cloutier, et al., (2008) recommended that promotion may be important to successful implementation of tele-mental health services for children and young people.

A more specifiic study to this paper is the one done by Glinkowsk, et al., (2013) that targeted nursing students from medical universities in Poland. The aim of the study was to evaluate the knowledge and attitude of nursing students toward telenursing. The students were invited to complete a survey about telehealth and telenursing on a Web-based surveying platform (www.mini-ankiety.pl). A total of 308 undergraduate students of nursing faculty were surveyed of which 291 were females (94%) and 17 were males (6%). Most of the students (220 [71%]) in the study group were in the age range from 20 to 23 years. The accurate definition of telemedicine was identified by 251 (82%) respondents. The definition of telenursing was recognized properly by 230 (75%) respondents. Of the students, 207 (67%) would anticipate telenursing service implementation into the national healthcare system, and 214 (69.49%) would appreciate the addition of telenursing classes to the curriculum. Students from a few universities showed significantly higher willingness to introduce telenursing classes into

nursing curriculum and the intention to use telenursing services in their future nursing practice. Glinkowsk, et al., (2013) concluded that the current generation of university students of nursing seems to be well educated in medical informatics and technology use. They are better prepared for and open to information society membership, including the practice of telehealth. The advancement in university education has an influence on positive attitudes toward telenursing and may become a milestone in the development of e-health in Poland.

Similar to the study by Glinkowsk, et al., (2013) a study by Barrett, (2013) also focused on nursing students. Barrett, (2013) discussed the impact of a telehealth and telecare eLearning resource on a cohort of undergraduate nursing students in the United Kingdom. The resource was designed to raise awareness of telehealth and telecare applications, and to introduce learners to some of the drivers, challenges and research evidence associated with these interventions. Questionnaires were constructed that explored students' views on the resource itself, and on their knowledge of, and attitudes towards, telehealth and telecare. Both questionnaires included a 5-point Likert scale containing items linked to knowledge, awareness and opinions of telehealth and telecare. A pre-resource questionnaire provided a baseline measure that was compared subsequently with results from a post-resource questionnaire to identify the impact of completing the learning.104 students completed the learning resource. 51 students (49%) completed either the pre- or post-course questionnaire, with 44 (42%) completing both questionnaires. Feedback from students suggested high levels of satisfaction with the quality and utility of the resource. Responses to items in the knowledge and attitudes Likert scale were analysed primarily using non-parametric tests to identify any changes in responses before and after completing the resource. Wilcoxon signed-rank testing demonstrated statistically significant changes in responses in all but one of the Likert items, suggesting an increase in students' positive attitudes towards telehealth and telecare and their knowledge related to the topic. The conclusion by Barrett, (2013) was that the research suggested that pre-registration nursing students value the opportunity to learn more about telehealth and telecare, and that a well-designed resource can increase awareness and knowledge.

Most of the studies presented in this section present a focus on individuals working or training to work in the health sector. Literature on individuals in the information sector that are responsible for developing and managing health systems such as LIS students or professionals were not considered. This paper explores this discrepancy in literature.

2.1 The fields of health care where telehealth is being applied.

Many health care services, have now started adopting the use of electronic and telecommunications technologies in providing long-distance clinical health care. In short, they have embraced telehealth with the view of overcoming geographical barriers or as a way to decongest medical facilities. But whatever the reason may be to an individual medical facility, the provision is becoming an inevitable reality.

Telehealth has been applied in health care services either under the field of telemedicine or telecare. The study by Zilliacus, et al., (2010) showed that telemedicine through videoconferencing has been well established throughout many parts of Australia, with over 209 video-conferencing sites in New South Wales alone. Using video-conferencing telehealth (or telemedicine in this case) allowed genetic counselling for hereditary breast / ovarian cancer. The major finding of the study was that the application of telemedicine in health care, for outreach areas, allowed for a cost effective and efficient service. The study supplemented the existing research in videoconferencing for cancer genetic counselling.

Telehealth has also been applied in the screening of chronic health conditions such as diabetes and related complications such as diabetes retinopathy (DR). DR is a leading cause of vision impairment and blindness in all people who have diabetes. In Queensland, this type of screening has been established. The program is staffed by a registered nurse specially trained who does the screening and store the screened images and send them by e-mail to a paediatric ophthalmologist who makes an assessment. The results of this has shown that this technique is applicable to retinal screening and assessment that in turn facilitate access to appropriate eye care service for rural and remote people with diabetes (Smith, et al., 2005).

Going a stride further, a study in Ghana focused on the applicability of an algorithm-based Interactive Voice Response (IVR)-tool to correctly identify symptoms of the most common childhood diseases in the sub-Sahara Africa and to deliver appropriate health advise via mobile phones. The algorithm's tasks were to identify symptoms of common childhood illnesses (symptom detection), to detect an illness (disease assessment) as well as to estimate the severity of the symptoms and give suitable advice (treatment recommendation). This was achieved by asking questions. The questions aimed at identifying the symptoms such as fever, cough, diarrhoea and vomiting. Whenever the guardians responded that their child suffered from one of these symptoms, more specific questions were asked to assess symptom severity. Based on the symptom severity, calls were assigned to a treatment recommendation and additional advice was given on how to manage the child on the way to the hospital (e.g., "offer enough to drink")

or on how to treat the child at home (e.g., advise on the use of oral rehydration salts, if applicable). The algorithm was designed to register information on multiple symptoms for one participant but assigned calls to only one treatment recommendation according to the most life-threatening condition. The study also showed the transfer of information related to child disease symptoms would rely on audio files which proved to be useful for the multitudes of the illiterates in the sub Saharan Africa (Franke, et al., 2018).

Unlike the study by Franke, et al., (2018) which dealt with the guardian relying information on the sick infant to a medical practitioner on their way to a medical facility via a phone call, in Arizona, the University Medical Centre, in collaboration with Tucson Fire Department and Tucson Transportation Department launched Wireless Mobile Telemedicine and Telepresence in prehospital setting by having video, audio and data access from 17 Advance Life Support (ALS) ambulances of Tucson Fire Department (TFD) since August of 2007. This enabled the City of Tucson Emergency Room Link or "ER-Link Tucson" project to allows physicians to be virtually present at the scene and/or in the ambulance, while the patient is being transported to the trauma centre. In addition, this program provided emergency dispatchers and responders a view of the incident scene(s) in order to optimally assign emergency first responders and other necessary resources for incident management. The system allows constant two-way audio-video and near-constant medical data transmissions between ambulance personnel and the trauma and emergency room personnel. The communications are provided via regional traffic control and city communications infrastructure and wireless technology. The telepresence at the scene of event is made possible from cameras mounted externally to the emergency vehicle. These cameras, in conjunction with the existing highway cameras (operating along the freeways or at intersections) provide command and control video to the regional 911 centres and emergency department. The images facilitate the dispatch and management of emergency resources for incident command, accident management, and medical triage/mechanical assessment of the scene for the trauma team (Latifi, et al., 2007)

Deglise, et al., (2012) on the other hand examined SMS-supported interventions for prevention, surveillance, management and treatment compliance of communicable and non-communicable diseases in developing countries. It reported both peer-reviewed and grey literature reporting the use of SMS messages for disease prevention, surveillance, self-management and compliance in developing countries. A total of 98 applications fulfilled the inclusion criteria (33 prevention, 19 surveillance, 29 disease management and 17 patient compliance applications). In 31 projects, the SMS applications were evaluated. The majority of applications

focused on HIV/AIDS and were located in India, South Africa and Kenya. Most used bulk (push) messaging. In general, they were well accepted by the population. The study provided further evidence that mobile phones are an appropriate and promising tool for disease control interventions in developing countries (Deglise, et al., 2012).

The literature presented above identified genetic counselling, HIV/AIDS, childhood diseases, emergency response, and communicable and non-communicable diseases as field were telehealth is being applied. All the studies presented focused only on one field/aspect of health care and how telehealth is being applied there. The purpose of this study was rather not to investigate the details of telehealth provision but simply to identify the fields in the Zambian context.

2.2 The usage of telehealth services.

There are four main types of telehealth services mobile health, video conferencing, remote patient monitoring and store and forward. This part of the literature review will discuss case studies on usage of m-health, video conferencing and store forward

A study by Sutcliffe, et al., (2017) on the use of mobile phones to decrease the turnaround time for early infant HIV diagnosis and notification in rural Zambia involved texting mothers of infants according to their preferred method of communication when test results were available. Four hundred nineteen mothers and infants were enrolled. Only 30% of mothers had ever used a mobile phone. 96% of mobile phone owners were reached by study staff and 98% of mothers without mobile phones were contacted through their rural health centre. Turnaround times for mothers of positive infants were approximately 2 weeks shorter than for mothers of negative infants. Delivery of test results by the national SMS system improved from 2013 to 2014, with increases in the availability of texted results (38 vs. 91%) and arrival of the texted result prior to the hardcopy report (27 vs. 83%). Texted results arriving at the clinic before the hardcopy were received a median of 19 days earlier. Four discrepancies between texted and hardcopy results were identified out of 340 tests. Sutcliffe, et al., (2017) concluded that mobile phone and text messaging technology has the potential to improve early infant diagnosis but challenges to widespread implementation need to be addressed, including low mobile phone ownership, use and coverage in rural areas.

Similarly, a pilot study by The Text to Change (TTC) Organisation, (2009) also considered mHealth. The study explored the efficacy of a mHealth campaign using SMS as a platform to measure and disseminate HIV/AIDS knowledge and to promote HIV/AIDS testing at clinics in rural Uganda. Over a one-month period, 13 HIV/AIDS quiz questions were sent to 10,000 mobile subscribers. Despite participation incentives, only one-fifth of the mobile subscribers

responded to any of the questions. The campaign had proportionately limited success in increasing knowledge levels on a mass scale, and had even less impact on behaviour change. Further, the program design may be reinforcing entrenched knowledge gaps. The results suggest that we need to be conservative when considering the potential overall impact of SMS-based programs. However, we recognize the potential of mHealth tools when extended to millions of mobile phone users as part of an integrated health campaign approach. We propose several steps to improve the program design to reach a larger portion of the intended audience and increase campaign effectiveness.

A different study on telehealth conducted in Australia by Lazzarini, et al., (2010) focused on the store forward approach of telehealth. A survey was done and it was discovered that diabetic foot ulcers were one of the most hospitalised diabetes complications and contribute to many leg amputations. Trained diabetic foot teams and specialists managing diabetic foot ulcers have demonstrated reductions in amputations and hospitalisation but only a few of such teams exist in Australia. Thus, access is limited for all geographical populations and may somewhat explain the high rates of hospitalisation. The study aim was to analyse if local clinicians managing diabetic foot complications show improved access to diabetic foot specialists and outcomes with the introduction of a telehealth store-and-forward system. A store-and-forward telehealth system was implemented in different locations. Sites were setup which allowed patients or caregivers fortnightly telehealth access to a diabetic foot speciality service and provision to request for consultation. The study revealed that the telehealth system was easy to use, it also improved their access to diabetic foot speciality services, skill level of local diabetes service staff, and patient outcomes. Therefore, suggesting that clinicians found the use of a telehealth store-and-forward system very useful in improving access to speciality services, clinical skills and patient outcomes.

Contrary to the studies above a study conducted in South Australia focused on the video conferencing aspect of telehealth. The Flinders Telehealth in the Home trial (FTH trial), was a research conducted to test and evaluate the addition of telehealth services and broadband access technologies to improve the care of patients living in the community and home-based rehabilitation services for the elderly at home. Telehealth services at home were supported by video conferencing between a therapist, nurse or doctor, and a patient using the iPad tablet. During this study factors that influenced the quality if video conferencing and the impact of the introduction of these new telehealth services was assessed. The results revealed that video conferencing proved to be as or more effective than home visits about 72% of the time, despite the experience of low quality videos sometimes due to use of third generation mobile data

service. The quality of video conferencing when using 3G-based mobile data services instead of broadband fibre-based services was less due to failed calls, audio/ video jitter, and video pixilation during the telehealth sessions. Nevertheless, clinicians felt able to deliver effective services to patients at home using 3G-based mobile data services.

2.3 Measures being taken by mobile service providers to provide telehealth services in communities without the infrastructure needed for offering telehealth.

A research article by Health Affairs in the US on telehealth among US hospitals in 2014. The study identified that because telehealth is widely believed to hold great potential to improve access to, and increase the value of health care, gaining a better understanding of why some hospitals adopt telehealth technologies while others do not is critically important. After examining factors associated with telehealth adoption among US hospitals, data from the information technology supplement to the American Hospital Association's 2012 annual survey of acute care hospitals, showed that 42 percent of US hospitals have telehealth capabilities. The article concluded that there are a number of steps that policy makers can take to achieve greater adoption of telehealth by hospitals, these included; that hospitals and other telehealth providers be equipped with additional advanced medical technologies, also that they should be members of a larger system, and that they be non-profit institutions.

Similar to the research article by Health Affairs that focused on finding steps to achieve greater adoption of telehealth, the National Quality Forum (NQF) in Washington, DC issued two reports on 5th September 2017 (Wicklund, 2018). The reports provided national guidance on how to advance health information technology to make health care more effective and safer for all Americans. It was observed that since telehealth is a vital resource, especially for people in rural areas seeking help from specialists, it is critically important that we measure the quality of telehealth and identify areas for improvement just as we do for in-person care. In one report, the NQF identified critical areas where measurement can effectively assess the quality and impact of telehealth services. In another report, NQF assessed the state of interoperability (the electronic sharing of health information and how that information is being used) and its impact on the quality processes and outcomes. The NQF reports proposed that interoperability be measured in four broad categories; the exchange of electronic health information, its usability, its application and its impact- on patient safety, costs, productivity, care coordination, processes and outcomes. It can be concluded that the reports laid out a framework that gives important guidance on key concepts to help ensure that both providers and patients have the data they need to assess the relative quality and value of care and determine their next steps.

They also provide a national framework for measuring and supporting success in telehealth and telemedicine.

Unlike the Health Affairs research article and the NQF reports that focus on providing guidance to improve telehealth provision, the BioMed Central (BMC) Health Service paper published in the United Kingdom on 1st December 2015, focused on implementing solutions to improve and expand telehealth adoption. The paper reports a participatory action research carried out in UK, in four community health settings using telehealth for patients with Chronic Obstructive Pulmonary Disease and Chronic Heart Failure. The case study findings were identified as a key source of information for planning change. For example, with regards to mobile service providers, refining referral criteria; standardizing how evaluation processes. The paper concluded that raising awareness of telehealth provision by mobile service providers, can be done in order to increase adoption and help secure future financial investment for telehealth. It also concluded that the action research carried out enabled services to make planned changes to telehealth and share learning across multiple stakeholders about how and when to use telehealth.

It can be observed from the three studies above that there are no studies specifically about the measures being taken by mobile service providers in providing telehealth. The studies rather explain the measures being taken in general by various telehealth providers, in the provision of telehealth. The first two studies postulate that it is important to have a general framework or general steps, to follow in order to improve adoption of telehealth, while the last study postulates that raising awareness of telehealth is the key to improving telehealth adoption.

2.4 Existing barriers in the provision of telehealth services.

A study by Townsend, (2015) on mhealth regulation impact in 10 african countries, Zambia included, identified lack of explicit enabling mhealth policies and legal frameworks, lack of mhealth awareness amongst policy makers, the absence of explicit data protection law, and lack of mhealth / ICT / data protection regulatory bodies as barriers facing the development of mhealth. The study by Townsend (2015), concluded that the implications of not having the necessary clear legal safeguards in place in the countries may have an adverse impact of the development of mhealth initiatives in the region. The potential to realise the benefits of mhealth and the need to institutionalise mhealth after adoption is a collaborative journey that all stakeholders need to embark on. Townsend, (2015) recommended that African countries review the gaps found in their legal regimes and begin instituting appropriate measures to address them.

Jaccard, et al., (2014) on the other hand conducted a literature review on barriers to telehealth adoption in rural and remote Australian communities, based on the published works of Australian clinical trials and studies. The article presented their findings using a comprehensive barrier matrix. This matrix composed of four stakeholders (governments, technology developers and providers, health professionals, and patients) and five different categorizations of barriers (regulatory, financial, cultural, technological, and workforce). They explained each cell of the matrix (four stakeholders×five categories) and mapped the reported work into the matrix. Several exemplary barrier cases were also described to give more insights into the complexity and dilemma of adopting telehealth services. Finally, they outlined recent technological advancements that have a great potential to overcome some of the identified barriers

Despite his focus been on behavioral telehealth networks Nickelson, (1996) also identified similar barriers to those by Jaccard, et al., (2014) and Townsend, (2015). Nickelson, (1996) identified the lack of clinical protocols, solid evaluative research, payment for telehealth/telemedicine services, uniform state licensure, and uniform privacy/confidentiality policy as barriers in telehealth provision. He argued that behavioural practitioners, researchers, and advocates must actively participate in this rapidly developing field, and these professionals are ideally suited to supply ongoing federal and state policy initiatives with much needed empirical clinical data and evaluative research that will help to generate sound policy.

2.5 Summary

The chapter has presented empirical studies done by various researchers on the themes/objectives of our study. Most of the studies presented focused on health professionals who are responsible for offering services using telehealth but ignored information professionals who are responsible for developing and managing telehealth systems, this study tries to fill that void and also adds to the volume of empirical literature on telehealth in Zambia

3. RESEARCH METHODOLOGY

3.0 Introduction

Research methodology is a systematic way of solving the research problem. It provides various steps that are generally adopted by a researcher in studying the research problem along with the logic behind them. This is essential in order to ensure that research results will be capable of being evaluated either by the researcher or by others (Kothari, 2004). This chapter will indicate the type of study design used, the total population, sample size, sampling procedure, data collection instruments, as well as the method of data analysis.

3.1 Research Design

This study employed a descriptive-case study design which targeted specifically library and information science students at the University of Zambia, in order to assess the provision of telehealth services by Zambian Mobile Service providers. A descriptive research is used to describe characteristics of a particular situation, event or case. It involves asking questions such as: who, what, where, when and how. A case study design, on the other hand is used to narrow down the broad field of the research into easily researchable group. Lastly the purposeful research design was used, this is because the research is used for identification and selection of information-rich cases related to the phenomenon of interest, which in our case seeked to give a clear picture of the provision of telehealth by Zambian Mobile Service providers. It is important to note that descriptive studies can be undertaken in two ways; that is the small scale and large scale descriptive case study, in our case the small scale descriptive case study was used, this is because the investigation took place in an uncontrolled natural setting. Hale, (2011) supposed that a descriptive study is used in an uncontrolled natural setting to obtain information concerning the current status of the phenomena to describe what exists with respect to variables or conditions in a situation. Hence, descriptive research methods simply describe situations, they do not make accurate predictions and they do not determine cause and effect, and are thus suitable for uncontrolled environmental settings.

3.2 Total Population

The target population was all registered undergraduate students in the Library and Information Science Department at the University of Zambia. Both male and female students, regardless of the age groups and ethnic background were considered. There were 520 registered students in the LIS department as of July 2018. LIS students were selected due to the fact that the students are from almost all corners of the country and are ICT literate.

3.3 Sample Size

The sample for this study was drawn from the population of all registered undergraduate Library and Information Science (LIS) students from the University of Zambia from 1st to 4th year. Based on the limited finance, personal, and time resources available to the researches a sample of 100 students was drawn from the total population of 520 students using the techniques specified in the proceeding section. In addition, any number of observations that is greater than 30 is considered a large sample and is believed to have a normal distribution. (Anderson, et al., 2011). Thus, a sample of 100 students is statistically justifiable because it exceeds 30.

3.4 Sampling Procedures

The sampling technique that was employed in this study is cluster sampling. Specifically, two-stage cluster sampling was used. Stage one of Two-Stage Cluster sampling involves segmenting the homogeneous population (undergraduate LIS students) into different or heterogeneous groups called *"clusters"* (in this case four groups according to year of study). To give each cluster an equal chance of being selected, simple random sampling was applied to the four clusters to choose only two (2) which were used to generate a study sample. The formula is (Anderson, et al., 2011);

$$P(x = \text{year of study}) = \frac{number\ of\ favourable\ outcomes\ (n)}{Total\ number\ of\ outcomes\ (N)}$$

Using the above procedure first years and fourth years were randomly selected from the four groups of year of study.

Stage- two involved subjecting the two selected clusters to convenient sampling technique. A convenient sampling technique is a non-probability sampling technique where subjects are selected based of their convenience of accessibility and proximity to the researcher. Convenient sampling thus involved choosing subjects from each cluster randomly.

3.5 Data Collection Instruments

As far as data collection is concerned, the conduction of the research involved the use of questionnaires. A carefully semi-structured questionnaire was given to consenting participants in order to allow feedback from a large number of students. Closed-ended questions were used so as to make it easier to collect and analyse the data qualitatively in software packages while open questions were used to allow the respondents freedom to respond in their own words and qualify their answers. Each participant was required to fill out the questionnaire themselves.

The target group i.e. LIS students at University of Zambia are all literate and familiar with English therefore the questionnaire was written in English language.

Furthermore, secondary data was not obtained from relevant authorities i.e. Ministry of Health and the Mobile Service Providers. According to Bhattacherjee, (2012) there are two types of data: primary and secondary data. Primary data refers to collection of required data by the researcher specifically for their own purpose and study. Secondary data refers to the data that has been collected by other researchers for some other purposes. The primary data collected by use of questionnaires was sufficient for the completion of the research, thus, secondary data was not used.

3.6 Data Analysis

The analysis employed the use of computers to process the data because of their accuracy and efficiency in processing data and the relatively large number of variables. This was done with the help of computer software known as EpiData and Statistical Package for Social Sciences (SPSS). These computer applications were used because the research contained quantitative and qualitative data and they helped generate graphs, tables and charts to explain the findings. The data entry template was designed and used in EpiData where the data entry was done. This is because of the ease and user friendliness of EpiData in designing templates and data entry. Thereafter, the entered data was exported to SPSS for analysis because the two software support the same data formats and SPSS offers more operations for data manipulation and analysis.

3.7 Summary

This chapter outlines the research methodology. It has systematically shown how the research problem was solved. It provided the various steps that were adopted by the researcher in studying the research problem along with the logic behind them. The study design, the total population, sample size, sampling procedure, data collection instruments, as well as the method of data analysis have been discussed in detail.

4. FINDINGS

4.1 Overview

The information presented in this chapter is findings based on responses acquired from questionnaires administered to first year and fourth year LIS students at the University of Zambia. A total of 100 questionnaires were administered to first year and fourth year LIS students and 82 questionnaires were brought back. This translates to a response rate of 82%.

4.2 Background Information

The study had a total of 82 participants, of which 45 were males (i.e. 19 first years and 26 fourth years) and 37 were females (i.e. 23 first years and 14 fourth years). In total 42 respondents were in their first year of study and 40 were in their fourth year of study. The majority of participants were between the age of 21years and 25 years. This age group made up 80.5% of the participants while 13.4% were between 16 years and 20 years and the remaining 6.1% were between 26 years and 30 years.

When asked to select the mobile service providers that the participants are subscribed to on average 32.95% chose MTN, 56.7% chose AIRTEL and 10.35% chose ZAMTEL. The table below shows the number of participants who selected a particular network in percentages. The last column shows the average distribution of subscribers. The diagonal cells in red boarders show the percentage of respondents that chose one network only while the cells below them show the percentage that chose two or more networks. For example, cell in column 2 (MTN), row 3 (AIRTEL) shows the percentage of respondents, 29.3% that use both MTN and AIRTEL networks.

Table 1: Number of Subscribers in Percentages

Netwrok Provider Name	MTN	AIRTEL	ZAMTEL	TOTAL	AVERAGE TOTAL
MTN	15.9			15.9	32.95
AIRTEL	29.3	35.4		64.6	56.7
ZAMTEL	4.9	13.4	1.2	19.5	10.35
TOTAL	50.0	48.8	1.2	100.0	100

4.3 The Level of Awareness of Telehealth Services

Participants were asked if they have heard about health services being provided through ICT'S (telehealth). Results show that 52 (63.4%) of the participants were aware of telehealth while 30 (36.6%) were not. This can be said to be a good level of awareness. Additionally, 54% of the respondents that said "yes" were female and 46% were male. It appears that female respondents were more aware of telehealth than male respondents.
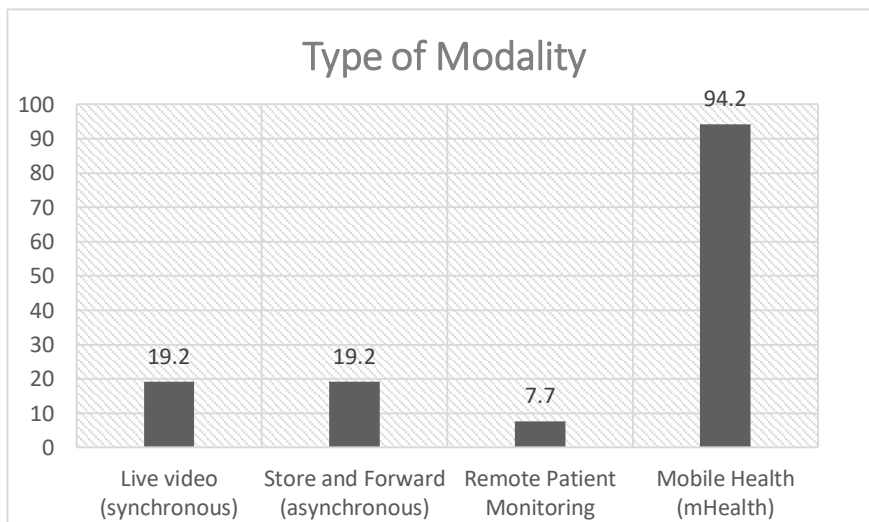
Figure 3:Awareness by Telehealth Modalities

Furthermore, the 52 participants that indicated to be aware of telehealth were required to select which modalities of telehealth they were aware of. The most known modality of providing telehealth was mHealth (chosen by 49 (94.2%) participants), followed by Live video (synchronous) and Store-and-Forward (asynchronous) chosen by 10 (19.2%) participants for each, and lastly, the least known, Remote Patient Monitoring (RPM) chosen by 4 (7.7%) participants. This is illustrated by Figure 3.

Lastly, on levels of awareness, participants were asked if they were aware that Zambian Mobile Service Providers provide telehealth services. This was in an attempt to establish the level of awareness among LIS students on the existence of telehealth in Zambia. The results obtained review that 57.3% of the respondents were aware of telehealth services been offered by Zambian Mobile Service providers while 42.7% of the respondents did not know. This can be said to be a fairly good level of awareness. When we cross tabulate the responses on this question to those on awareness above, findings show that 42 out of the 52 respondents that agreed to knowing telehealth also knew that it is being provided by Zambian mobile service providers. Results further indicate that 50% of first years and 65% of fourth years were aware of telehealth been provided by Zambian mobile service providers.

The figure 3 below compares awareness to usage of telehealth by the respondents. Among the respondents that were aware of telehealth 91% had received messages from their respective service providers but only 21% of the respondents had dialled or texted service providers to access telehealth.
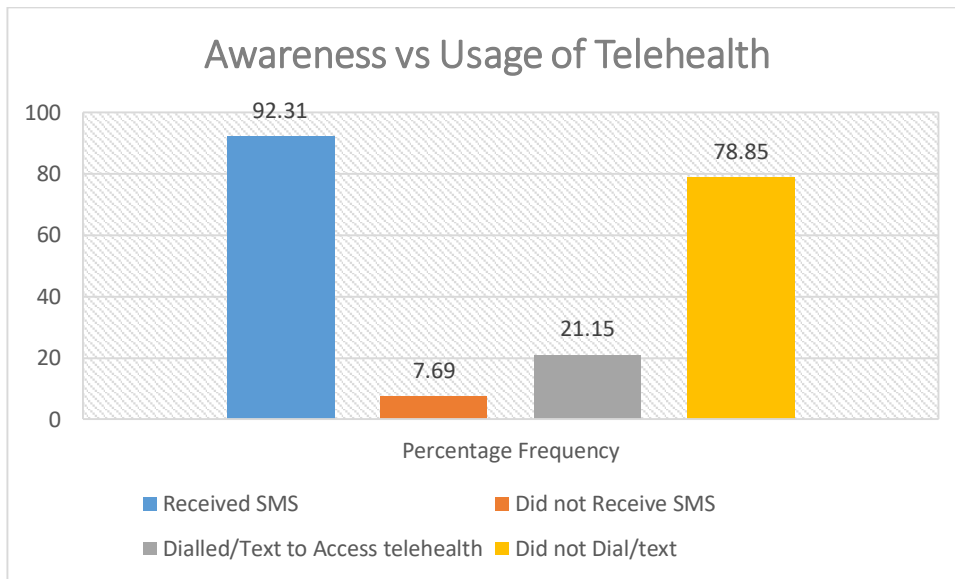
Figure 4:Awareness vs Usage of telehealth

4.4 The Fields of Health Care Where Telehealth Is Being Applied

A priori, the study identified six fields of healthcare where telehealth is being applied, namely counselling, chronic health / disease, cholera, fitness and lifestyle, parenting, and sexual health information. In addition to the above fields, respondents further identified Ebola as a field where telehealth is being applied. Respondents were asked which of the fields they had received information on and dialled/texted to access information on.

Respondents indicated to have received more information about cholera (85.5%) followed by information on Chronic health and disease (40.6%). Parenting was the least among the type of information respondents received having a 4.3% response rate. Other type of information which respondents indicated to have received concerned Army worms and the Ebola disease.
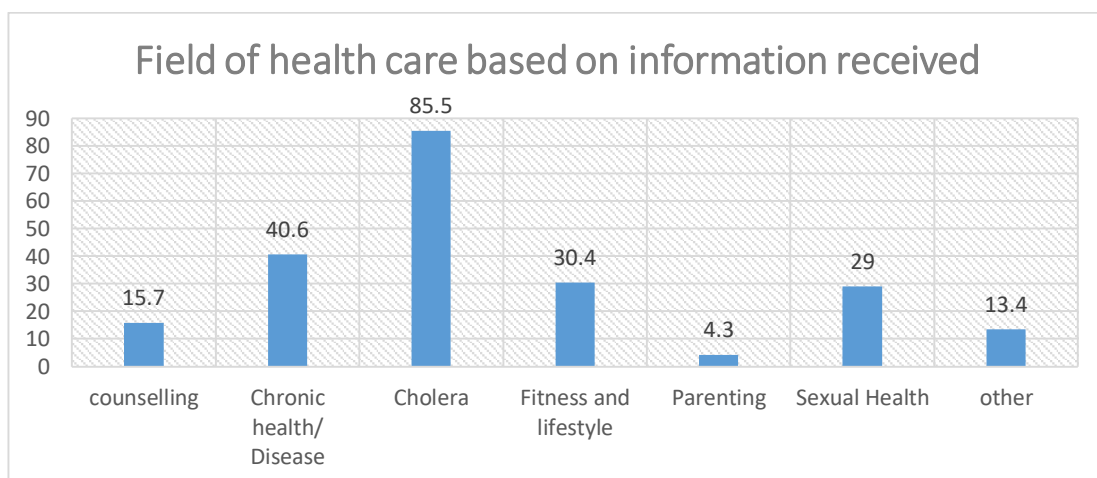

Figure 5: Field of health care based on information received

Further, respondents were asked to indicated which fields of health care they had dialled/texted their service providers to access information on. Cholera was the most accessed field (57.1%).
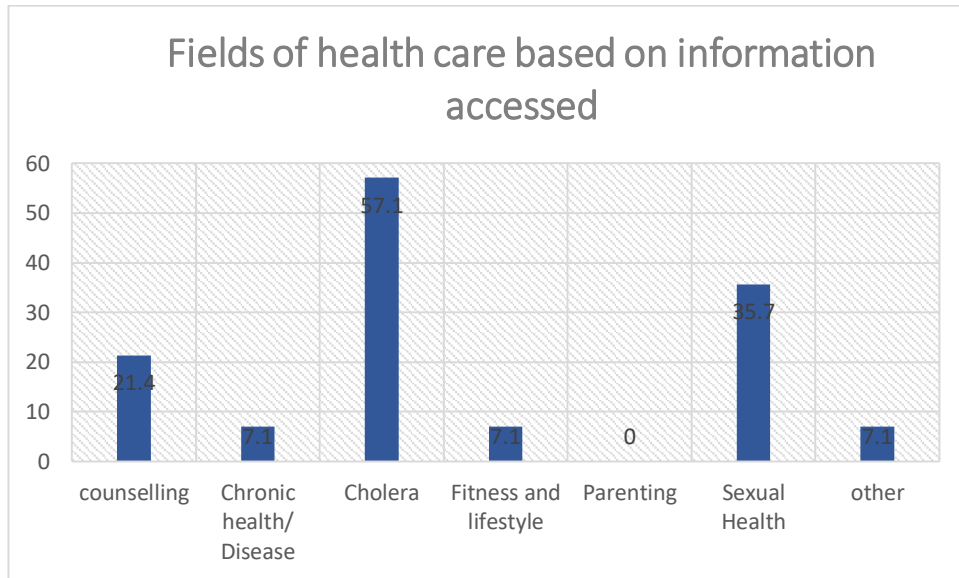

Figure 6: Fields of health care based on information accessed

4.5 The Usage of Telehealth Services

To determine usage, respondents were, firstly, asked if they had received any health related information from their mobile service providers. From the total number of respondents, about 87.8% responded to have received health related information from their respective mobile service providers while 12.2% others responded not to have received such information.
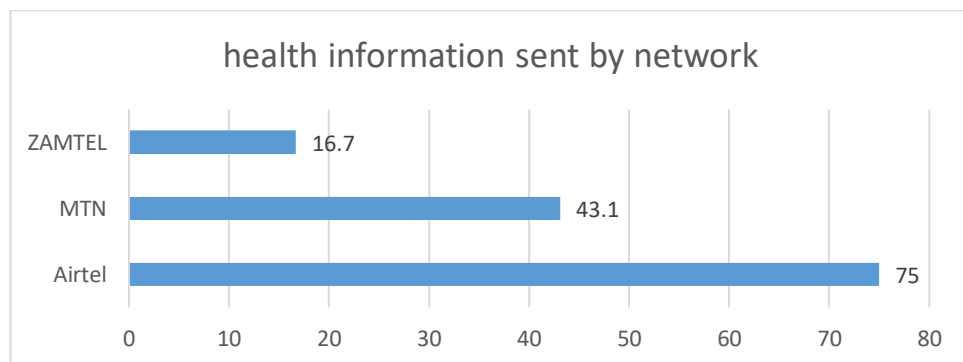

Figure 7: Health information sent by network

The figure 7 above shows that much of the information came from the Airtel network in comparison to MTN and ZAMTEL networks. The ZAMTEL network had the least response rate of about 16.7%.

To add on, respondents were asked how often they accessed the information. The pie chart below, figure 8, shows the frequency with which respondents accessed health information from

their respective mobile service providers. The chart displays that much of respondents' access to health information was a one time-off experience.
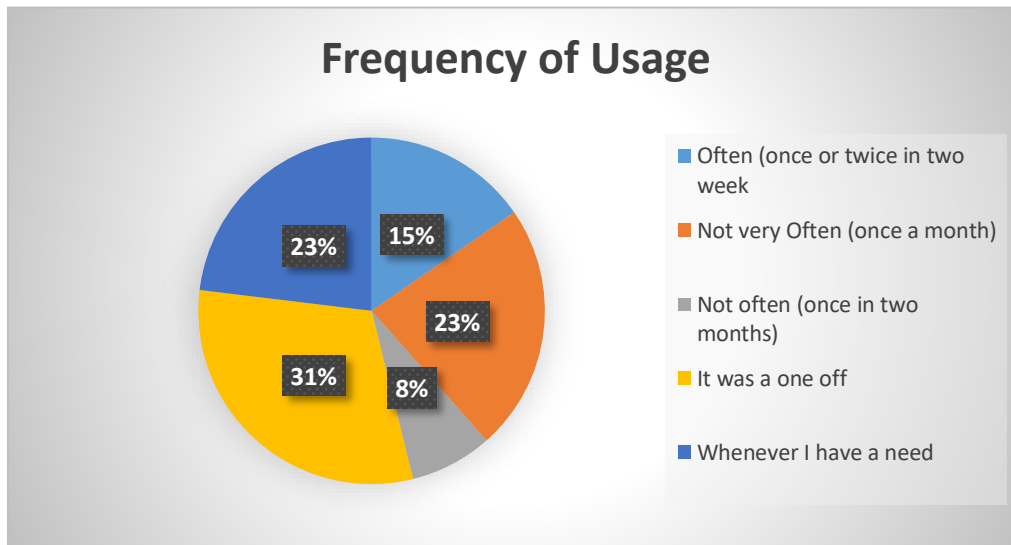

Figure 8: Frequency of Usage

Lastly, 75% of the respondents who dialled/texted their mobile service providers found the information helpful and agreed to use the information in the future. When asked to give reasons on why they would use the service again, respondents gave the following reasons: in case of disease outbreak, to acquire more information on preventive measures, and if the service become more efficient and quicker. 25% found the information useful but opted not to use it due to slow provision of the service. Other respondents (7.9%) indicated that they did not find the information helpful and would not use it in future because none found the information they sought.

4.6 Measures Being Taken by Mobile Service Providers to Provide Telehealth Services in Communities Without the Infrastructure Needed for Offering Telehealth.

In order to analyse the measures being taken by mobile service providers participants were asked if they thought the measures were sufficient and to give reasons for their answers. Most respondents, about 86.1% against 13.9%, felt the measures put up by mobile service providers were not sufficient.

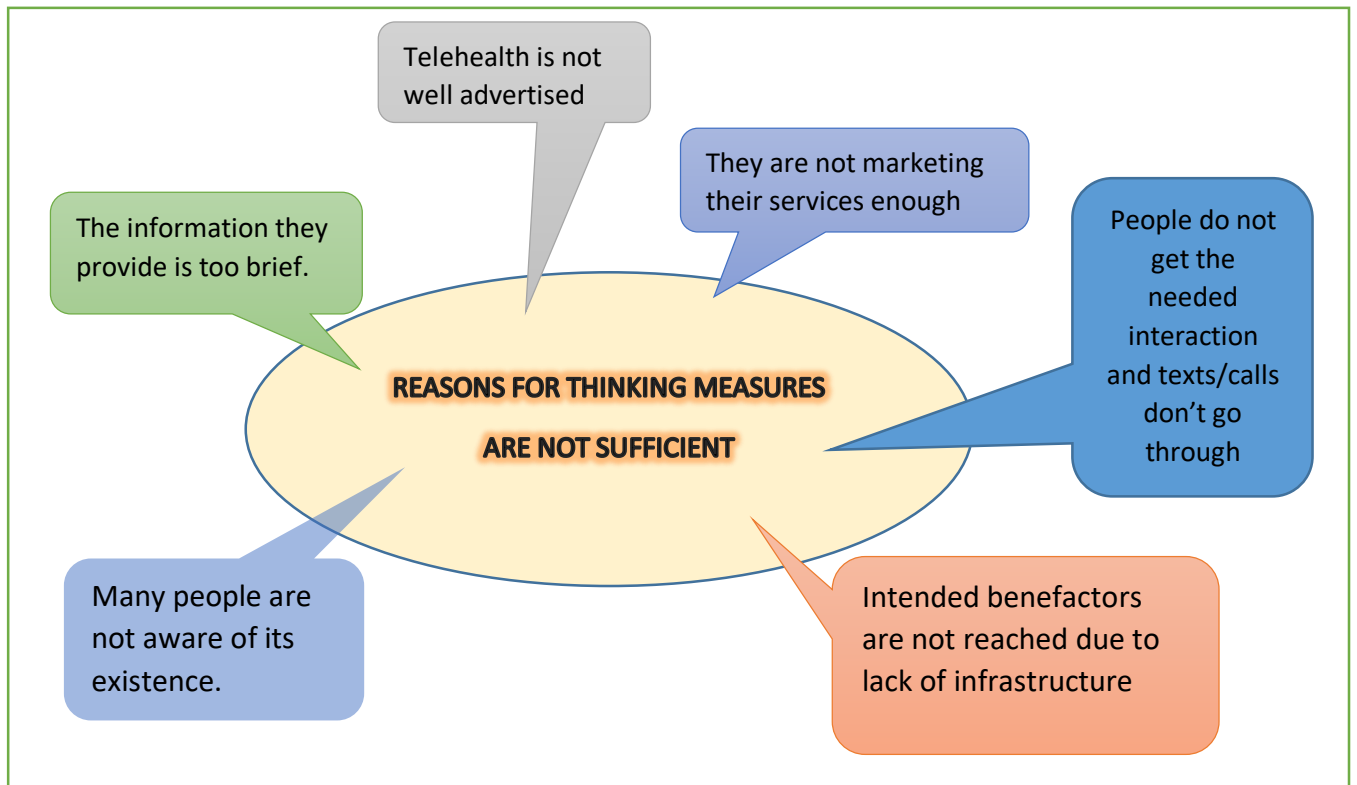The diagram below shows some of the reasons respondents gave for thinking the measure were not sufficient.

Telehealth is not well advertised

The information they provide is too brief.

They are not marketing their services enough

People do not get the needed interaction and texts/calls don't go through

REASONS FOR THINKING MEASURES ARE NOT SUFFICIENT

Many people are not aware of its existence.

Intended benefactors are not reached due to lack of infrastructure

Figure 9: Insufficiency of Measures

4.7 Existing Barriers in The Provision of Telehealth Services.

The concluding section tried to identify barriers affecting the provision of telehealth. The chart below indicates some barriers that respondents identified. The results pointed out lack of subscriber awareness as the major barrier to the provision of telehealth. Next to it was lack of policies and legal frameworks. Lack of capital and low literacy levels where other barriers respondents specified to be a hindrance to provision of health information.
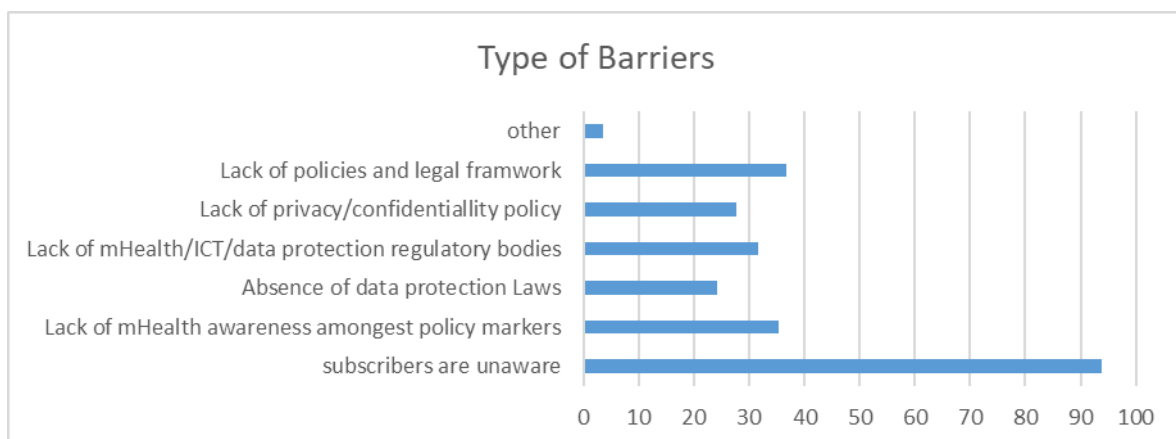

Type of Barriers

Figure 10: Type of Barriers

5 DISCUSSION OF FINDINGS

This chapter discusses the findings presented in the previous chapter and also compares them to studies done by other authors and also explains the possible causes of differences in discoveries. The chapter then provides recommendations and gives a conclusion of the study.

A large number of respondents were between 21 years and 25 years implying that most individuals in University could be in their early 20s'. Additionally, most respondents use Airtel network thus Airtel seems to be the most preferred/used network by respondents. With regards to year of study and gender the researchers tried to capture an even number to avoid biased results.

The first part of this study was to determine the level of LIS students' awareness of telehealth services. Results showed that there is a good level of awareness among LIS students meaning LIS students, especially female students, are interested in knowing how ICTs' are being applied in various sectors of the economy. A significant number of respondents identified mHealth as a modality of providing telehealth, as expected a prior, perhaps because Zambian mobile service providers have not yet developed platforms for other modalities. This adds meaning to the fact that over 80% of respondents that were aware of telehealth also knew that it is being provided by Zambian mobile service providers and 92.3% acknowledged to have received messages from service providers. Thus, it would not be misleading to say mobile service providers are a primary source of information on telehealth in Zambia. Sadly, most respondents did not text/call service providers to access services meaning only few take action after receiving telehealth information. A possible explanation for this is that subscribers receive multiple messages from service providers in a day thus they tend to ignore most of them. These findings are in line with the ones found by Barrett, (2013) and Glinkowsk, et al., (2013) who found high levels of awareness of telehealth among university students. The study by Cloutier, et al., (2008) ,on the other hand, focused on physicians and found a low level of awareness, about 27%, despite having a high response rate. The difference in the findings could be as a result of the study by Cloutier, et al., (2008) focusing on an aspect of telehealth (video conferencing) and not telehealth in general.

The second focus of our study was on identifying fields of health care where telehealth is being applied. According to findings, cholera, sexual health, and counselling were the top three fields were telehealth is being applied in Zambia. This is because the implementers of telehealth consider cholera, sexual health and need for counselling as the major issues affecting most

developing countries in Africa, Zambia inclusive. Hence the decision to emphasize on them would be based on the idea that, if people had more access to such services, it would benefit our country as a whole. Based on our study's findings, it is fair to say a favourable number of fields of health care are being applied in telehealth. However, there seemed to be low application in some fields such as parenting, this could be because the target population of our study were students, who are mostly not yet parents. Maybe changing the target would result in different results. These findings are similar to those by Zilliacus, et al., (2010) and Deglise, Suggs, & Odermatt, (2012) who carried out research on telehealth in counselling and sexual health, respectively. No study was reviewed on the application of telehealth in cholera treatment or awareness. This could be because chorela is a disease that prevellent in few African countries, Zambia included.

Thirdly, this study investigated the usage of telehealth by LIS students. The majority of respondents reported to have received health information from there service providers, a significant number being Airtel subscribers, which contradicted our primary expectation, that MTN users would have the majority of respondants, because just as stated in the background of our study, MTN has the largest subscription base among all mobile service providers in Zambia. Hence a justification for why Airtel reported with the highest number could be based on a number of reasons such as; airtel using more reliable methods to make people more aware of telehealth than other service provders, such as, sending messages regularly to their customers about telelhealth services available and how they can be accessed, and also because majority of people in our target population are Airtel users. On the Contrary,it was discovered that most of the respondents did not dial or text service providers to access telehealth. These findings mean most people are aware that telehealth exists, but very few actually use it. Unlike study by Lazzarini, Clark, & Mann, (2010) our study, on usage, did not explore other modalities of telehealth such as store forward and video conferencing. This is due to the fact that Zambian Mobile Service Providers have not included such modalities in their service provision of telehealth. However, our findings are very similar to results presented by Sutcliffe, et al., (2017) and The Text to Change, (2009). In both studies mHealth was the focus and large numbers of participants received text messeges but only a few responded. The study by Sutcliffe, et al., (2017) later showed an improvement on the rate of response.

Another focus of this study was to analyse the measure being taken by mobile service providers to provide telehealth. Measures being undertaken by mobile service providers where perceived to be insufficient. The finding implies communities have not seen any significant improvement

in the service and have not benefited much from telehealth and still lag behind as far as how quick medical health can be delivered without physically visiting the health center. It appears the current measures have not broadened the understanding of the telehealth. Respondents gave the low levels of rural community awareness of telehealth and lack of infrastructure for access as the major reasons for thinking the measures are not sufficient. This was the same conclusion given by Wicklund, (2018) in his paper focused on finding steps to achieve greater adoption of telehealth.

Lastly, the paper focused on identifying barriers in the provision of telehealth. From the type of barriers considered in this study, subscribers are unaware of telehealth and lack of policies and legal framework were found as the major barriers to the provision of telehealth. This finding is collaborated by the finding of Townsend, (2015) who did a study on telehealth in 10 different African countries. This finding implies that the development of telehealth in Zambia is hindered mostly by low levels of awareness concerning the provision of telehealth by mobile services providers. This level of unawaresness suggests that citizens are not being properly informed especially those in rural areas and this can be due to language barrier as most telehealth services are offered in engish. Lack of proper infrastructure in most areas also is seen an impediment in enforcing policies and legal frameworks that have been put in place. The lack of policies and legal frameworks and lack of capital are in line with studies by Jaccard, Nepal, Alem, & Li, (2014), and Nickelson, (1996). Lack of awareness, however, was not seen to be a barrier in these studies probably because the studies were done in environments where telehealth had been in existance for a substantial period of time.

5.1 Conclusion

The Aim of this study was to assess the provision of telehealth services by mobile service providers in Zambia. To do this, a set of specific objectives were presented and tried to be answered with empirical evidence. The first objective was to determine the level of awareness of telehealth in the target population and based on findings there is a good level of awareness. The second objective was to identify the fields of health care where telehealth is being applied. Cholera, sexual health, and counselling were identified as the top three fields were telehealth is being applied in Zambia. The third objective was to investigate the usage of telehealth services by LIS student's and it was found that in as much as most people received telehealth information, very few actually take a step to access telehealth. The fourth objective was to analyse the measures being taken by mobile service providers to provide telehealth services in communities without the infrastructure needed for offering telehealth. Based on respondents'

perceptions, the measures taken by mobile service providers are not sufficient. The last objective was to identify the existing barriers in the provision of telehealth services. Subscribers are unaware of services and lack of policies and legal framework were identified as the major barriers to the provision of telehealth in Zambia.

Ultimately, the paper assessed that telehealth provision by Zambian mobile service providers is fully functional or operational and the scope of improving the service is wide enough despite the challenges involved.

5.2 Recommendations

There is need for mobile service providers to raise awareness on their provision of telehealth services and also extend the provision of the services to include video conferencing, remote patient monitoring, and store-and-forward. In addition, the Ministry of Health and mobile service providers must also improve and strengthen policies and legal frameworks to safeguard customer information and acquire clientele trust

6 REFERENCES

A.E, A., 2006. *The Role Of National Army Medical Corps In Helping African Nations Meet Health Care Delivery Challenges.* s.l.:s.n.

Anderson, D. R., Sweeney, D. J. & Williams, T. A., 2011. *Statistics for Business and Economics.* 11th ed. Ohio: Cengage Learning.

Barrett, D., 2013. Effectiveness of a telehealth and telecare learning resource within an undergraduate nursing curriculum. *Journal of the International Society for Telemedicine and eHealth,* I(1).

Bhattacherjee, A., 2012. *Social Science Research: Principles, Methods, and Practices.* South Florida: Scholar Commons..

Calgary Scientific , 2017. *Telehealth whitepaper.* [Online]
Available at: https://datadistributing.com/wp-content/uploads/2017/02/Telehealth-whitepaper.pdf
[Accessed 10 May 2018].

centre for connected health policy, 2018. *what is telehealth.* [Online]
Available at: http://www.cchpca.org/what-is-telehealth
[Accessed 15 may 2018].

CGI GROUP INC, 2014. *CGI.* [Online]
Available at: http://www.cgi.com/sites/default/files/white-papers/cgi-health-challenges-white-paper.pdf
[Accessed 15 05 2018].

Cloutier, P., Cappelli, M., Glennie, E. J. & Keresztes, C., 2008. Mental health services for children and youth: A survey of physicians' knowledge, attitudes and use of telehealth services. *Journal of Telemedicine and Telecare,* XIV(2).

Deglise, C., Suggs, S. L. & Odermatt, P., 2012. SMS for Disease Control IN Developing Countries: A Systematic Review of Mobile Health Applications. *Journal Of Telemedicine and Telecare,* p. 9.

F., F. & Wootton, R., 2018. Telemedicine, Telehealth or E-health? A bibliometric Analysis of the trends in the use of these terms. In: s.l.:s.n., pp. 460-464.

Franke, K. H. et al., 2018. A Mobile Phone Based Tool To identify Symptoms Of Common Childhood Diseases in Ghana: Development and Evaluation of The Integration Clinical Algorithm in A Cross Sectionl study. *BMC Medical Informatics and Decision Making,* p. 10.

Gagnon, M. P., Cloutier, A. & Fortin, J. P., 2004. Quebec Population and Telehealth. *Telemedicine Journal and e-Health,* 9 July.X(1).

Glinkowsk, W., Pawłowska, K. & Kozłowska, L., 2013. Telehealth and Telenursing Perception and Knowledge Among University Students of Nursing in Poland. *Telemedicine and e-Health,* IXX(7).

Guy, R. et al., 2012. How Effective Are Short Message Service Reminders at Increasing Clinic Attendance? A Meta-Analysis and Systematic Review. *Health Services Research,* 47(2), pp. 614-632.

Habeenzu, S., 2010. *Research ICT Africa.* [Online]
Available at:

https://www.researchictafrica.net/publications/ICT_Sector_Performance_Reviews_2010/Vol%202%20Paper%2017%20-%20Zambia%20ICT%20Sector%20Performance%20Review%202010.pdf
[Accessed 2018].

Hale, J., 2011. *The 3 Basic Types of Descriptive Research Methods.* [Online]
Available at: https://pyschcentral.com/blopg/the-3-basic-types-of-descriptive-research-methods/
[Accessed 5 December 2018].

Jaccard, J. J., Nepal, S., Alem, L. & Li, J., 2014. Barriers for Delivering Telehealth in Rural Australia: A Review Based on Australian Trials and Studies. *Telemedicine and e-Health,* XX(5).

Latifi, R. et al., 2007. Telemedicine And Telepresence For Trauma And Emergency Care Management. *Scandinavian Journal Of Surgery,* p. 9.

Lazzarini, P., Clark, D. & Mann, R. D., 2010. Does the use of store-and-forward telehealth systems improve outcomes for clinicians managing diabetic foot ulcers? A pilot study. *Journal of Foot and Ankle Research.*

Marcoux, R. M. & Vogenberg, R. F., 2016. Telehealth: Applications From a Legal and Regulatory Perspective. *Pharmacy and Therapeutics: A Peer-Reviewed Journal for Management Care and Hospital Formulary Management,* 41(9), p. 567–570.

Ministry of Transport, Works, Supply and Communication, 2009. *macha works.* [Online]
Available at: http://www.machaworks.org/files/perslinks/ZambiaReportToCTOConference-1-.pdf
[Accessed 11 05 2018].

Mulavu, S., 2007. *Research ICT africa.* [Online]
Available at:
https://researchictafrica.net/publications/Telecommunications_Sector_Performance_Reviews_2007/Zambia%20Telecommunications%20Sector%20Performance%20Review%202007.pdf
[Accessed 11 may 2018].

Nickelson, D. W., 1996. Behavioral Telehealth: Emerging Practice, Research, and Policy Opportunities. *Behavioral Sciences and the Law,* XIV(4), pp. 443-457.

Rouse, M., 2018. *Mobile Service Provider.* [Online]
Available at: https://searchmobilecomputing.techtarget.com/definition/Mobile-service-provider
[Accessed 10 May 2018].

Smith, A. C. et al., 2005. Telemedicine And Rural Health Care Applications. *Symposium,* December.vol 51(issue 4).

Sutcliffe, C. G. et al., 2017. *Use of mobile phones and text messaging to decrease the turnaround time for early and notification in Rural Zambia.* [Online]
[Accessed 1 June 2018].

Taylor, A., Morris, G., Pech, J. & Rech, S., 2015. *JMIR Mhealth Uhealth,* s.l.: Published online.

Taylor, J., Coates, E. & Hawley, M. S., 2014. *BMC health services research.* [Online]
Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4666096/
[Accessed 6 june 2018].

The Text to Change, 2009. *Evaluating the effectiveness of a Text Message HIV/AIDS campaign in North West Uganda,* Arua: s.n.

Townsend, B., 2015. *mHealth Regulation Impact Assessment: Africa,* s.l.: s.n.

Warren , I., Weerasinghe, T., Maddison, R. & Wang, Y., 2011. A Mobile Service Platform For Telehealth. *Procedia Computer science,* Vol 5(1), pp. 681-688.

Wicklund, E., 2018. *nqf unveils quality measurement framework plan for Telehealth.* [Online]
Available at: http://www.google.co.zm/amp/s/mhealthintelligence.com/news/amp/nqf-unveils-quality-measurement-framework-plan-for-telehealth
[Accessed 6 June 2018].

Zambia Information and Communications Technology Authority (ZICTA), 2016.
Zicta/views/Publications. [Online]
Available at: https://www.zicta.zm/views/publications/ICTandPostServiceInvestementProfile.pdf
[Accessed 14 05 2008].

Zambia Information and Communications Technology Authority, 2016. *Zicta/views/Publications.* [Online]
Available at: https://www.zicta.zm/views/publications/ICTandPostServiceInvestementProfile.pdf
[Accessed 14 05 2008].

ZICTA, 2015. *ZICTA.* [Online]
Available at: http://www.zicta.zm/views/publications/2015ICTSURVEYREPORT.pdf
[Accessed 14 May 2018].

Zilliacus, E. et al., 2010. *Sermatic Scholar.* [Online]
Available at: http://pdfs.semanticscholar.org/bedc/dacc5afaf8ae690a89f5d956eed58b1b196e78.pdf
[Accessed 5 june 2018].

THE UNIVERSITY OF ZAMBIA
SCHOOL OF EDUCATION
DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

Dear Respondents, we are fourth year Library and information science students at the University of Zambia doing an assessment of the Provision of Telehealth Services by Zambian Mobile Service Providers: A case study of Library and Information Science Students at The University of Zambia. You are among few respondents that have been randomly selected to take part in the study and the information you provide in this questionnaire is strictly for academic purposes.

INSTRUCTIONS

- ➢ Do not indicate your name on the questionnaire
- ➢ Please kindly respond to the questions in the questionnaire as sincere as possible. Tick (√) the answers that apply.

QID: ☐

SECTION 1: BACKGROUND INFORMATION

101 Sex of respondent: Male ☐ Female ☐

102 Age group: 16 – 20 ☐ 21 – 25 ☐ 26 - 30 ☐

103 Year of study:

a) First Year b) Second Year c) Third Year d) Fourth Year

104 Mobile Service Providers:

	Yes	No
Airtel	☐	☐
MTN	☐	☐
Zamtel	☐	☐

SECTION 2: THE LEVEL OF AWARENESS OF TELEHEALTH SERVICES.

201 Have you ever heard about health services being provided through ICT'S (telehealth)? (If no skip to Q203)

a) Yes b) No

202 Which of the following ways of providing health services through ICT'S (telehealth) have you heard of? (Multiple response)

	Yes	No
a) Video Call	☐	☐
b) Store-and-forward	☐	☐
(sending and receiving pictures, documents etc.		
c) Remote patient monitoring (RPM)	☐	☐
d) Mobile health (Voice calls, text messages)	☐	☐

e) Other specify _____

2

203   Are you aware that Zambian Mobile Service Providers provide health services?

   a) Yes   b) No

SECTION 3: THE USAGE OF TELEHEALTH SERVICES & THE FIELDS OF HEALTH CARE WHERE TELEHEALTH IS BEING APPLIED.

301   Have you ever received any health related information from your mobile service provider?

   a) Yes   b)   No

302   If yes, which mobile service provider(s) sent the information?

	Yes	No
Airtel	☐	☐
MTN	☐	☐
Zamtel	☐	☐

303 What was the information about? (Multiple response)

	Yes	No
a) Counselling	☐	☐
b) Chronic health/diseases	☐	☐
c) Cholera	☐	☐
d) Fitness and Lifestyle	☐	☐
e) Parenting	☐	☐
f) Sexual health	☐	☐

   g) Other Specify _____

304   Have you ever dialled or texted your mobile service provider to access health services?

   a) Yes   b) No

305 If yes, what information did you access? (If no skip to section 4)

	Yes	No
a) Counselling Information	☐	☐
b) Chronic health/diseases Information	☐	☐
c) Cholera Information	☐	☐
d) Fitness and Lifestyle Information	☐	☐
e) Parenting Information	☐	☐
f) Sexual health Information	☐	☐

g) Other Specify _____

306 If yes, how often do you access the information?

a) Very Often (every week)

b) Often (once or twice in two weeks)

c) Not very Often (once a month)

d) Not often (once in two months)

e) It was a one off

f) Whenever I have a need

307 Was the information you received or accessed helpful?

a) Yes   b) No

308 Would you use it again? Please provide a brief reason for your answer.

a) Yes   b) No

Reason: _____

_____

SECTION 4: MEASURES BEING TAKEN BY MOBILE SERVICE PROVIDERS TO PROVIDE TELEHEALTH SERVICES IN COMMUNITIES WITHOUT THE INFRASTRUCTURE NEEDED FOR OFFERING TELEHEALTH.

401 Do you think the measures being taken by mobile service providers to provide health services in communities without the infrastructure are sufficient? give a reason for your answer.

    a) Yes   b) No

    Reason: _____

    _____

402   What do you think can be done to improve the provision of the services?

    _____

    _____

SECTION 5: EXISTING BARRIERS IN THE PROVISION OF TELEHEALTH SERVICES.

501   Which of the following barriers do you think affect the provision of health services by mobile service providers? (Multiple response)

	Yes	No
a) Subscribers are unaware of the service	☐	☐
b) Lack of mhealth awareness amongst policy makers	☐	☐
c) The absence of data protection law	☐	☐
d) Lack of mhealth / ICT / data protection regulatory bodies	☐	☐
e) Lack of privacy/confidentiality policy	☐	☐
f) Lack of policies and legal frameworks	☐	☐

g) Other specify _____