Evolving usage and access to ICTs in the Nigerian health care sector: challenges and prospects

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EVOLVING USAGE AND ACCESS TO ICTs IN THE NIGERIAN HEALTH CARE SECTOR: CHALLENGES AND PROSPECTS

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A thesis submitted in partial fulfillment of the requirements of the University of Westminster for the degree of Doctor of Philosophy

December 2016

DEDICATION

This work is dedicated to Almighty God and to my family.

DECLARATION OF ORIGINAL AUTHORSHIP

I, Yewande Adekunle, confirm that the work presented in this thesis is my own. Where material has been derived from other sources, I confirm that this has been indicated and acknowledged.

ABSTRACT

Good health care delivery is one of the most essential social services and is the lifeline of a country's infrastructural development. Since most of Nigeria's disease burden is due to preventable diseases, the emerging ICTs have a significant role to play in a country's health care delivery industry. This research offers a distinctive perspective on the applications of ICTs in seven university teaching hospitals in Nigeria, with a focus on the University College Hospital, Ibadan. A research model that was proposed with its associations was tested using both qualitative and quantitative data collected from health workers (including those in training) and the clients/patients they serve.

For the first time, the perspectives of the beneficiaries of ICTs' usage in the health sector, apart from the health workers (i.e., the patients/clients), were considered. Hitherto, the few research studies and findings that are available in this area in Nigeria and other developing countries was focused only on the users of the ICTs, i.e., the health workers. The data presented here found evidence that health professionals were highly aware of the on-going trends in the adoption of ICTs and their applications for use in communication in the health sector, but the potential benefits of ICTs in the health sector have not been fully exploited by the Nigerian teaching hospitals that were studied. The study also found that there are many barriers to the implementation of e-health solutions in Nigeria, and that these barriers cause delays or hinder their use. The Nigerian health sector is compromised with a lack of infrastructure, services and expertise, limited resources, low literacy levels and professional associations. In addition to these inherent problems, shortcomings in the knowledge and skills of patients and health professionals in using ICT solutions present other challenges. Some of these obstacles pertain to ICT itself and, with time, they will be alleviated, while others relate to the challenges that ICT poses for health care organizations. This calls on different stakeholders to fully implement and mainstream ICT applications in the health sector so as to make them a reality, and not a myth, in promoting the access to, and the quality of, health services. ICTs and their applications offer the foundation for information sharing and exchange. In Nigeria, the journey is likely to be a lengthy one, with numerous obstacles, many of which are unique to health care settings that must be surmounted.

However, policy makers should realize that ICTs are not only necessary in the health sector for a well-adjusted society, but the lack thereof may render such a society obsolete.

The study also notes that the adoption of ICTs in an organization and/or in a society can be driven by many factors. Since the diffusion of innovation requires an understanding of people, hardware, software, communication networks and data resources that collect, transform and disseminate information, it has been suggested that theories from information systems are well suited to explain such aspects of the diffusion and adoption phenomena. This work has therefore proposed a hybrid of Rogers' (1995) Diffusion of Innovation Model and Venkatash et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT). Both theories provide important insights into the factors influencing technology transfer in developing countries, and this has been demonstrated by the findings of this research study.

ACKNOWLEDGEMENT

I give God all the glory and honour for taking me through my educational career and to the successful completion of this thesis.

I would like to acknowledge the Communication and Media Arts Research Institute (CAMRI) for granting me the approval to embark on this relatively new area of research with an unflinching support from both my supervisors and the other faculty members. My sincere and profound gratitude go out to my supervisor, Dr. Winston Mano, Reader in CAMRI, Director of the African Media Centre and the Course Leader for the MA Media and Development, for his invaluable advice, encouragement, and for making time out for discussions and clarifications that were necessary in the course of my writing up. I equally extend my profound gratitude to Professor Jeanette Stemmers - Research Director, for her willingness to support me as appropriate. I accord the same to Dr. Anthony Mcnicholas - Research Director, whose valuable critiques prompted me to read between the lines of my work towards a better presentation. I thank Ms Fauzia Ahmed, the Research Administrator, for being always gracious and thoughtful.

I must acknowledge the cooperation of the staff and students of the College of Medicine, University of Ibadan, Nigeria, and the University College Hospital, Ibadan, Nigeria, for their assistance during the field work. My sincere gratitude goes to all the Principal Officers of the two institutions for taking time out of their busy schedules to participate in the in-depth interviews. I equally express my gratitude to the staff and students of the other six teaching hospitals that participated in the study, especially to the senior members of the faculties that supervised the data collection and returned the questionnaires to me. I thank all of those who assisted me with the Focus Group Discussions, as well as the participants. My special thanks go to Mr. Justin Dansou for his advice and assistance with the statistical analysis.

Lastly, my sincere thanks go to my parents, Professor Adeyemi Adekunle and Mrs. Kikelomo Adekunle, for their unfailing financial support, love and encouragement, and to my brothers, Dr. Oluwatosin Adekunle and Dr. Oluwaseyi Adekunle, for their unflinching support. Without them, it would have been a difficult journey.

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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AKUTH	Amino Kano University Teaching Hospital
ART	Anti-retroviral therapy
ATM	Automated Teller Machines
ETFA	e-Health Task Force for Africa
FHI	Family Health International
FP	Family Planning
GPRS	General Packet Radio Systems
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
ILS	Integrated Logistics System
IPM	Informed Push Model
MB ,BS	Bachelor of Medicine, Bachelor of Surgery
NDHS	Nigeria Demographic Health Survey
OAUTH	Obafemi Awolowo University Teaching Hospital
PDA	Personal Digital Assistant
PLWA	People Living With AIDS
PSI	Population Service International
POS	Point of Sales
SMS	Short Messaging System
UCH	University College Hospital
UCTH	University of Calabar Teaching Hospital
UMTH	University of Maiduguri Teaching Hospital
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNTH	University of Nigeria Teaching Hospital
USAID	United States Agency for International Development
WHO	World Health Organization

INTRODUCTION

Communication is a process in which participants create and share information with one another to reach a mutual understanding (Rogers, 1995). Nigeria is a country that is in need of rapid communication solutions, especially in the health sector. Information Communication Technologies (ICTs) are increasingly important for communication. ICTs include an enigmatic amount of equipment, services and devices that enable the transmission, processing and the use of information and knowledge. Essentially, ICTs are enabling technologies that are necessary for the delivery of voice/audio, data, video, fax and Internet services using wired and wireless media and associated equipment, all of which are connected via Internet protocol (IP) and non-IP networks (Aluko, 2004 http://www.dawodu.com/aluko98.htm). ICTs have a major role to play in the current transformation agenda of the present Nigerian government, particularly in the health sector, as stated by the Nigerian ICT Minister for Information Technology, Mrs. Omobolanle Johnson, on the 6th February, 2012 (Johnson, 2012). The advent of the Internet has revolutionized the compilation, assessment and distribution of information relating to healthcare (WHO, 2012). The Internet enables more effective and instantaneous communication within communities, allowing for improved access to libraries and global resources, amongst others of the numerous opportunities (Idowu et al., 2003: 69-75).

It is increasingly evident that ICTs can also transform health systems (Kwankam, 2012: 95-397). In the United States of America, Cebul et al. (2011: 825-33) have, for example, shown that the meaningful use of electronic health records could improve the quality of diabetes care, irrespective of the type of health insurance held by the patient. New media and communication convergence are reshaping the ways in which communications can be used for development (Prusad, 2009). ICTs have been recognized as the tool that will potentially improve the quality and efficiency of a health care delivery systems and the knowledge of workers, in both the developed and developing countries (Idowu et al., 2003). Good health care delivery is one of the most essential social services and is the basis of a country's infrastructural development. There are constant changes in health care delivery which have led to an increased need for communication with important publics (Adekunle, 2006). Providing access to reliable health information for health-care workers in developing countries is potentially the single most cost-

effective and achievable strategy for sustainable improvement in health care (Pakenham-Walsh et al., 1977: 90).

Most studies on ICTs in the health sector in Nigeria have examined narrow aspects of these innovations, mostly its benefits to physicians (Ajuwon, 2004; Bello et al., 2004; Odusanya and Bamgbala, 2002). My research is intended to conduct an assessment of the ICTs that are used in health care, not only from the perspectives of the "health givers", but also those of the clients and patients who benefit from the services. It is envisaged that this study will contribute to knowledge on the usage of ICTs in a specific area and in development communications. Since the levels of the technologies involved in communication tend to be complex, it is envisaged that the scope of this research study will be limited to the role of ICTs, such as the Internet, the Global System for Mobile Communication (GSM), iPads, smartphones (including Blackberry) and Telemedicine, in the promotion of health information and health care delivery.

ICT Policy for Development in Nigeria

The emergence of ICTs and their role in stimulating rapid development in all sectors of the economy, and in the inseparable sociocultural and political spheres of life, is widely acknowledged (Olatokun and Adeboyejo, 2009; Akanbi, 2005; Ajayi, 2003; Idowu et al., 2003 Previous reports by Idowu et al. (2003) and Akanbi (2005) have emphasized the strategic disadvantage that nations, institutions, and industrial sectors will face if they did not position themselves to harness and implement ICTs as tools for leveraging their activities in the emerging global economy (Olatokun and Adeboyejo, 2009: 181-187). There is a significant scarcity of information on the data usage of the emerging information technologies in Nigeria (Salawi, 2008: 115-135). While this information is rare and quite elusive, however, according to the Internet World Statistics, Nigeria boasted of a population of 155,215,573 in 2012. In December, 2010, statistics showed that there were 200,000 Internet users, while in December, 2011, the country recorded an estimated usage of 45,039,711, which is a huge improvement in comparison to the previous year. The current penetration rate for Nigeria is 29% and there is a general penetration within Africa of about 32.2%, which is quite impressive. Facebook users, as of

March, 2012, amounted to 4,312,060, which places Nigeria in approximately the 4th position in Africa (Internet World Stats, 2011). An annual study recently released by the World Economy Forum, showed that Nigeria ranked 104 of the 138 countries in its use of communication and information technology. These statistics offer conservative estimates that ignore multi-user dimensions and the unregistered ownership of the new technologies, which is common in Nigeria. The government in Nigeria has promoted ICTs because they see them as developing a solid IT industry that creates jobs, bridges the knowledge gap, diversifies the economy, generates foreign earnings and enhances the image of the country (Popoola, 2010: 129–134). From the early 1990s until today, the Federal Government of Nigeria (FGN) has initiated and adopted some ICT related policies and laws that have guided the development of the sector in order to harness its benefits for national development.

Efforts made by the government towards ICTs' development in Nigeria include the launching of the National Telecommunication Policy in September, 2000, the development of a comprehensible Science and Technology Policy in 2001, the development and launching of the National IT Policy in 2001, the establishment of the National Information Technology Development Agency (NTDA) in 2001, and the launching of the National Space Research and Development Satellite Systems Programmes by the National Space Research and Development Agency (NASRDA) in 2001 (Babalobi, 2010). These efforts are complementary to additional development initiatives, such as the granting of licenses to mobile telephone network operators, beginning with MTN in 2001 (Oyelekan, 2008: 8-14).

On May 18, 2010, Nigeria's Information and Communications Technology for Development (ICTT4D) was launched in Abuja, Nigeria. The National Information Development Agency (NTDA), in collaboration with the United Nation's Economic Commission for Africa (UNECA), co-ordinated the development of the National ICT4D Strategic Action Plan. This Action Plan provides concrete implementation strategies for a period of 5 years for the key sectors – health, education, infrastructure, human resources, and development. agriculture, legal/regulations, private sector/industry, media/community, among others - as part of an integrated approach to achieving national development within the context of the Federal Government of Nigeria's

Seven Point Agenda, the national Economic Empowerment Development Programmes (NEEDS) and various socio-economic development programmes and initiatives (http://www.jidaw.com/policy.html). There has been a tremendous improvement in Internet penetration in Nigeria, particularly in the last four years (FGN, 2012).

While there has been this phenomenal growth in Internet web communication technology usage, the other ICT that has experienced a similar usage is mobile telephone technology. The investments in ICTs in the Nigerian education system have not yielded what could reasonably have been expected, compared to those made in GSM communications (Babalobi, 2010). The consensus of various authors on ICT usage in Nigeria's tertiary institutions is that it is still very low and shallow (Babalobi, 2010; Iloanusi and Osage, 2009; World Bank 2003). The government took a very bold step by approving a National ICTs Policy in January, 2012. This National ICTs Policy has been developed in support of the development of Nigeria's *Vision 2020* (FGN, 2012). The goal of the National ICTs Policy is to yielded reasonable expectations if compared to similar investments made in GSM communications ("*create a conducive environment for the rapid expansion of ICT networks and services that are accessible to all at reasonable costs, and for the transformation of Nigeria into a knowledge-based economy*" (FGN, 2012: 8-10).

Significance of ICTs in Nigeria

The development of ICTs has brought about phenomenal improvements and great opportunities that allow developing countries to participate meaningfully in the global digital economy (FGN, 2012). In the past five years, there has been a significant improvement in Nigeria's ICT sector. The country has moved from approximately 400,000 available fixed telephone lines pre-1999, to over 90.5 million available mobile telephone lines by the first quarter of 2011, thereby making Nigeria's telecommunications market the fastest growing in Africa. There is now a modest ICTs deployment in the functioning of government organizations, as well as in the private sector. In addition, ICTs now drive some activities in the financial, oil and gas sectors, while various e-Government initiatives are on-going in the different departments in the three tiers of government (FGN, 2012). The long term strategic vision for the ICTs sector was elaborated in the National

Development Plan, which was entitled "Nigeria Vision 2020" (FGN, 2010). According to the document:

> *"The increasing globalization driven by ICTs makes it imperative for Nigeria, as an emerging market, to irreversibly consider the application and promotion of ICTs strategy to facilitate its rapid growth and development. This will involve the development of a vibrant ICTs sector to drive and expand the national production frontiers in the agriculture, manufacturing and service sectors."*

The paucity of the ICT infrastructure in Nigeria has greatly hindered the provision of efficient and affordable ICT services to its citizens. Over 70% of Nigerians reside in the rural areas (NDHS, 2013), and most do not have access to advanced ICT services. In addition, some Nigerians reside in urban areas that are not-served at all or are underserved (FGN, 2012). The development of a national fiber-optic backbone infrastructure that ensures high bandwidth availability, universal access funding and programmes, Internet connectivity and telecommunications access network extensions; and the use of appropriate and existing government structures, will serve as platforms for extending ICTs to rural communities. The gaps in ICT usage in the Nigerian health care systems include poverty and isolation. This covers both rural and urban areas. In 2000, it was recorded that 15 cities were operational for Internet usage and access; unfortunately, 70% of Nigeria's population are concentrated in the rural areas and villages. By 2004, the NCC had made efforts to improve telecommunications' infrastructures.

Most of Nigeria's disease burden is due to preventable diseases. The maternal mortality rate (about one mother's death in every one hundred deliveries) is one of the highest in the world. The under-5 mortality rate and the adult mortality rates are higher than the average for sub-Saharan Africa (NDHS, 2013). Most causes of illness that lead to these morbidities and mortalities can be prevented through health education, which would involve training the health workers in these rural sites and giving them the opportunity to participate in the promotion. It is not without significance to note that consumers' knowledge, and the level of their rights to quality care, are low (FGN, 2004).

Originality of the Study

Previous research studies in Nigeria have examined the use of the Internet by health workers, especially physicians, so as to update their knowledge and not necessarily to promote health information. Although many Nigerians subscribe to GSM and own smartphones (including blackberries) they hardly employ them to seek and obtain medical information. In Nigeria, Idowu and Ajayi (2008: 421–427) showed that patients' case notes, which encompass their symptoms, diagnosis, medication and a clinical number), were transmitted using mobile phone on a Global System for Mobile Communication carrier from the referral package within a few seconds. They concluded that the work has the potential to increase medical personnel's productivity, to reduce perinatal and neonatal mortality rates, to improve medical care, and to minimize the cost of referral.

My research intends to investigate the available ICTs used in health care, not only from the perspectives of the "health givers", but also those of the clients and patients who are benefitting from the services. Access to health care services in Nigeria seems to be poor, as the doctor/patient ratio is unacceptably low, especially when compared to that in developed countries. Furthermore, 70 percent of Nigerians live in the rural areas, where medical services are generally lacking. This study will focus on the use of ICTs in health and disease prevention. Sustainable health promotion programmes in health conscious and medical establishments should ultimately give rise to healthier life styles and should lower the utilization of services and their costs to the providers (Permanente, 1987). The uniqueness of this study is that the focus is not only on the health workers, but also on the publics/users who are benefitting from their services.

Justification of the Study

The ICT revolution in Nigeria is touching many sectors, including banking, education, agriculture, media, marketing, advertising, healthcare, and a host of others. The Federal Government of Nigeria (FGN) devoted a huge amount of resources and financing towards the development of ICTs in its 2012 budget; the budget line for health was in the amount of 282.77 billion Naira (Techloy, 2012). The government has also put various policies into effect, and a

Ministry of Information and Communication Technology, to which I have referred in the discussion on the "ICTs' Policy for Nigeria". Examples of these vast resources include: the adoption of ICTs in education and teaching, which has forced teachers to revolutionize teaching styles in order to meet the new standards (Ojedokun and Owolabi, 2003).

Nigeria is the most populous country in Africa. Its ICT development has been hindered by the country's underdeveloped and unreliable fixed line infrastructure, but this has changed in the last ten years as competition intensifies and new technologies are able to deliver wireless broadband access. More than 400 ISPs have been licensed, as well as a number of data carriers, Internet exchanges and gateway operators (IWS, 2012).The Internet, which provides a wide range of technologies that enable health professionals to communicate between themselves and with the public, may soon be the primary source for an individual searching for health information (Yazin and Ozen, 2011). Nigeria, considering its vastness in terms of natural resources, should be a net consumer of web content, although it has so far made little contribution to the web information pool, especially in the health sector. As in many other fields, the Internet is also present in the medical domain (Ajuwon, 2003). It is pertinent to ask what views the Nigerian health workers and the users of health services have in regard to the potentials that ICTs have had in benefiting health care delivery thus far, and to investigate new and innovative methods for future applications and uses of ICTs in Nigeria.

The field of e-health has made significant advances in a short period of time, demanding a thorough and scientific approach to understanding and evaluating its progress (Mechael et al., 2012). My research will investigate the developments that the new ICT policy (as well as those that were in existence earlier on) has made thus far in the Nigerian health sector. The research will also highlight the perspectives of the users of ICTs. There is a dearth of literature on the role and usage of ICTs in the Nigerian health sector when compared to other sectors, such as Education, Agriculture and the Economy. It is therefore hoped that the findings of this study will stimulate new thinking and an appetite for more studies on the roles that ICTs can play in health care delivery in Nigeria. It will also determine the gaps that may be contributing to the "digital divide." As Roger Harris (2012) concluded, in his paper entitled "ICT Development and Innovation Growth: Opportunities and Issues," which was presented at the APEC Digital

Opportunity Center (ADOC) Workshop 2012 of the Asia-Pacific Economic Cooperation (APEC), which was held in Taipei, Taiwan, from July 10th to 12th, 2012:

> *"Bridging the digital divide is about more than access. It is not what technology you have but what you do with it that counts. There's more potential for future ICT-induced development than has been achieved so far: greater use of the Internet; greater use of other technologies; using them together."*

In the ICT Policy for Nigeria, the government has acknowledged its role as a major employer and user of ICTs. The University College Hospital, Ibadan, Oyo State, is the flagship of Nigerian Medical Education and it is a renowned centre in the African region. I have chosen the University College Hospital as the primary sight of my study because it offers fertile ground for exploring all of the issues relating to the role of ICTs in the delivery of health care in Nigeria. The goal of my study is to review and determine the level of implementation not only of the ICT policies of the Nigerian government and the involvement of other stakeholders, but also to investigate the influence and usage of ICTs in the provision of health services in Nigeria. It will examine the findings in the context of theories on the dimensions of the Digital Divide, Social Shaping and Development Communication. In addition to exploring the ways in which ICTs are being used, and can be used, by Nigerians to enhance healthy living, the study will determine the extent to which these factors have limited the adoption of ICTs by the health workers in their practice. It will also investigate policy debates from the Nigerian government and other stakeholders. To attain quality, value, and performance levels that are acceptable to all, it is essential that both the health workers and the "users" of health services i.e., the clients and patients, are involved in the decision-making process. The study will explore all the issues relevant for a participatory approach and will identify any gaps. It is envisaged that this study will contribute new knowledge on the policies and usage of Information and Communication Technologies (ICTs) in health communications in a developing country.

CHAPTER ONE

Theoretical Framework

1.0 Introduction

In this chapter, I examine studies that have thus far been conducted on the role of ICTs in the health sector, the extent of the Digital Divide and selected and relevant theoretical models of Communications. The theoretical studies on ICTs which have been used to study Information Behaviour are also described. Additionally, I propose a hybrid of two models, based on my literature review, from which I have drawn a specific hypothesis.

Development has been described as a process that is widely participatory in order for social change to occur in a society and it is intended to bring about both social and material advancement that is characterised by freedom, equality and other valued benefits, for the collective majority of the people (Servaes, 2008:14-15; Rogers, 1976). Development Communication aims to seek a common understanding among participants for an initiative that is targeted towards development. These mechanisms are tools to be used to broaden public access with regard to empowerment, reforms, negotiation and, ultimately, a participatory process from the grassroots. (Servaes, 2008: 14-15; World Bank, 2006; UN FAO, 1984).

The tradition of communication research and practice manifested itself around the second half of the 20th century. This was focused on the development of Third World needs, which gave rise to an area which has now become known as Development Communication (Melkote, 1991: 19). Research into development projects was prominent in the 1960s. The works of Melkote (1991: 1), Wilbur Schramm (1964), Frey and Everett Rogers (1969, 1962) and Daniel Lerner (1958) delved extensively into this area. The notion of development is based on earlier concepts of structural human transformation which was more popular in the 1970s (Servaes, 2008: 36). However, the concept's popularity diminished as a result of the idea behind tackling global development. Critics argued that change is a transformational process which is dependent on the people

themselves identifying with crucial needs in order to fulfil them. Scholars, such as Jan Servaes (2008: 80-112), have well documented work on the abundance of the development initiatives that have been funded by various agencies in Africa and worldwide, focusing on the different aspects of development, such as the economy, poverty, education and health care (Servaes 2008: 80).

The process of communication and development for social change involves a process of public and private dialogue through which people come to the realization of their basic needs, of themselves as individuals, and of ways to improve their standard of living. This collective "problem identification strategy" serves as a means to provide specific solutions that are targeted towards various development issues through information and communication technologies (Servaes, 2008:14; CFSC, 2006). The essence of communication and development runs on the concept of sharing information and knowledge. Communication media is therefore also a vital tool in achieving this process and, as such, the tools for communication cannot be effective on their own but must be used in conjunction with interpersonal communication. Over centuries, communication and development concepts have been applied in different areas and in different ways. The relationship and understanding of development communication and the practical application of technologies is achieving positive development outcomes (Servaes, 2008: 26).

Scholars such as Carey (1989) have been intrigued by the question of message delivery and have posed questions on the increased complexity of the communication environment. Studies based on various theories have tried to pinpoint the main role of the power of the media in Development Communication, i.e., to set an agenda for public discourse, influencing public opinion, persuasion and education, cultivating audience perception of a society in a manner that is moulded more by the media context and not the actual statistical reality (McQuail, 1994: 131–132). However, new ICTs have inspired new and more elaborate arguments about the power of the said technologies and the mass media in order to deliver information, to persuade, to effect social change, educate, set

agendas and satisfy audiences. Evidently, having considered all of these aspects, the above scholars have concluded that communication is the maintenance, modification and creation of culture. The institutions of communication, culture and development are all woven together and therefore, it is impossible to think of communication solely as the transmission of information (Melkote, 2001: 106).

1.1 ICT and Health

The field of Communication and Information Technology has ushered in tremendous advancements in the 21st century. These improvements ,which come in the form of digital technologies such as the Internet, have brought about qualitative changes and an elevated standard of living worldwide, in places that range from villages in East Africa to rural and indigenous parts of the Middle East (Servaes, 2008: 31-34).

In addition, significant advances have been made in communication technologies, resulting in an enormous increase in global information flows. Radio and television, which happen to be the earliest forms of ICTs, multiplied exponentially (Servaes 2008: 225-230; Melkote, 2001). With the advent of the Internet, the revolution in homes, work environments, and societies as a whole, resulted from the convergence of three technological inventions – computers, which provide the storage of data, satellites, which can relay the information over vast distances rapidly, and digitization, which converts any form of communication data i.e., pictures, sounds, texts etc., into a binary code that can be readily decoded and delivered to the intended audience.

In the health sector, Information and Communication Technologies (ICTs) are being applied to facilitate the delivery of appropriate health services to the populace (Mechael, 2012: 62-66). Many health agencies, especially in developed countries and, more recently, in many developing countries, are taking advantage of ICTs to provide critical information and services on-line, to automate once cumbersome organizational internal transactions, and to deploy enterprise Internet and web-based information services and databases (Lecky, 2012). With the Internet and the numerous networks within it, the

world has turned into a global village (Glowniak. 1995: 123-131). The health professions have been tremendously affected by the information and telecommunications technology revolution, especially in the areas of information access, storage, retrieval, analysis and dissemination (Asangasi et al., 2008: 1-5). ICTs have been used to manage patients at a distance (telemedicine), to manage hospitals and their patients' records, and to search and retrieve pertinent information for research, and to assist in clinical decision making. In general, clinical practice has been hugely improved by the technological interventions, and a new and rapidly growing field of applications called health (or medical) informatics has emerged (Smith et al., 2009: 395-3973; Asangasi and Aiyetan, 2005: 24-27; Moulin et al., 2005: 191-120; Coiera, 1995: 1381–1386). Similarly, cellular telecommunication networks and mobile phones have reached far more people than any other technology, especially in developing countries (Thirumurthy and Lester, 2012: 390-392). Although Internet use has also increased substantially in recent years, in 2011, 26% of the people in developing countries had Internet access, whereas 79% had mobile or cellular phone subscriptions (ITU, 2011: Issue10).

The landscape of expanded access to modern communication technologies has given rise to the concept of "mobile health" (or m-health, a part of what is commonly referred to as "electronic health" or e-health), which is the use of mobile phones for improving health outcomes. Mobile phones can benefit patients and providers by helping overcome resource limitations on the demand side (Thirumurthy and Lester, 2012: 390-392). However, a research study designed to determine the use of Internet in Imo State, Nigeria, with a view to enlightening societal stakeholders on their implications for development, revealed that reasons for Internet use followed the conventional trends, and these included e-mail, academic/research, leisure, employment and e-commerce (Anumobi and Mbagwu, 2009: 436-442). Similarly, Ajuwon (2003), in a study on computer and Internet use by first year clinical and nursing students in a Nigerian teaching hospital, found that the students had not fully utilized the opportunity that the use of the computer and Internet offer for medical education. Lesley et al. (2004: 25-32) examined the effectiveness of using the Internet to teach consumers about quality health

care, and they compared consumer definitions of quality health care both prior to and following the completion of the Internet experience. The authors concluded that the intervention was effective in increasing consumer knowledge of quality care from pre- to post-test.

The success of information and communications technology applications in health is dependent on the level of computer use by health professionals, especially doctors (Asangasi et al., 2008: 1-5). Bello et al. (2004) investigated the use of ICTs to transform modern health systems in the areas of communication, teaching, the storage and retrieval of medical information among health care professionals and students in a teaching hospital at Ile-Ife, Nigeria. The authors concluded that medicine is an ever evolving and information-based discipline, and, as such, the provision of structured computer and IT training for all members of the health team would equip them with the skills to practice up-to-date and evidenced based medicine, which are essential in improving the quality of medical care.

A good ICT infrastructure, therefore, is a condition of enhancing the well-being of a country. Gates (1999) reported that intra-and inter-organizational networks in some advanced countries function like the digital neural system of the organization. He, therefore opined that communication for health purposes has shifted from the largely manual or documentary method to digital communication. This, he stated, and such access to ICTs, has helped disseminate information to the rest of the world. Gates further cited the practice by physicians in the United States in using ICTs to collaborate, as often and as quickly as they want, with doctors in other parts of the world. Using ICTs in this way is particularly beneficial to health workers in developing countries such as Nigeria, with poor resource settings, as patient's data can be sent electronically to experts in other collaborating centers for prompt and adequate diagnosis. In addition, difficult medical cases and new procedures can be discussed through audio or videoconferencing. Other workers (Olatokun and Adeboyejo, 2009; Eysenbach and Watt, 2002) suggested that health workers can use the Internet to identify research issues, to search literature

databases, to seek information on surveys and clinical trials, and to publish results. ICTs have, and are, contributing to health education, knowledge sharing, statistics gathering and analysis, the delivery of care, and in meeting internationally agreed upon health targets with respect to a number of diseases (UNDP, 2003).

In a survey of four general hospitals, ten primary health-centers and six private facilities in Nigeria, Adeyemi and Ayegboyin (2004) found that none of the institutions had e-mail or web access, and only a small percentage of the workers possessed computers or were computer literate. The production of quality health-care delivery in a country is guided by the level of ICT infrastructure that is possessed and used by that country (Olatokun and Adeboyejo, 2009). Other studies have reported the use of ICTs by some specialists of medicine. Idowu et al. (2003) reported that while ICTs capabilities (personal computers, mobile phones, Internet) were available in Nigerian teaching hospitals, mobile phones were more widely available. Their study also revealed that computers and mobile phones were in use in all the teaching hospitals, but not much Internet connectivity was available. Instead, most health workers depended on the services of cybercafés, and then purely for rudimentary Internet access, such as e-mail. However, the results of a more recent study (Olatokun and Adeboyejo, 2009) which sought to establish the usage of ICTs by Reproductive Health Workers (RHWs) at the University College Hospital (UCH), Ibadan, Nigeria, revealed that these workers made reasonable use of various ICT facilities that were available, including e-mail, access to the World Wide Web, video- and audio conferencing. The authors also found that male respondents used the ICT facilities more often than females, to varying degrees, particularly e-mail, video- and audio conferencing, which gives some credence to the results of previous studies that technology is a male sphere. Even though the adoption of ICTs has a huge impact on the health sector, it would be unwise to assume that the advent of ICTs instantly endorses a new form of digital colonialism, since the impact of ICTs in Africa still seems farfetched (Robins, 2002). There are tremendous challenges inhibiting the diffusion of ICTs in Nigeria, and in Africa as a whole, in the attempt to “get connected” (Ojo, 2006). These obstacles include high illiteracy levels, the spread of poverty, poor leadership and

management, and the absence of basic infrastructure with regard to telecommunication facilities, for example, a scarce and erratic electricity supply. These challenges make the diffusion of ICTs a problematic task.

1.2 The Digital Divide

The contribution that communications play in the development process has been clearly demonstrated. However, there is disparity in access to Information and Communication Technologies (ICTs), which has resulted from differences in class, race, age, culture, geography, or other factors that have affectively deprived certain citizens from participating in the global economy (Kroukamp, 2005). This disparity is known as the Digital Divide. While the Global Digital Divide affects a number of developing nations, it is most evident on the African continent; Africa has the lowest penetration of ICTs per capita in the world (International Development Research Center, 2005). The digital divide is defined by Cullen (2003: 247) as being the metaphor used to describe the perceived disadvantage of those who either are unable or do not choose to make use of ICTs in their daily life. The Digital Divide Network (2004) defines the concept as the gap between those who have access to communication tools, such as the Internet, and those who cannot. The American Library Association (ALA), Office for Information Technology Policy (2000) defines the digital divide as disparities based on economic, status, gender, race, physical abilities and geographic location between those "who have" or "do not have" access to information, the Internet, and other information technologies and services. Mariscal (2005) defines the concept as the gap between individuals, households, business and geographic arrears at different socio-economic levels with regard to both their opportunities to access information technologies and to the use of such technologies for a wide variety of activities.

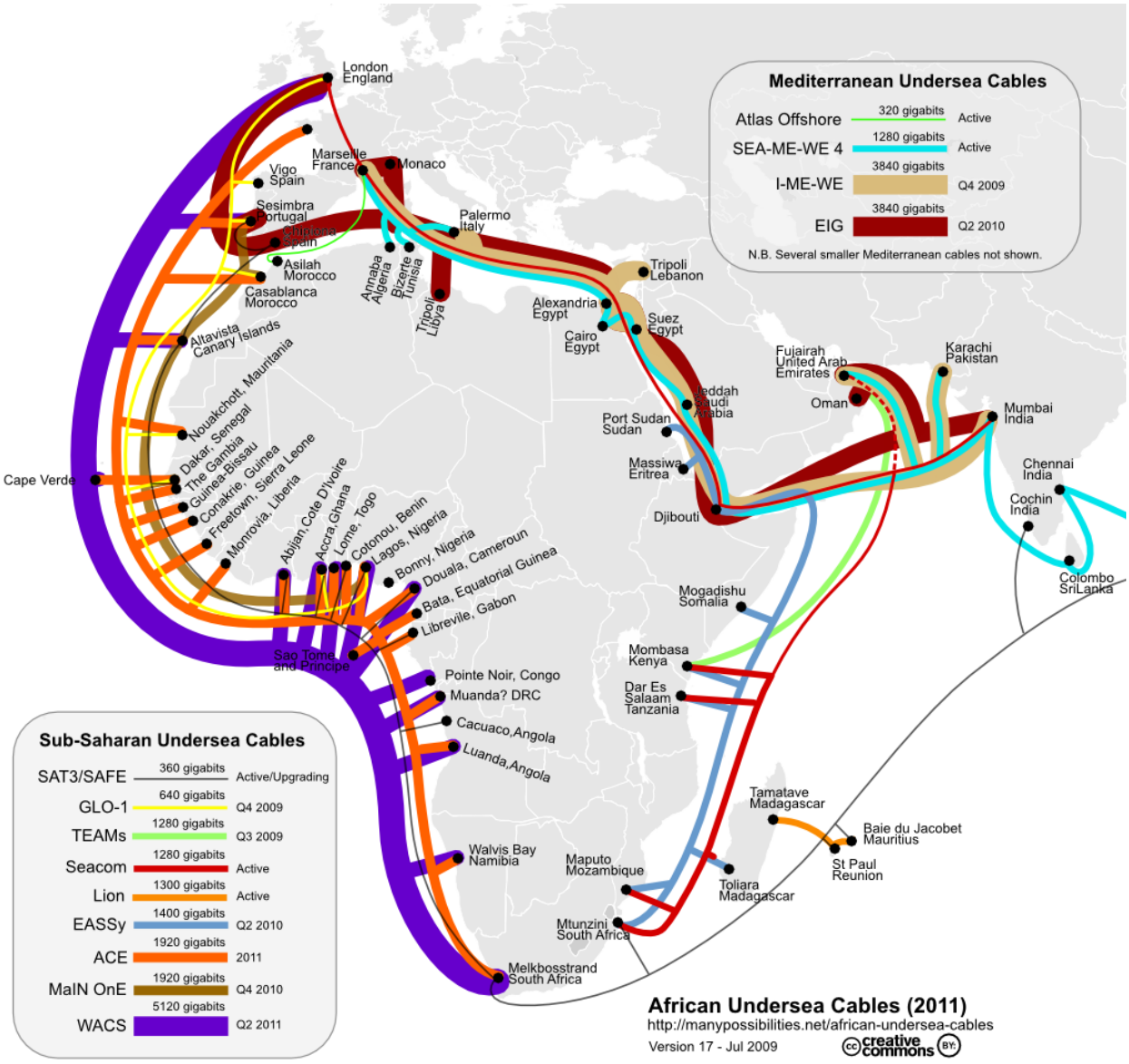
The biggest development in expanding access to information and communication technologies (ICTs) in Africa involves the communications infrastructure. The lack of basic infrastructure is historical in the region, with the percentage of fixed telephone lines being the lowest worldwide having an average of 4 main lines for 100 people (ITU,

2008). This has led to Africa being dubbed "one of the least wired regions in the world" (ITU, 2009). Despite these challenges, efforts are underway to bridge the digital divide in Africa by expanding broadband penetration and building services that leverage the increased connectivity of the African population. Many African governments have prioritized ICTs in their national agendas, appreciating the great impetus and contribution that communications play in the development process. These commitments, together with those of other stakeholders, are in parallel with ITU's comprehensive strategy to bridge the digital divide. Wilson (2006) considers the digital divide from eight main aspects. First, the physical access that describes the access to ICTs and its infrastructure, which are fundamental. Second, is the financial access. The third aspect is the cognitive access, which includes the ICT skills and knowledge needed to use these technologies and to gain benefit from it. Further aspects are design access for usability, content access, and the production access, which are not a necessity but are important for developing their own content and ideas with ICTs, especially on the Internet.

Very important is the institutional access that enables access; and probably the most important one, Wilson's eighth aspect, is political access (Wilson, 2006). Although most African countries (including Rwanda, Tanzania, Ghana, Nigeria and Uganda, to name a few) do not have access to fixed line telephones infrastructure, the picture has changed dramatically in the last decade, and even smaller countries are connected with satellite up-down-link stations, broadband sea-cables, or fiber optic cables (Hagen, 2007). Africa's satellite connectivity has grown dramatically in the last couple of years, but not much has changed in fiber optics that can connect Africa to the rest of the world (Moore, 2009). The map below shows the current undersea cable projects that are already in process.

Some researchers are of the opinion that Africa is experiencing a "developmental divide" between the regional and the industrialized countries, and not necessarily a "digital divide" (Idowu, 2008; Ojo, 2006; Adomi, 2004). Hope is assured when ICTs in the

Figure 1.1: African Undersea Cables (2011)



Source: http://manypossibilities.net/african-undersea-cables [Accessed 13/08/2012]

{The thickness of the drawn lines indicates the bandwidth planned for single projects. The projects try to connect the West coast with higher bandwidth, and the East coast will be connected with undersea-cables for the first time (Moore, 2009).

African health sector are in line with the cultural values of the people and are thus further integrated into the design and implementation of these technologies. ICTs should not be seen merely as being the solution that will eradicate the problems within Sub-Saharan Africa, but, rather, as a means of infinite development (Ojo, 2006). The gaps in ICT usage in the Nigerian health care systems are poverty and isolation. This covers both rural and urban areas. In 2000, it was recorded that 15 cities were operational for Internet usage and access; unfortunately, 70% of Nigeria's population are concentrated in the rural areas and villages. Most of Nigeria's disease burden is due to preventable diseases. The maternal mortality rate (about one mother's death in every one hundred deliveries) is one of the highest in the world. The under-5 mortality rate and the adult mortality rates are higher than the average for sub-Saharan Africa (NDHS, 2013).

The majority of people live in low income countries and are highly dependent upon technology to help to solve the pressing problems of poverty and, as such, technology has been seen as a means for appropriate change and increase benefits (Harris, 2002). Mark Pagel (2012), in the "Wired for Culture" series, published an article in the *Daily Beast* which strongly suggests otherwise, by inherently stating that the culture to which human beings presently belong fills us with a peculiar inventory that shapes our mandates and determines our expectations, further stating that the basic texture of our inner lives is sewn by cultural threads. The Internet serves as a means to enable the emergence of new mechanisms which are shaped by, and which also shape, the development of communication. New technologies, such as the ICTs, serve to expand reciprocal and non-reciprocal communication (Slevin, 2000). Technological determinists argue that scientific progression inevitably induces change, while social/cultural determinists counter that change is effected through bureaucracy, stake holders and government forces (Green 2001). With the progress of Information Communication Technologies, aging societies are being provided with new and interesting opportunities for more accessible and universal health care services (Haux et al., 2008: 77).

1.3 Communication, Development and Empowerment

The view of development communication reflects varied underlying thoughts, which are communication, development and empowerment (Melkote, 2003: 105). Scholars, such as Jan Servaes (1992, 2008), tend to be split on the issue of communication as an organized delivery system, or of communication being viewed more broadly as an inseparable part of culture and of all facets of social change. This orientation rests in certain assumptions that are consistent with certain perspectives on development, empowerment and development communication (Melkote, 2001).

Scholars, such as Melkote (2001, 2003), who have viewed communication as a process of message delivery, also invariably view development as a process of modernization through the delivery and insertion of technologies and of analysing different values, attitudes and behaviours within a population. Communication and information have assisted in the modernization process and are also known as a crucial part of the dominant paradigm (Mody, 2000: 185-196).

The focus on empowerment had direct consequences for the agenda of development communications. Scholars, such as Servaes (2008: 206-262) and Melkote (2001:35-37), argue that the delivery of information, combined with technological innovations, will prove to be inadequate. Empowerment requires more than just the diffusion of an innovation and information delivery but also has the need for development communicators to embrace the grassroots organizations of marginalized groups in order to produce social change. Other scholars have suggested a different route in redefining and operationalizing development communication. The idea that development is supposed to be freedom from oppression and personal communal empowerment means that development communication, in its totality, should support these goals. As such development communication is not merely the exchange of messages, but is rather "emancipatory communication" that will allow people the opportunity to determine their own paths and future, it must be participatory. Aside from the various thoughts and differences between communication and development, the idea of development

communication has become strategic over the years, given the convergence of mass communication and the existing information technologies. It is imperative to base newer with existing approaches and principles in relation to their relevance. Development Communication can thus simply be defined as the study of social change that is brought about by the application of communication theories (and technologies) in order to bring about development (Rogers 1976: 213-214).

1.4 Models of Development Communication

The adoption of e-Health has been rather slow in the developing world. Rudowski (2003: 219-221) remarked that a low diffusion of ICTs in healthcare in any given country is an indicator of obstacles to e-health's development. Innovation in health service delivery has been defined as being a novel set of behaviours and ways of working that are targeted towards improving health outcomes, cost effectiveness, administrative efficiency and user experience, which are implemented and planned by coordinated actions (Greenhalgh et al., 2004: 581-629). It is imperative to distinguish among the key variables in the diffusion of an innovation, i.e., the diffusion (passive spread), dissemination (an active and planned effort to persuade target groups towards adopting an innovation; implementation (the active and planned effort of making an innovation mainstream within an organization), and sustainability (the routine use of an innovation until it becomes obsolete). However, if innovations in an organization are adequately maintained and sustained, it is unlikely that employees will be open to new innovations (Greenhalgh et al., 2004: 581-629). In light of this development, it can be observed in Castells's "Key Contemporary Thinkers" (2007), that the conception of the role of ICTs in social change is crucial to the constitution of a society.

1.4.1 The Diffusion of Innovation Model

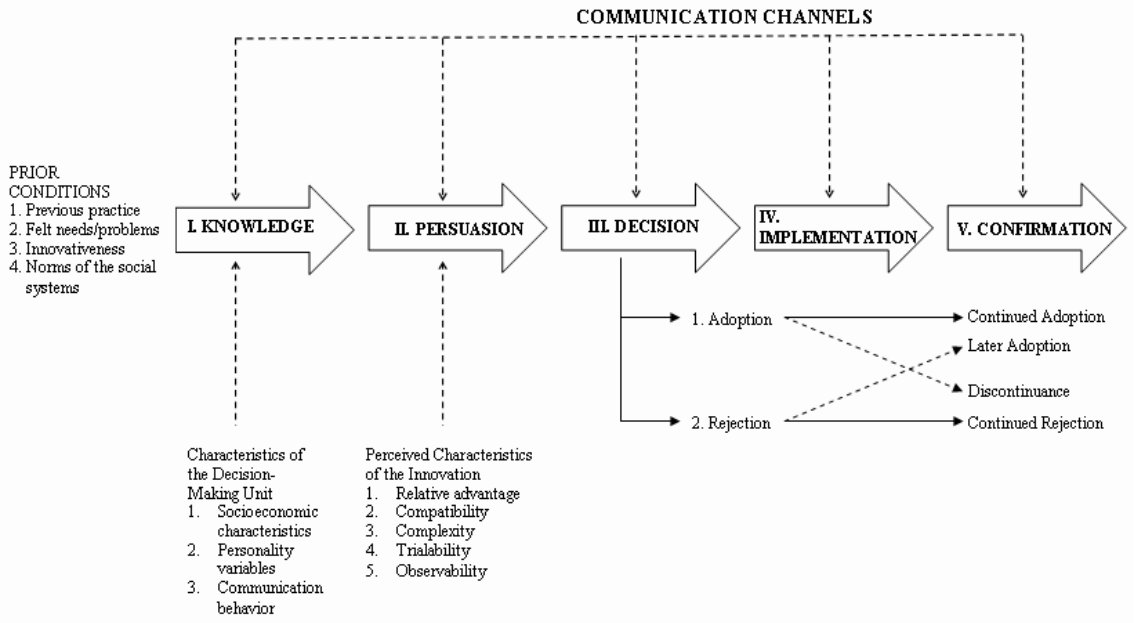
Technology has always played an important role in Castells' analysis. His assessment of technology as being part of a social dynamic has been predominant in the last two decades and, as such, it has become impossible not to take note of the "technization" of all aspects of life, especially in the area of medical technology (Stadler, 2007: 20).

Addressing these blurring boundaries has given rise to new domains of inquires among scholars, which include Rural Sociology - an area for which Everett Rogers (1995) first developed the concept of "The Diffusion of Innovations." In 2003 (172), Rogers described the innovation-decision process as "an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation." The innovation-decision process involves five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. These stages typically follow each other in a time-ordered manner. This process is shown in the Figure 1.2 below.

When theoretically applied to health care, the term was seen as being Medical Sociology - with similar concepts applied to health care practitioners' clinical behaviour. An example of this would be the 1966 study by Coleman, Katz and Menzel on the spread of prescribing newly introduced antibiotics. These early studies in Medical Sociology as an adoption of innovation, set the ground work for the network analysis of the concepts of "who knows whom" and "who imitates whom", which ultimately led to the conclusion that individuals who are better educated and have a higher social status are earlier adopters of innovations (Burt, 1973: 125-144, Achimugu et.al., 2010: 25-34).

Scholars of communication and development, such as Daniel Lerner (1956: 43) and Everett Rogers (1962: 39-41, 78), have created models which have been consistent with development goals and contexts. The Linear Approach by Lerner, in Grunig and Hunt (1984), and The Diffusion of Innovations model, advocated by Everett Rogers (1995), are the earliest forms of the communication models that existed. The linear process suggests that a message is sent via a channel/medium and a response is received. This response is known as feedback. The Diffusion of Innovations emphasizes the ability of the mass media (and the opinion leaders) to create knowledge of ideas and persuade the target to adopt exogenously introduced innovations (technologies).

Figure 1.2: Diffusion of Innovation Model



` Source: Diffusion of Innovations, Fifth Edition, by Everett M. Rogers (2003)

Given the volume of messages transmitted by the mass media and by broader forms of media through the use of various forms of technology, early theorists, such as McQuail (1994: 131–132), agreed that mass media through the use of ICTs has considerable power to inform and influence.

More emphasis was placed on the spread, the direction of the message and on altering key variables, such as the channel, the nature of exposure and the message style (Melkote, 2003: 112; Rogers and Kincaid, 1981: 382). As a result of more recent research into health care, technology and development, some of the past conceptual models seemed inadequate and, as a result, development studies seemed more invested in the spread of an innovation that was based on the technological, ideological and social value which might induce social change. A more refined introduction to this concept was health promotion, which described innovations for a healthy lifestyle and this conceptualization fostered many promotional programmes for target groups (Potvin et al., 2003: 1295-

1305). Ultimately, this shed light on evidence-based medicine, and medical researchers subsequently recognized that the implementation of these ideas requires change in the linear systems and approaches (Grimshaw et al., 2004: 1-84).

1.4.2 The Top-Down Approach

In the early days of development, extension services happened to be the main mode of persuasion in relation to improved standards of living. This seemed to be the most logical form of information dissemination to receivers. Scholars, such as Everett Rogers, had tremendous influence on this study by pointing out that the extension agent would be classified as an "innovator" and also had the responsibility to decide what trend was suitable for adoption, and this was followed by awareness campaigns to further persuade individuals regarding their choice. However, soon after this discovery, it became more obvious that the collection and conveyance of information was not enough to have an impact on adoption and this gave rise to the idea of change agents - an influential individual who dominates the process of adoption (Rogers, 1962; Melkote, 2003: 109). This phenomenon gave rise to the one-way flow of information in the order of a persuasive message – reaching the change agent - passed along to the peasantry/community (which is at the end of the information chain). This notion was what coined the term a "top-down" approach to communication (Melkote, 2003: 109-118). By this effect, the innovation would trickle down into the community and, over time, it would be diffused across a social system (Melkote, 1991; 2003: 111). As the name suggests, the information trickles down, starting from the influencer, who retained the notion that the community was rational enough to see the benefits of the chosen innovation. The disadvantage of this approach to communication is the general lack of ability in individuals to make rational decisions without being consciously influenced.

This approach had various flaws, such as its heavy reliance upon face-to-face communication and application in rural communities. The inhabitants of the community greatly outnumber the pool of adopters, and the lack of geographical cover was also a major issue. This, however, showed that the top-down approach was highly dependent on

proximity and it exposed the desperate need for a multiplier, which introduced one of the earliest forms of electronic communication, i.e., the transistor radio, which also marked the passing of a traditional society into a modern society. Lener concluded that the role of economic expansion may be equivalent to developments in all areas. Schramm followed suit, with the belief that the co-existence of literacy and mass media was a powerful catalyst for breaking away from the traditional and for embracing the modern. Hoping that the media would stimulate interest in the change agent whose message would consist of persuasive antidotes that would produce an acceptable information climate, in which the early adopter would be trained with the necessary skills and serve as a role model. By this effect, the innovation would trickle down into the community and, over time, it would diffuse across a social system (Melkote, 2001: 107).

Occasionally, the 2 Step Flow is confused with the Top Down Flow. This usually involved an informal social set of relations who significantly influenced how people selected content from the media. The major channels from which the information flowed were the newspaper and the radio to an opinion leader, and from that person to more inactive societal groups (Suresh, 2003). The informal groups have a degree of influence that is capable of moulding how selected media content is chosen. The top down approach argued that the information would trickle down from a change influencer eventually, which seemed time consuming and cost-ineffective, whereas the 2 Step Flow allowed for the option of media sources, such as the newspaper and one of the first forms of ICTs – radio, and, more importantly, freedom of choice and a faster way to disseminate information.

1.4.3 The Bottom-up Approach

In today's world, having access to information and knowledge is imperative for the advancement of economic and social well-being (Fors, 2002: 201-206). Incorporating ICT strategies using the bottom-up approach at first seemed tricky, as this was a design of western origin with no immediate concern for user needs outside of the cultural and economic context. This is why the implementation of ICT strategies has, over time,

favoured a top-down approach. As a result of the design of the bottom-up approach, three main elements were identified - basic needs, empowerment and rural based development. Development Communication has always presented the unique challenge of understanding these key concepts and the ways in which they contrast with their various users (Melkote, 2003: 105-111). As the nature of society has changed, it can be argued that knowledge and information have become basic needs in a knowledge-oriented society, which clearly leaves ICT's at the helm of social change. There is no doubt that the function of ICTs is to provide and disseminate information. This strong link indicates the key principles and similarities between the use of ICTs and the bottom-up approach. The effect of ICTs in development not only has the capability to disseminate information but also serves as a crucial tool in empowering people for rural based development.

1.4.4 The Alternative paradigm

The Alternative paradigm views development as a process that provides society with access to appropriate and sustainable opportunities to improve their standards of living as a community reference (Melkote, 2003: 109). The participatory approach to communication and development has gained support over the past 20 years. The operationalization of the participatory approach ranges from a number of factors that are reflected in the dominant paradigm. Participation, as a basic human right, should be accepted and supported as an end in itself, and not as a result (Melkote, 2003: 109; Diaz 1989). Although the participatory approach stresses equal cooperation between people and experts, that has not always been the case, and the true empowerment of the people has not really been reflected. Instead, some of the indicators of the dominant paradigm have been revealed, and even though participatory communication has been distinctly encouraged, the control is still with experts and authorities.

1.4.5 The social marketing approach

This approach was introduced as a result of the inadequacy of the diffusion theory to stand on its own. This was quite reflective of the inability of the diffusion theory to account for feedback, which is highly imperative for the success of a campaign and, for

this reason, communication efforts have increasingly turned to science-based commercial strategies. These challenges make the diffusion of ICTs a problematic task. Rogers (2004: 21-34) observed that "The rate of diffusion of a communication technology is dependent on at least in part, infrastructure -- such as mass literacy in the case of printing and wide spread computer accessibility in the case of the Internet". The onus is therefore on the government to develop partnerships with international developmental agencies and civil society groups to work on ICT projects, which should all be done without abandoning social needs, such as education, energy and healthcare (Ojo, 2006). Soniake (2004: 41–61) has maintained that the combination of basic needs and the development of ICTs should be characterized by simultaneous investment in a society's basics and long term needs in the provision of infrastructure for wider information access. Jensen (2001: 77-112) has also stated that "the cost of access is seen as a primary problem associated with the lack of ICT infrastructure". ICT skills training, human development and the improvement of local expertise will enable a new generation to utilize ICTs and advance development goals (Adeya and Coburn, 2001: 77–112).

The incorporation of science-based commercial strategies proved to be sufficient for a brief period when models for health-related activities, such as HIV awareness in the third world, showed similar stereotypes in the source to receiver dynamic and, as such, the top-down approach was adopted with the hope that autonomous adoption would take place. The assumption was that knowledge seemed to be the missing link; this emphasized the challenge of changes in values and of what constitutes knowledge. This brought about several new concepts in the dissemination of ideas and the incorporation of an approach that was more people-based, in order to produce social change. Although the mass media are essential for the spread of information and the awareness of new possibilities and practices, they are not as effective in the design-making stage of adoption, i.e., "to adopt" or "not to adopt," and in this situation, personal communication is far more likely to have a lasting effect on social behavior (Servaes, 2008: 20).

Newer perspectives on development communication still suggest that personal influence is key to social change, which is still a limited view. Scholars have argued that diffusion is vertical, and for that reason it is characterized as a one-way flow of information and that active involvement in communication is essential in order to enhance change and development.

1.5 Existing Debates: Traditional versus Modernity

Many countries have employed different strategies and theories, some of which have failed to yield results and, as such, newer theories have emerged and these concepts have redefined development over time. The works of scholars such as Schramm (1964), Lerner (1958) and Rogers (1969), have been geared towards development communication and social change, although some of the studies carried out have been critiqued as being narrow minded and out of sync with development practitioners. Everett Rogers (1962) went a step further, and gathered research information based on how an innovation was communicated via the mass media, as well as extension agents, such as opinion leaders. The progression of the third world concerns, theories and concepts at that time summarized the transition from the traditional to the modern which, in turn, brought forth a host of concepts for development.

The basic earlier, yet linear, approaches suggested that traditional societies were mainly comprised of small rural communities where people had strong close knit relationships and a strong bond of solidarity. Eventually, societies began to change and now comprise of interpersonal relationships which happen to be impersonal, and in which traditional and shared values no longer have a dominant influence. However, this observation served as a tool for diagnosing social change in different societies, particularly in the contrast between developed and developing nations (Sparks, 2007: 25). Schramm (1964: 114) duly noted that the overall summary would be the reassessment of old commitments which are broken down, and having people become familiar with new patterns of behaviour and social change. The recognition of this modern outlook would be the fuel for social change and development. The use of the mass media was highly influential in

the pedagogy of thought that moved towards participation and which sought to familiarise society with a modern mind set and new concepts (Sparks 2007: 25-41).

1.6 ICT in Communication: Other arguments, texts and scholars

Communication has been described as the maintenance, modification and creation of culture, and therefore these terms are inseparable. (Melkote, 2001: 106). This statement suggests that the process and institutions of communication, culture and development are interwoven. These days, communication cannot be singled out purely as being a process of message transmission. Scholars have concluded that communication enforces hegemonic values and priorities within a society. The term ICTs is rarely defined in most of the relevant literature and the vagueness and inconsistency of this has made it difficult to compare with other studies (Martinez et al., 2002). ICTs have always played a huge role in Castells' analysis of the prominence and assessment of information technologies as part of a social dynamic. Scholars have argued that the new technologies concentrate more on the user experience and have been adopted into the very structure of how people relate with one another and with the world at large (Stalder, 2007: 20). ICTs have made changes to the way people communicate through the creation of various channels which have, in turn, changed the dynamic, based on the combination and characteristics of these ICTs i.e., telemedicine, video conferencing, etc. In today's society, having access to knowledge and information plays a vital role in social wellbeing (Fors and Mureno, 2002: 198 – 206).

The improvement of information's speed and access has enhanced the level and amount of information which can be circulated, and which can be stored at a lower cost with more efficiency. However, research has proven that the use of ICTs in communication is more predominant in high income countries than in low income ones. The exclusion of users in such countries has raised the issue of the digital divide (DFID, 2000). In an attempt to close this gap, NGOs, organizations, such as the United Nations and universities, are working hand in hand to make ICTs in communication main stream so as to further development. The use of Information and Communication Technologies to

develop programmes and initiate social change is not a new concept. By the year 2000, the United Nations (UN) and the G8 summit group of industrialised countries flagged ICTD as being one of the global development priorities (Pannu et. al., 2010: 3-10). ICTs have emerged over the years as a key factor at both the macro and micro levels in globalization. The use of the Internet, mobile phones and other forms of ICTs has significantly changed communication patterns worldwide, so much so that they have been identified as being the mind tool for the future (Pannu et al., 2010: 3-10). This rapidly evolving phenomenon of ICTs has been an enabler of other areas for development in communication, such as poverty alleviation, policies, government and, more importantly, health care. The revolutionary potential of ICTs has contributed to the following: empowering citizens and communities, instantaneous connections to vast resources, networks and individuals, across vast geographical distances.

Although all of these amount to an added advantage, the important issue is in raising the awareness of ICTs overall. Against the advantages and the backdrop of all of the benefits of ICTs and an enabled ICT society, there is still a sobering statistic: that a third of the world's population has no access to the Internet (UNDP et al., 2001). This illustration is merely an aspect of the digital divide, i.e., the incapacity of a huge portion of the world's population to access and effectively use ICTs, given all the advantages that they enable in order to achieve strides forward in development.

Other scholars have introduced thoughts that affect the use of the media in communication. Blumler and Katz's (1974) 'Uses and Gratification Theory' suggests that media users play an active role in choosing and using the media. The uses and gratifications theory takes a more humanistic approach in considering media use. Blumler and Katz believe that there is not just one way in which the populace uses media. Instead, they believe there are as many reasons for using the media, as there are media users. According to the theory, media consumers have a free will when deciding how they will use the media and how it will affect them. Users take an active part in the communication process and are goal oriented in their media use. This simply suggests that a media user

seeks out a media source that best fulfils the needs of the user. Uses and gratifications theory assumes that the user has alternate choices when attempting to satisfy their needs. This ties in very well with Maslow's well known hierarchy of needs (McLeod, 2007). The earliest and most widespread version of Maslow's (1943, 1954) *hierarchy of needs* includes five motivational needs, which are often depicted as hierarchical levels within a pyramid (Figure 1.3).

Maslow (1943) stated that people are motivated to achieve certain needs. When one need is fulfilled, a person seeks to fulfil the next one, and so on. The Diffusion of Innovation theory, by Everett Rogers, ties in very well with the hierarchy of needs, since one of its key themes, i.e., Self-actualization- a feeling of purpose in exploring something new, is a major motivator for influential groups to decide which media best satisfy their needs. This has an advantage for the quicker spread of an innovation.

Figure 1.3: Maslow's Hierarchy of Needs

Source: Peter Linder (2015 April). http://www.ericsson.com/thinkingahead/the-networked-society-blog/2015/04/29/maslows-hierarchy-of-needs-applied-to-distributed-cloud-data-centers/ Accessed January 23rd, 2015.

1.7 How ICTs can be linked to health

The debate on the usefulness of ICTs in communication and development is an on-going one (Servaes, 2008: 41; Melkote, 2001). The focus seems to be more on tracking systems, maps, hurricanes and, most especially, military purposes. The aspects which involve development are often neglected, such as the engagement with policy implications that are supportive of ICTs and development. However, the fields of health and medicine have proven to have made extensive use of ICTs, specifically, of the Internet, which has been a crucial part of the inception of their use in these fields. Indisputably, telemedicine consists of a range of immediate and practical benefits. It is well documented that developing countries experience a lack of up-to-date medical information and training books, and they are often faced with out-dated materials, or the latest information on health and disease prevention simply do not even exist in these countries. A better form of access can enable long distance consultations and training which, in turn, automatically improves the quality of health care. However, these technologies are not a substitute for primary health care personnel and infrastructure, such as clean water and equipment (Fors, 2003: 201-206).

Many communications practitioners hope that the greatest understanding of health and development needs can be achieved through combining a series of frameworks in order to enhance development in health care, as well as economic growth (Servaes, 2008: 74). Communication is crucial to the gathering, informing, educating and persuading of individuals, in order to manage social change effectively (Moody, 2003). With regard to health development, communication must, in most cases, be strategic. Communications professionals, representatives of the UN, and academics, have met periodically in the last decade to reach a consensus on the area of ICTs and development. The conclusion has been that communication is imperative to the issue of development. especially with the advent of new ICTs that are led by the Internet, Computers and the web of information, which are difficult to classify at times due to the overlapping frameworks. A classic example of the usefulness of ICTs in health care is the role of ICT4D and, more specifically, some of their recent campaigns for satellite computers to control river

blindness in Africa. However, there are people who still question the involvement of ICTs, rather than having actual live clinics and medicines. Some communication scholars have argued that ICTs tend to neglect the engagement of development policies and serve as a substitute for meeting basic needs, such as education and distance learning (Servaes, 2008: 95-101).

1.8 Defining Technology and ICTs in this study

In this chapter, I want to define the concept of Information Communication Technologies (ICTs) in my area of research. New technologies also known as ICTs (Rogers, 1986). are especially important in modernizing a developing or an already modern society. It transcends the idea of being merely hardware and equipment. It is a series of organizational structures and social values from which individuals gather, process and exchange information with other individuals. Certain communication technologies go back centuries, such as mass media technology that is designed with the potential to meet mass audiences, such as talking drums, pictographs and radios, etc.

The word technology is derived from the Latin root “texere”, which means to weave or construct. The perception of technology should therefore not be limited to just machines, even though this narrower meaning is implied in the everyday spoken word. Rogers (1983) defined technology as a design for instrumental action that reduces the uncertainty in the cause-effect relationships that are involved in achieving a desired outcome. This notion suggests that technology is comprised of various elements, which usually consist of the hardware aspect (the constitution of material and physical aspects) and the software aspect (that is, the information base for the software). However, because of the visible nature of hardware, i.e., computers, conductors, televisions, we often think of technology in the most linear terms, which is much more than just an isolated autonomous force (Slack, 1984).

The transfer and the exchange of information make ICTs extend past the human senses of sight, taste, touch, smell and hearing, because they allow individuals to reach out through

space and time (McLuhan, 1985). ICTs provide a window on the world, and so distant events and information are closer to human beings because of the direct access through global computer networks, which provide a variety of information and communication filters and facilities through interconnected networks with standardized protocols - also known as the Internet (Slevin, 2001). The term Internet is often used for a specific type of ICTs, any device used for the global network or computer networks that are based on IP/TCP protocols. The category of the Internet/ICTs is not one specific network, but a phenomenon of the interconnection of knowledge-based technologies and network based systems (Fuchs, 2007). For the purpose of this enquiry, ICTs should be seen and defined as a collection of interconnected systems comprising of various mechanisms and relationships that should positively foster delivery and access to health care. These will include the use of computers, Internet, radio, television, mobile phones, smart phones, General Pocket Radio Service (GPRS), Personal Data Assistants (PDAs), Telemedicine, and other appliances that can be used to provide access to health care delivery.

ICTs have significantly altered the nature and impact of work and organizational structures in the health care industry. The use of text-based and synchronous technologies, such as emails and mobile technology, mentioned above, have become ubiquitous social tools for many people, especially the younger generation – in fact, they have been dubbed "Generation Text" (Lin et al., 2007). Email based instant messages (IMs) and short messaging services (SMS) have become a huge phenomenon. There are also forums and online chat rooms covering various topics, such as health care, the economy and politics, where people engage in multiple conversations, either one-to-one, or in a group, to converse on various topics. Some of these online sites have also incorporated graphic social environments, thus making it easier to communicate. This widespread adoption of ICTs in the form of SMS, chat forums, IM, suggests that these social interaction technologies are useful and with the motive of gaining information for gratification. This was earlier expressed in the "Uses and Gratification Theory" (Blumler and Katz, 1974), which is an audience-centred approach to communication based on ICT usage.

Traditionally, there has been extensive research on the role of ICTs in health care delivery from the supply side, i.e., the services that are required of health care workers, the tools needed for teaching, training and working, and not on the demand side, which are the end users, who are the patients and other client groups. Studies from the 2008 Ghana Health Survey Demography, examined the effects of women's access to ICTs for maternal health. The variables employed were contraception provision and use, antenatal care, and place of delivery. This proved that the use of ICTs was both positive and significant, especially with the use of mobile technology, radio awareness campaigns and televisions. ICTs have the capacity to influence the diffusion and demand for information (Abekah-Nkrumah et al., 2014). Health programmes in developing countries have focused on child survival initiatives through preventive maternal health services, based on evidence that shows that the utilization of ICTs for health services resulted in substantial improvements in outcomes (Elo, 1992). In a review of various health care implementations and evaluations, Blaya et al. (2010) concluded that the greatest potential that health care could possibly have would be improved communications between the provider and the seeker of health services through support, medication ordering, management and patient monitoring for improved health care and regimens. It is pertinent to acknowledge that the end users' perspective is beginning to receive consideration in the developed world; however, there is limited literature on the developing world especially sub-Saharan Africa (Abekah-Nkrumah et al., 2014).

1.9 Limitations of ICTs and their political and economic connotations

The usage of ICTs in many fields has been written about by many scholars, such as Leila Green (2001) and Eric Hirsch (2003). There is also a wealth of information available on the Internet. Most of the scenarios relating to technology and social change have fallen into two areas, which are the positive and negative impacts of ICTs on the health, economic and political environments. In most cases, ICTs are seen to improve standards of living and bring about positive social change, allowing economic growth, etc. However, ICTs have also received opposing views, such as phishing schemes and fraud, to say the least. In addition, the scarcity of equipment, products and infrastructure have

been a problem in some regions of the world. The Digital Divide is a concept that directly relates to international social change and it is an idea that is built on the premise that the wealthier, more educated and more privileged a society is, the easier it is for them to gain access to computers and the Internet. This has been particularly reflected in developing countries, where the use of ICTs is limited by a number of factors, such as poor infrastructure, funding, attitudes and inadequate government policies. For ICTs to have any effect at all, they need to be contextualized as part of a social system (Lin et al., 2007). ICTs and/or the Internet on its own, cannot account for human behaviour, however, it can act as an agent - depending on the usage.

1.10 Role of ICTs in legitimizing neo-liberal and privatized healthcare across the globe

Globalization is constantly impacting on the use of new media/ICTs and health care. The International Monetary Fund (IMF) has defined globalization as the rapid integration of economies worldwide, through the use of trade, financial flows, technology spill over, information networks and cross cultural currents (Lievrouw et al., 2006; IMF, 1997). The renowned economic theorist, Karl Marx, argued that capitalism possesses a structural tendency towards globalization as the need is set out to constantly expand markets. However, the bourgeoisie exploit these markets, which alter production and consumption in every country (Marx, 1969). Neoliberalism, on the other hand, is a term associated with the 20th century resurgence of ideas relating to economic liberation, such as privatization, free-trade and deregulation, etc., with the aim of reducing government spending to encourage the role of the private sector. The idea seeks to provide developmental alternatives.

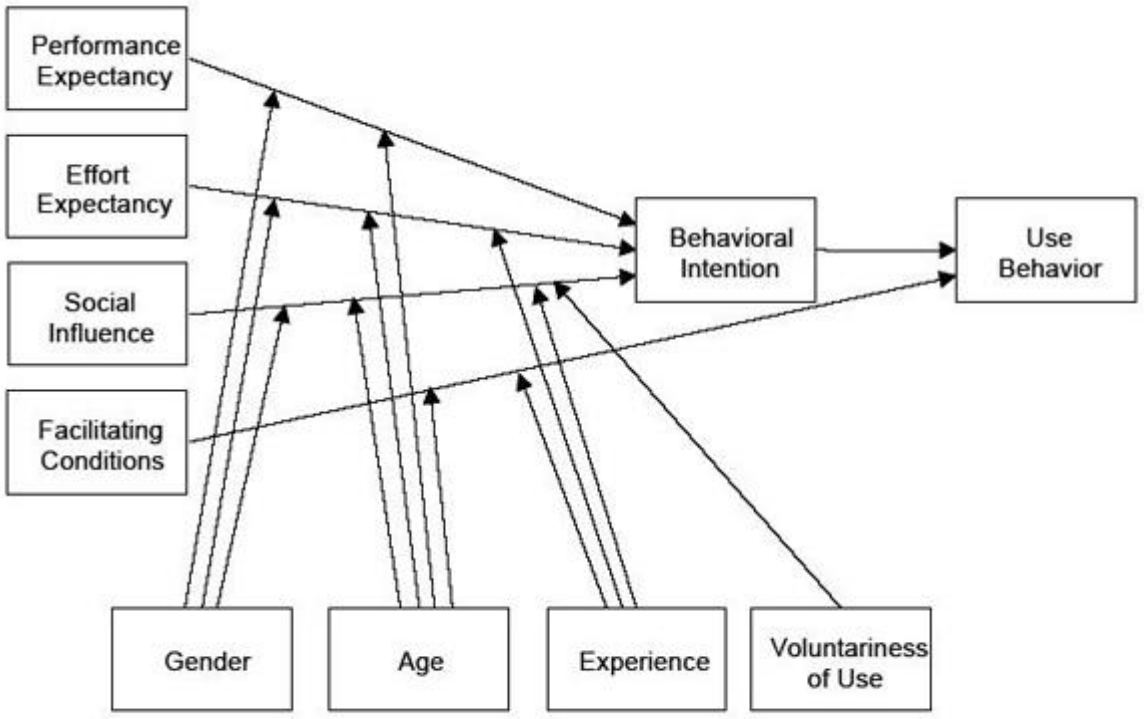
A number of nations have gone through many changes in health care financing and funding where the neoliberal philosophy resonates and is dictated by policy makers and members of the private sector (McGregor, 2001). Social policy has been defined as a means by which a society protects human life and dignity. Health care is considered to be one of societies' three pillars of social policy, along with education and welfare. A health

care policy is therefore comprised of the decisions a government takes with regard to cost accessibility, delivery, affordability, quality and the evaluation of programmes that are usually funded by taxation, designed to enhance the physical wellbeing of all members of the population, with an emphasis on the elderly and children. A country's health status is reflective of the health policy that has been put in place. The reforms taking place in the health care system, such as domestic policies, are now compelled to take into account factors such as funding, design, implementation and neoliberal mind-set/attitude shaping. The mechanism of delivery in the public health system is significantly different from the approach of the private health sector, based on issues such as capitalism and, predominantly, the free-market for profit system (McGregor, 2001).

1.11 Unified theory of acceptance and use of technology (UTAUT)

The UTAUT is a technology acceptance model that is formulated by leading technology researchers and published in the September 2003 edition of MIS Quarterly (Schapel and Pervan, 2004: 736; Venkatesh et al., 2003: 425 – 478). The model aims to explain user intentions to use an information system. and the subsequent usage behaviour. The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour. These are: the theory of reason action, the Technology Acceptance Model (TAM), the theory of planned behaviour, s combined theory of the planned behaviour and technology acceptance models, and the model of personal computer use. The others are the diffusion of innovations theory and social cognitive theory. The theory stipulates that four key constructs impact on usage intention, behaviour and use behaviour. These constructs are performance expectancy, effort expectancy, social influence and facilitating conditions. Gender, age, experience, and the voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behaviour (Figure 1.3 below).

Figure1.3: Unified Theory of Acceptance and Use of Technology (UTAUT)



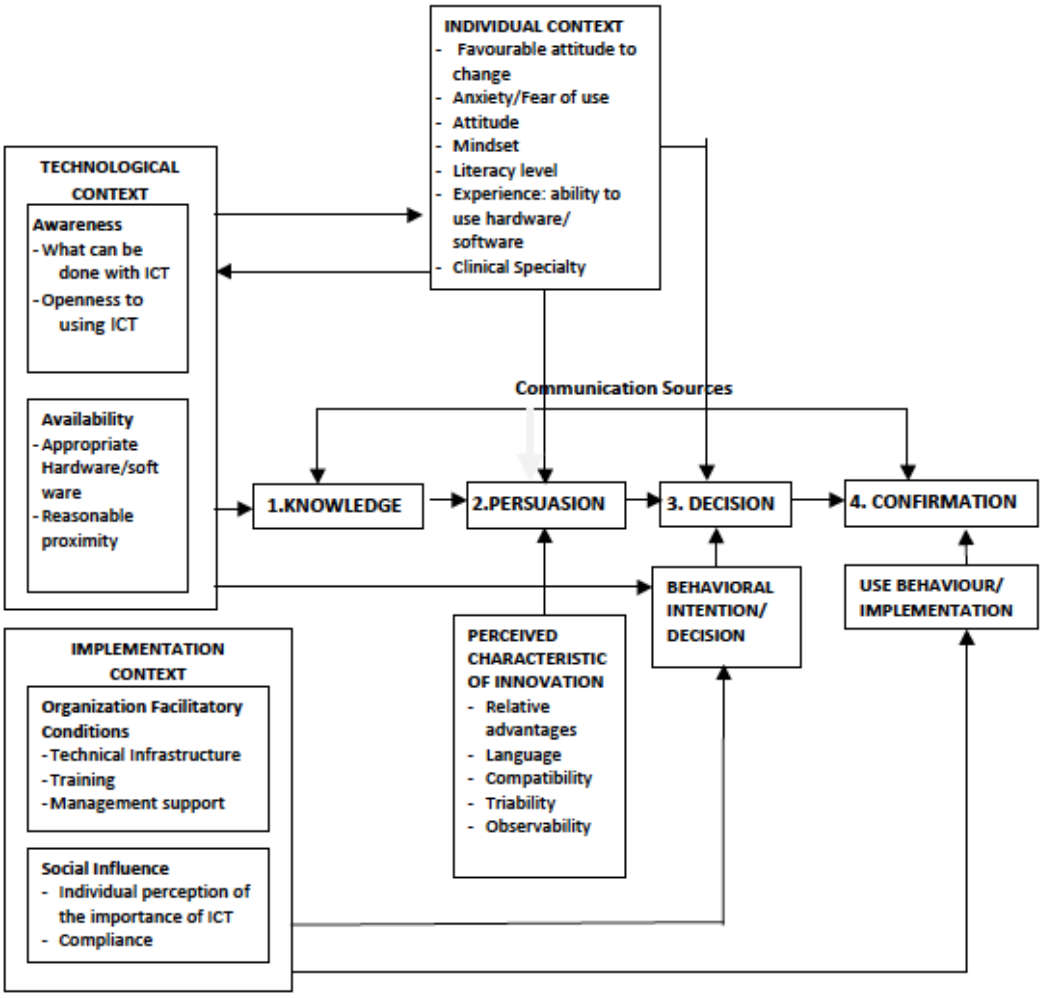
Source: Venkatesh, V., Morris, M.G., Davis, F.D., and Davis, G.B. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, 27, 2003: 425-478.

Subsequent validation by Venkatesh et al. (2003: 425 – 478) of UTAUT, in a longitudinal study, found it accounted for 70% of the variance in behavioural intention and about 50 percent in actual use, impact usage intention, behaviour and use behaviour.

1.12 Theoretical Research Model and Hypotheses

The adoption of ICTs in an organization and/or in a society can be driven by many factors. However, technology adoption consists of consecutive stages that ultimately lead to its use or its rejection. My theoretical model is a hybrid of the Diffusion of Innovation Model of Rogers (1995), and the Unified Theory of Acceptance and the Use of

Figure 1.4: Research Theoretical Model



Technology (UTAUT). Both theories can provide important insights into the factors influencing technology transfer in developing countries. All the consecutive stages of the Diffusion of Innovation Theory and the core determinants of the intention and usage of UTAUT have been incorporated into the research model depicted below:

The Technological Context encompasses awareness – what health workers think can be achieved with ICTs in the health sector and their openness to using the innovations in their practice/work. It also relies on the availability of these innovations, including

hardware and software – which must be within reasonable proximity of the organization. The organization context will certainly impact on the knowledge of the health workers. The awareness, perception and openness to use ICTs of the health workers are included in the focus of this research.

The Implementation Context delves into the specific environment of the health workers which are outlined in the research model as determinants of social influence and organization facilitatory conditions. Again, the social influence entails the health workers' perception of the importance of ICTs to their work and to their readiness to comply with their use. The organizational facility conditions include the existing organization and technical infrastructure, capacity development – the training and management support that is needed. The adoption of ICTs in the health sector can be negatively affected by the complexity of an organization's structure, and the conflicting roles of key actors, such as professionals and managers. Both social influence and organizational facility conditions will certainly influence the use of ICTs in the heath sector.

The Individual context of the research model includes those variables that are likely to moderate the persuading of the health workers to adopt the use of ICTs. They include the possession of a favourable attitude to change, anxiety/fear of the use of innovation, attitude, mindset, ability to use hardware/software, and how useful a particular innovation is to his/her specialty. Persuasion is also driven by the perceived characteristics of the innovation. which include its relative advantages, language, compatibility, triability and observability.

The implementation context referred to earlier in the model also has a direct impact on the behavioural intention leading to a decision by the individual to use ICTs. The intention-behaviour relationship is well documented in the technology acceptance literature and has been found to be conclusive in the industry and health-care contexts (Schapel and Pervan, 2004: 739; Chau and Hu, 2001: 699-719; Davis et al., 1989: 982-

1003). The link between the intention to use a technology and its actual usage is well established (Schapel and Pervan, 2004: 739; Venkatesh and Morris, 2000: 115; Taylor and Todd, 1995: 144-176).

From the theoretical model, above, I thus hypothesize that :

H_1: Greater awareness of recent advances in the use of ICTs in the health sector is positively related to the adoption of the applications.

H_2: Organizational structures that promote the development of ICTs are positively related to the acceptance of ICT applications by the health workers.

H_3: Investments in the provision of ICT applications are positively related to their acceptance by health workers

H_4: Health workers' individual characteristics are positively related to the adoption of ICT applications in the health sector.

H_5: Health workers' adoption of the use of ICT applications are positively related to their acceptance by the clients/patients.

H_6: Policies that favour the development of ICTs in general, especially with a specific focus on health care, will facilitate the adoption of ICT capabilities in the health sector.

1.13 Conclusion

The world has continued to change considerably since the inception of development institutions, theories and their policy interventions (Qureshi, 2015). It has been suggested that development theories, policies and interventions from western institutions may not be suited to the conditions of the countries that they intend to improve (May et al., 2014; Willis, 2011; Easterly, 2006). Current debates support the usefulness of ICTs in the long run. Existing studies have shown that knowledge mobilization, alliances and networks can only be facilitated through the important role that ICTs have to play. Sustainable development can only take effect through the advancement of human knowledge, which will, in turn, improve the situation in developing countries (Mirghani et al., 2010: 744 –

758). According to the European Information Technology Observatory (EITO, 2002), more recent debates show that the role of ICTs in sustainable development, but it is still not totally understood, the deployment of ICT tools is still very much at the early stages and cannot be validated at this time, and the forecast of any immediate effects on sustainability would be premature. (Mirghani 2010: 745; Wolters and Boer, 2002) have argued that growth and change in a society's mind-set are subject to global readiness. Even though a plethora of literature on ICTs and development, in general, exists, there has been little research into its strategic importance.

CHAPTER TWO

Applications of ICTs in the Health Sectors in Africa

2.1 Introduction

The purpose of this chapter is to examine the different ways in which ICTs have been used to advance health services and programmes in Africa. In this chapter, I have described selected ICTs and their applications, which are being used on the African continent to promote healthy living. The chapter also illustrates the myriad ways in which technologies have been adapted to respond to local needs, as well as to support national health programmes and global health initiatives. The contributions that ICTs play in the development process will be clearly demonstrated.

Good health care delivery is one of the most essential social services in a country's infrastructural environment. The use of ICT throughout the world has skyrocketed, but there is still a significant and large gap between the developed and developing worlds, especially in relation to countries in Africa. In the last two decades, many developed countries have made remarkable progress in improving the health status of their citizenry. As a result, the disease burden is increasingly defined by disability instead of premature mortality. The leading causes of death and disability have changed from communicable diseases in children to non-communicable diseases in adults. However, in Sub-Saharan Africa, the picture is quite different as communicable, maternal, nutritional, and new-borns' diseases continue to dominate (World Bank, 2013). Many developing countries have an acute shortage of doctors and nurses/midwives. Sub-Saharan Africa has, on average, fewer than 10 doctors per 100,000 people (Hassan et al., 2011: 296-299).

There are constant changes in health care delivery, which have led to an increased need for communication among and between health care providers as well as the publics. In addition, emphasis has shifted from curative medicine to preventive medicine, and this has necessitated the need for increased communication, especially with the community. The world population now exceeds six billion, of which more than 4.7 billion reside in

the developing world (UNDP, 2000). As the population increases, there is a need to find ways of improving efficiency and the quality of health care delivery systems in developing countries. With the rising educational level of most nations in Africa, and the advent of the Internet, the growing field of information and communication technology (ICT) definitely has a part to play in bringing health information to the underserved population of the world. The emergence of the use of ICTs in the health sector appears to be an ideal vehicle for the dissemination of informational content. Existing ICTs have the capacity to improve access to health information and services and examples of this abound in many African countries, including Ethiopia, Kenya, Rwanda, Senegal, Tanzania, Malawi and Uganda.

There is confusing, and sometimes conflicting, information on what constitutes ICT. Terms such as information and communication technologies (ICTs), information and communication technologies for development (ICT4D), electronic health (e-health) anmobile health (m-health) are often used interchangeably (The AIDSTAR-Two Project, 2011). The ICTs are tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means. This comprises all electronic digital and analogue ICTs, including radio, television, telephones (fixed and mobile), computers, and electronic-based media, such as digital text, audio-video recording, and the Internet, including Web 2.0 and 3.0, social networking, and web-based communities (GAID, 2010). The ICT4D is an highly dynamic field of development interventions that use ICT to help the poor and marginalized communities across the world benefit from the modern technology that improves the quality of their lives (The AIDSTAR-Two Project, 2011). The ICT4D is, by nature, multidisciplinary, and its interventions require a multi-stakeholder approach, not least to keep abreast with, and take full advantage of, rapid technological developments (SPIDER, 2011).

The World Health Organization (WHO) has described electronic health (e-health) as the combined use of electronic communication and information technology in the health sector for “cost-effective and secure use of ICT in support of health and health-related

fields, including health services, health surveillance, health literature, and health education, knowledge, and research (WHO, 2011). The key e-Health applications include, among others, electronic medical records, telemedicine, health information networks, decision support tools, Internet-based technologies and services, digital imaging, computer-assisted surgery, wearable and portable monitoring systems, and health portals (Open Clinical, 2011). Mobile Health (m-Health), a new field of e-Health, has been described by the WHO as "medical and public health practice supported by mobile devices, such as mobile phones, patent monitoring devices, personal digital assistants (PDAs), and other wireless devices. An emerging new set of applications designed for mobile devices have been labelled as m-Health Education (m-HealthEd); they are used for training, testing, supporting, and supervising health care workers, and provide health information to individuals (iheed, 2011).

Linking ICT and global health development is not a new concept, but the proliferation of ICT applications over the last decade has been unprecedented (The AIDSTAR-Two Project 2011). Some key global health documents had mentioned ICTs as a means to support strategic developmental goals. A good example is the United Nations Millenium Development Goals. The 8th Goal, which specifically called for increased access to new technologies states "Develop a global partnership for development" and its sixth target is, "in cooperation with the private sector, make available the benefits of new technologies, especially information and communications." Several programmes around the developing world illustrate the myriad ways in which technologies have been adapted to respond to local needs, as well as to support national health programmes and global health initiatives.

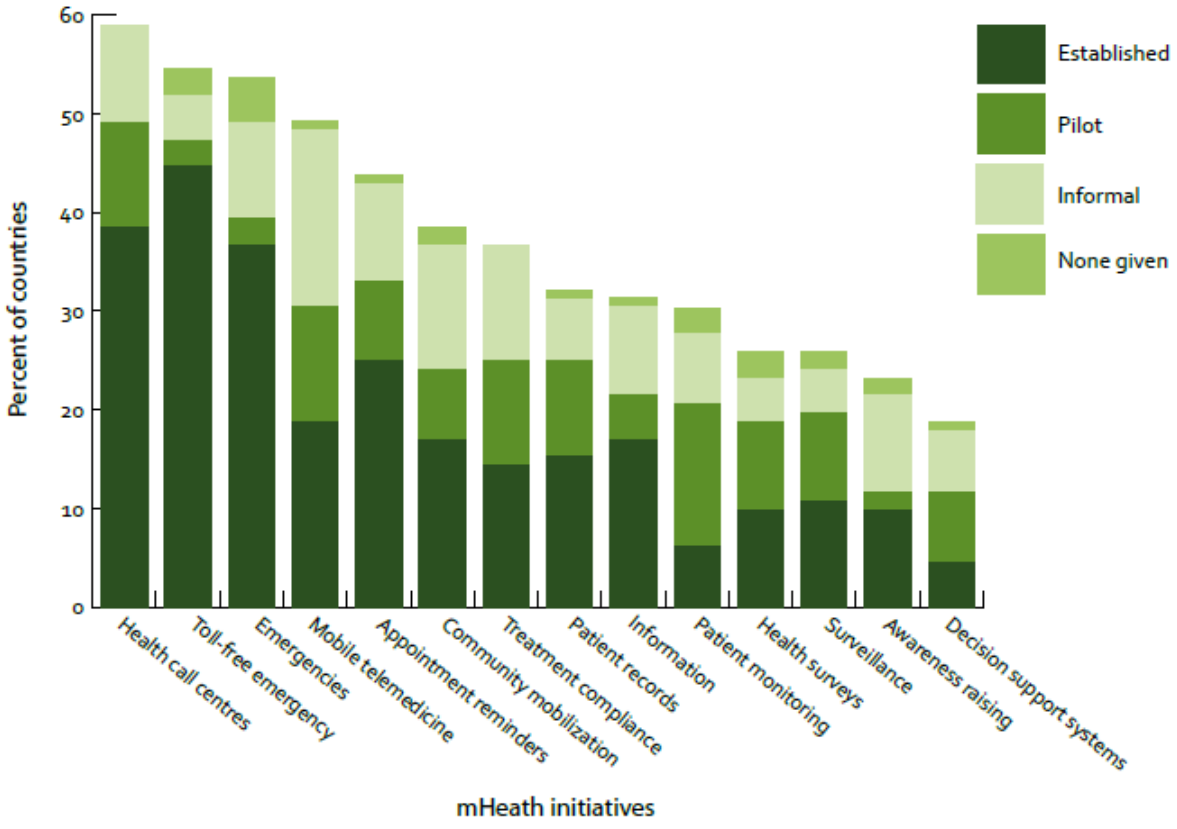
Internet penetration in Africa as of April, 2011, was 11.4 per cent, while the world average was 30.2 percent. Nigeria currently has the largest number of Internet users (44 million) across the continent, but only a 28 percent Internet penetration rate. In the sub-Saharan region, the Seychelles has the highest penetration rate, at 37 percent, and Sierra Leone has the lowest at 0.2 percent, followed closely by the Central African Republic,

Congo, and Niger – all at 0.3 percent (Miniwatts Marketing Group, 2011). Several factors are responsible for this, and they include availability, cost and accessibility. Nevertheless, the developing countries have no other choice but to adopt these technologies. "Those who do not, risk being further marginalized" (Africa.oneworld.net).

2.1 m-Health – provision of health services and information through mobile technologies

The unprecedented spread of mobile technologies, as well as the advancements in their applications to address health priorities, has evolved into a new field of e-Health, known

Figure 2.1: Adoption of m-Health Initiatives and phases, globally



Source: WHO (2013). m-Health: New horizons for health through mobile technologies. Global Observatory for e-health series. World Health Organization, Geneva.

m-health – using mobile and wireless technologies to support the achievement of health objectives. m-Health has the potential to transform the face of health service delivery across the globe (WHO, 2013). A powerful combination of factors is driving this change. These include rapid advances in the mobile technologies and applications, a rise in new opportunities for the integration of mobile health into existing e-Health services, and the continued coverage of mobile cellular networks. There are now over 5 billion wireless subscribers; over 70% of them reside in low- and middle-income countries (ITU, 2013). The GSM Association reports that commercial wireless signals cover 85% of the world's population, extending far beyond the reach of the electric grid (WHO, 2013).

The interest of many governments across the world to achieve the health-related Millennium Development Goals (MDGs) has manifested into a series of m-Health developments that are providing early evidence of the potential for mobile and wireless technologies. M-Health is being applied in maternal and child health, and programmes reducing the burden of the diseases linked with poverty, including HIV/AIDS, malaria, and tuberculosis. M-Health applications are being tested in such diverse scenarios as improving timely access to emergency and general health services and information, managing patient care, reducing drug shortages at health clinics, enhancing clinical diagnosis and treatment adherence, among others (WHO, 2013). The Figure 2.1, above, depicts the adoption of m-Health initiatives and phases, globally.

Based on the findings of the second global survey on e-Health conducted by the World Health Organization, they classified the types of m-Health initiatives as:

Communication between individuals and health services

- Health call centres/Health care telephone help line
- Emergency toll-free telephone services

Communication between health services and individuals

- Treatment compliance
- Appointment reminders
- Community mobilization

- Awareness raising over health issues

Consultation between health care professionals

- Mobile telemedicine

Intersectoral communication in emergencies

- Emergencies

Health monitoring and surveillance

- Mobile surveys (surveys by mobile phone)
- Surveillance
- Patient monitoring

Access to information for health care professionals at point of care

- Information and decision support systems
- Patient records

In the WHO survey, cited above, globally, the types of m-Health initiatives most frequently reported were health call centres/health care telephone help lines (59%), emergency toll-free telephone services (55%), emergencies (54%), and mobile telemedicine (49%). These m-Health initiatives share the common characteristic of using the core voice functionality of a mobile device (WHO, 2013). The least frequently reported m-Health initiatives were health surveys (26%), surveillance (26%), awareness raising (23%), and decision support systems (19%). These results differ from the reports in the literature, which supported the use of mobile devices for data collection and disease surveillance.

2.2 M-Health Application Areas in Africa

Modern information and communication technologies (ICTs), such as the Internet, are not yet commonly available in countries in Africa, with their poor resource settings, but the growing coverage of mobile phones is providing health systems with new possibilities with which to address problems of accessibility, quality, effectiveness, efficiency and the costs of health care. M-m-Health Application Areas in countries with poor resource settings are classified into the following areas:

- Education and Awareness
  (e.g., disease prevention, educational programmes, health promotion, community mobilization)

- Point-of-Care Support and Diagnostics
  (e.g., support in diagnostics, screening and clinical care)

- Patient Monitoring
  (e.g., treatment adherence support, appointment adherence)

- Disease and Epidemic Outbreak and Surveillance
  (e.g., real-time tracking of cases of infectious diseases)

- Emergency Medical Response Systems
  (e.g., emergency obstetric care, disaster management, accident)

- Health Information System (HIS)
  e.g., supply chain management, procurement information)

- HRH m-Learning
  (e.g., distance training, continuous professional development for health workers)

- Health Financing
  (e.g., smart cards or vouchers making use of mobile payments

(Source: http://www.m-Healthinfo.com/what-m-Health)

Mobile phones are a promising tool for sharing health information quickly and reliably, and women and youths perceive mobile phone-based communication as being more confidential than in-person visits to clinics. SMS messaging can also stimulate word-of-mouth communication of health care information within peer groups. A variety of programmes that are using m-Health in Africa are summarized in the next sections.

2.2.1 Using m-Health in capacity building for health workers

The maternal mortality ratio (MMR) in Ethiopia is among the highest in the world, with a rate of 676 per 100,000 live births (EDHS 2011). CHAI Ethiopia piloted a maternal and neonatal health (MNH) programme using mobile health technology (m-Health) to

increase access to, and the uptake of, skilled delivery in primary health care units in Ethiopia via improved tracking and referral. The m-Health system focused on the retention of women in antenatal care to ensure delivery in the health centre by facilitating tracking and referral at the community level. The objective of the pilot implementation (conducted from January, 2011, to September, 2012) was to demonstrate the effectiveness of the application of m-Health in increasing skilled delivery attendance in the Ethiopian setting. Training was given to 59 personnel at 10 health centres, and to 64 community volunteers. The pilot showed that there was improved communication between the health centres and the health-posts/community. The improved link led to timely and quality services being offered to pregnant women. There were challenges, including the limited computer knowledge/skill of health care workers, the loss of mobile apparatus, the delay of confirmatory messages from the pregnant women, poor mobile network coverage and electric power interruption in some places (Clinton Health Access Initiative 2012).

In Kenya, through a dynamic mobile platform that integrated a series of technological solutions, the Kenya Integrated Mobile Maternal and Newborn Child Health information platform (KinMNCHip) strengthened the health system by facilitating effective linkage between facilities, community health personnel and households. This enabled the effective management of defaulters and the tracking of high risk pregnancies, access to subsidized services, and change in societal behaviour relating to maternal and child health perceptions.

In a study, the University of Pennsylvania,. in collaboration with the National Library of Medicine, launched text2MEDLINE, a short messaging service (SMS) query of PubMed/MEDLINE and SMS-optimized clinical guidelines in Botswana, in order to establish and evaluate the utility of these tools for clinicians in the country. The researchers found that most of the clinicians would use the service daily or weekly (Armstrong et al., 2012).

2.2.2 Using m-Health to provide health information

The m4RH (mobile for reproductive health) is a means of communicating educative and interactive information on reproductive health via mobile phones application. m4RH has demonstrated success in providing evidenced-based family planning and sexual and reproductive health information directly to individuals via their mobile phones (www.fhi360.org/m4rh). Since 2008, Family Health International (FHI360), through funds from USAID, have conceptualized, developed and deployed m4RH as part of a research study that is aimed at determining the feasibility of providing family planning information via text messages, the reach of the communication channel , and suggestions for impact on family planning use. From 2010 to2011, m4RH was piloted in Kenya and Tanzania.

In Ghana, the Grameen Foundation, in collaboration with the Bill and Melinda Gates Foundation and the University of Ghana, have conducted the Mobile Midwife project in the northeast of the country as part of the "Mobile Technology for Community Health" (MoTeCH) Project. It aimed to improve antenatal and neonatal care among the rural poor and to empower women to take control of their own health. Voice or text messages provided relevant health information during the pregnancy and encouraged women to seek antenatal care. After the birth of the child, information on essential vaccinations and the management of critical childhood diseases was sent. In addition, the community health workers could keep electronic records and retrieve patient information using the mobile phones (Grameen Foundation, 2011; Richardson, 2011).

In Nigeria, ActionAid, a non-governmental organization, in collaboration with the Federal Ministry of Health (FMoH) and other organizations, conducted an m-Health education and awareness project labelled "Learning about Living". The project was launched in 2007 and used different educational tools to teach reproductive health and to promote HIV/AIDs awareness and prevention programmes among adolescents in Nigeria. E-Learning tool on sexual and reproductive health and rights was aimed at students as

well as teachers and parents. “My Questions and My Answers’” was a Q&A service that used mobile phone technology to engage young people, and it offered confidential advice. More than 53,000 text messages were received within the first year (ActionAid, 2009).

Similarly, in Rwanda, the m4RH for Young People Programme aimed toimprove access to sexual and reproductive health information and services via mobile technologies. The programme took advantage of the increasing popularity of cell phones in Rwanda, where 40% of households had at least one mobile phone. With a population of 11 million, half of them aged 24 years or younger, it was assumed that 2.2 million young people have access to a mobile phone. The programme provided information about puberty, sex and pregnancy prevention, HIV, other sexually transmitted infections. Users were able to dial a short code (*744# in Rwanda), free of charge, and could access a menu with the choices above. When they chose the topic about which they wanted information, they would receive that information in a text message with 2-3 screens. The information would then be stored on the phone, so that the user could share it with others and refer to it later (www. fhi360.org).

While access to anti-retroviral treatment has significantly improved in recent years, especially in areas of Ethiopia, there is still a shortage of experienced HIV-care providers. Since May, 2008, the “Fifun Warmline AIDS Hotline”, a free hotline, has provided health care professionals across the country with answers to their questions about HIV/AIDS care and treatment (Royal Tropical Institute, 2009). In 2009, ahead of Ethiopia’s New Year celebrations, all of the 2.5 million mobile users in the country received a text message to inform them about free HIV testing for themselves and their families (Royal Tropical Institute, 2010).

In a study conducted in South Africa to investigate the effectiveness of using short messaging services (SMS) to engage HIV Counselling and Testing (HCT) while interrogating the impact of altering SMS content and dosage (the number of SMS), the

workers found that, in comparison with the control, the receipt of 10 motivational messages (MOTTI), SMS had the most impact on the uptake of HCT, with a 1.7-fold increase. The researchers demonstrated the potential of SMS to influence the importance of HCT among other advantages (de Tolly et al., 2012).

2.2.3 Using m-Health in Patient Monitoring and Support Programmes

In South Africa, the CellPhones4HIV Project, sponsored by Cell-Life, Vodacom, USAID and PEPFAR, in collaboration with other partners, supported the management and monitoring of HIV/AIDS through the Intelligent Dispensing of Anti-retroviral Treatment (iDart) for adherence improvement, data collection tool aftercare, and the use of SMS to expand the uptake of HIV testing and follow-up in the prevention of transmission and testing (PMTCT) (Royal Tropical Institute, 2011).

Similarly, in Kenya, the ChildCount Project began piloting a "Point-of-Care Support and Diagnostics" service using a mobile application based on RapidSMS. It was used by 100 community health workers in Sauri, Kenya, to actively monitor 9,500+ children under-five in relation to their nutritional status, to conduct home-based testing for malaria using Rapid Diagnostic Test (TDT) kits and the immediate dispersal of treatments. Community health workers used SMS messages to register patients and to send their data, with the ultimate goal of improving child health and empowering themselves (Royal Tropical Institute, 2010).

In Nigeria, Pathfinder International implemented the m4Change Project. It aimed to equip community health extension workers (CHEWs) with a CommCare, a mobile phone decision support application, in order to improve the quality of antenatal care (ANC) services, thus contributing to the goal of reducing maternal mortality within the framework of Nigeria's "Saving One Million Lives Initiative". In February, 2013, the project was formally launched in 20 health facilities in Nassarawa State and Abuja Federal Capital Territory (FCT), with more than 150 community health extension

workers and midwives currently using the application. More than 3,000 women had been registered and were being followed in CommCare at project health facilities. A rigorous research study was conducted to assess the perceptions and the change in quality of ANC as a result of integrating the mobile phone application – a final write up and dissemination of the study were expected in 2014 (Pathfinder International, 2013). In a similar programme conducted in Rwanda, "Saving Mothers and Newborn Lives using RapidSMS", David Holmes (2010) wrote in *The Lancet* that:

> "Another advantage of the SMS system is that mandatory registering of new births and deaths gives live and death population data…..The data generated by the SMS system will be crucial in enabling the Ministry of Health to target interventions that are most needed most and plan more effectively for the future. It is a future that is looking increasingly bright".

In a similar programme on "Saving mothers and new-born lives in the community using a RapiSMS Technology", in the Musanza District of Rwanda, Kalachi (2011) reported on their experience and listed the immediate impact as:

- Instant transmission, digitalization and analysis of data that are immediately accessible to all stakeholders;
- Decrease in data entry error rates through feedback loop system identifying data outside normal parameters and verification with end-users;
- Increased capacity for service delivery through automated feedback loops;
- Improved monitoring capacity at clinic, district and national levels.

The results of a five-month review showed an increased number of antenatal visits, a reduced number of home deliveries, increased facility of deliveries, a reduction in child deaths and intrauterine foetal death, and decreased maternal deaths.

The WAHA International, Ministry of Health of Senegal and the Fistula Foundation used mobile technology to reduce maternal deaths. In order to improve access to skilled assistance during delivery, the project aimed to improve communication links between villages and the health centres by donating prepaid mobile phones and working in a

network of community workers, who call the nearest health centre in the case of an emergency. A motorbike could be called to transport women to a health centre or hospital (Royal Tropical Institute, 2010).

In Tanzania, the CommCare Project also used a mobile phone application to assist community health workers in managing household visits and planning their days, while at the same time collecting and reporting data so as to monitor and evaluate community health programmes. Mozambique now has an Expedited Results System to improve early infant diagnosis. After a successful pilot was conducted in 2009 by the Clinton Access Initiative, Mozambique has nationally rolled out SMS printers in 2010. The results of infant HIV tests are electronically transmitted from two central reference laboratories in Maputo, and in the northern provincial capital, Namputa, to more than 275 health centres. This has reduced the time for clinics to receive test results from reference laboratories from an average of about three weeks to about 3 days (Royal Tropical Institute, 2010).

Innovative approaches are needed to enhance adherence to antiretroviral treatment (ART) and to support HIV transmission risk reduction for people living with HIV/AIDS (PLHA). In a study that was conducted on the use of personal digital assistants (PDAs), for HIV treatment adherence, safer sex behaviour support, and provider training in resource-constrained settings, researchers in Kenya reported that PLHAs were willing to use PDAs as support for their HIV care. They suggested that PDAs may be a culturally appropriate way to support ART adherence and safer sex for PLHA. In addition, the use of tools such as PDAs among PHLA, in some resource-constrained settings, may be acceptable and can build on existing use patterns. PDAs can collect high-quality data, deliver chronic disease support and provider training, and are less expensive than laptops (Kurth et al., 2007).

2.2.4 Using m-Health to perform social marketing interventions

In 2005, PSI Madagascar began the use of mobile technology for mapping geographical coordinates of all points of sales in order to get evidence on the coverage, and the quality of coverage, of its social marketing products and services (www.psi.org). Subsequently, in 2009, PSI Madagascar began integrating PDAs with GPS tools to strengthen and leverage its commercial and community based distribution. The organization concluded that the use of mobile technologies as instruments for research, monitoring and evaluation, and informed decision making, have been key to attaining the core promise of "measurable results". It has enhanced the ability of staff to make timely and informed decisions that are based on evidence. In addition, the organization stated that "mobile technology contributes to the protection of the environment by reducing the use of paper for data transcription and activity reports." However, these results were not obtained without challenges. These included users' proficiency in handling the tools, monitoring and reminders for timeliness and completeness, and the error margin.

2.2.5 Using m-Health to track commodities

Family Planning (FP) Commodity Security is an integral part of successful FP service delivery. Timely and constant availability of the entire range of FP methods in health facilities is essential in increasing family planning uptake and, in turn, in improving the low contraceptive prevalence rates in many African countries. However, perennial stock-outages of FP commodities at the facility level have been identified as one of the key factors that have hampered effective service delivery. In order to address the challenge, the Tupange Project in Kenya developed and rolled out the Informed Push Model (IPM) for FP commodity distribution. The IPM is a distribution model that has relied on timely and good quality information to make supply decisions. The data was provided through the Tupange SMS Commodity Tracking (TSCT) System, which uses mobile technology to transmit FP commodity stock status to a web based platform. The data were then analysed and fed into the IPM to inform re-supply or re-distribution to facilities.

Similarly, in Tanzania, the ILS Gateway was a mobile alert and reporting system that was designed to support and strengthen the Integrated Logistic System (ILS) by expanding the accessibility to and visibility of logistical data and to improve their use for supply chain decision-making. The health worker received a text message on his/her personal mobile phone requesting information about the amount of stock-in-hand at the facility. The individual sent the stock-in-hand information to a toll-free short code, in either English or Swahili. Accessible through the Internet, the dashboard displayed the latest data collected, enhancing data visibility to support logistics decision making. Thereafter, decision makers used the data to ensure consistent product availability (USAID-DELIVER Project).

2.2.6 Using m-Health in Disease and Epidemic Outbreak Surveillance

Quality health management requires timely and accurate data and paper-based reporting does not fill this role adequately. The introduction of malaria rapid diagnostic tests and the availability of wireless communications have presented an opportunity to open direct data transmission and feedback between peripheral health workers and central managers (Asiimwe et al., 2011). In Uganda, in November, 2009, a Rapid SMS reporting system was implemented to monitor malaria at more than 140 clinics in remote areas. The system implementation was aimed at improving data reporting and management and monitoring artemisinin combination therapy (ACT) stock availability. An evaluation of the project revealed that the SMS-programme has the potential to obtain critical health-care related data from remote areas in real-time, supporting evidence-based decision making. The researchers added that this was achieved without disrupting normal workflows, while also maintaining their current practice of transcribing paper-based reports. Short message service-based messaging platforms offer a valuable opportunity for national disease control programmes and ministries of health to access specific health data to support evidence-based decision making at several levels of the health system. In addition, the level of transparency that such an SMS-based system can provide could go

far in addressing the concerns of ministries of health and donor partners (sponsors) so as to ensure that scarce funds are properly used to maximize heath impact (Asiimwe et al., 2011).

2.2.7 m-Health Health Management Information System (HMIS)

m-Pedigree, in collaboration with HP, mobile network operators, pharmaceutical companies and the government authorities of Nigeria, Ghana and Kenya, have developed an SMS-basal system to fight the exploding appearance of counterfeit drugs in developing countries. The scratch card method reveals a single use numeric code on drugs that users can text, free, from their mobile phones, instantly receiving information on whether the drugs are genuine or counterfeit. The system has been operational in Ghana and Nigeria since late 2010 (Ratemo, 2010). A pilot study in Kenya was underway in early 2011 with the aim of scaling it up.

2.3 Internet-based ICT – Telemedicine

Telemedicine has many definitions. Thomas Bird coined the phrase in the 1970s, in referring to health care delivery where physicians examine distant patients using telecommunications technologies (ADV, 2002). The European Commission's Healthcare Telematics Programme defines telemedicine as rapid access to both shared and remote medical expertise by means of telecommunications and information technologies, no matter where the patient or relevant information is located (EHTO, 2000). Telemedicine tools enable the communication and sharing of medical information in electronic form and thus facilitate access to remote expertise. A physician located far from a reference centre can consult with his colleagues remotely in order to solve a difficult case, follow a continuous education course over the Internet, or to access medical information from digital libraries. These same tools can be used to facilitate exchanges between centres of medical expertise, at the national or international levels (Graham et al., 2003: 36-8; Oberholzer et al., 2003:102 -14; Ganapathy, 2002: 88-94; Wright, 1998: 1-10). Of the

world's regions, sub-Saharan Africa is the area with the heaviest burden of communicable diseases, such as HIV/AIDS, tuberculosis and malaria. Large portions of the populations live in remote areas that are beyond the reach of telecommunication. Many of the countries have an acute shortage of doctors, particularly of specialists.

2.3.1 Potentials of Telemedicine

It is a recognized fact that satellite services are the only possible means of properly including healthcare systems for remote sub-Saharan African populations who are not covered by terrestrial or mobile phone networks. The e-Health Task Force for Africa (ETFA), formerly known as the Telemedicine Task Force (TTF), was set up in 2006, as an effort of European organizations, African stakeholders and the World Health Organization, to create a sustainable, satellite-enhanced e-Health and telemedicine network for the whole of Africa (ESA, 2009: 1).

The potentials of telemedicine tools are particularly significant in countries where distances and the quality of infrastructure hinder the movement of physicians and patients. The purpose of telemedicine is to add value in addressing a number of health challenges. These include: the potential to overcome distance by providing healthcare remotely whether in the format of advice and information sharing, reduction in professional isolation, encouraging the exchange of ideas, the optimization of the use of limited resources and support for continuing medical education, and a reduction in the cost of health care for both the patients and their relatives by avoiding unnecessary costs to the referral hospitals and the cost to healthcare providers by fewer referrals. In addition, Telemedicine could save lives by promoting the means of prompt assessment and clinical decision-making actions, and it may lead to the better planning of health services by enhancing epidemiological surveillance and data collection (Joseph 2013: 1-6).

2.3.2 Applications of Telemedicine in Africa

Several factors, such as ethnic conflicts and endless wars, decades of economic exploitation and corruption in government, have continued to ruin sub-Saharan African economic development. Most of the countries have inadequate ICT infrastructure and ineffective policies. Wamala and Augustine (2013: 6-11) conducted a meta-analysis of telemedicine's success in Africa and found that sub-Saharan Africa, which is made up of 33 of the 48 global poorest countries, has to extend its ICT policy to match the ever developing global economy. In some countries, such as Ethiopia and South Africa, significant progress in Telemedicine has been made, while in countries such as Burkina Faso and Nigeria, the progress has been slow, due to lack of political support. This is sad in the sense that the continent is resource-limited and is still enduring the effects of scarce resources, especially in health.

Teledermatology, Teleradiology and Telepathology services were established at 10 sites in Ethiopia between 2004 and 2006. Twenty physicians were trained per site. A lesson learnt from the pilot project was that Telemedicine implementation did not depend only on technological factors, but also on e-government readiness, enabling policies, multi-sectoral involvement and capacity building processes (Shiferaw and Zolfo, 2012: 1-8). In Sudan, the telemedicine crusade had been championed by Ascrafcom, which advocated the promotion of accelerated health care for consumers and health professionals via telecommunications technology (Wamala and Augustine (2013: 6-11). In Zambia, a Telemedicine project (the Virtual Doctor Project) used hard body vehicles filled with satellite communication devices and modern medical equipment to deliver primary health care services to some of the neediest areas of the country (Mupela et al., 2011: 8).

Rwanda has also initiated a telemedicine project to address its major challenge of having few doctors and other health care providers. In a research paper that examined the dynamics of the contextual factors which affected the adoption of Telemedicine in Rwanda, the authors concluded that the strategic choice of using low-cost and less

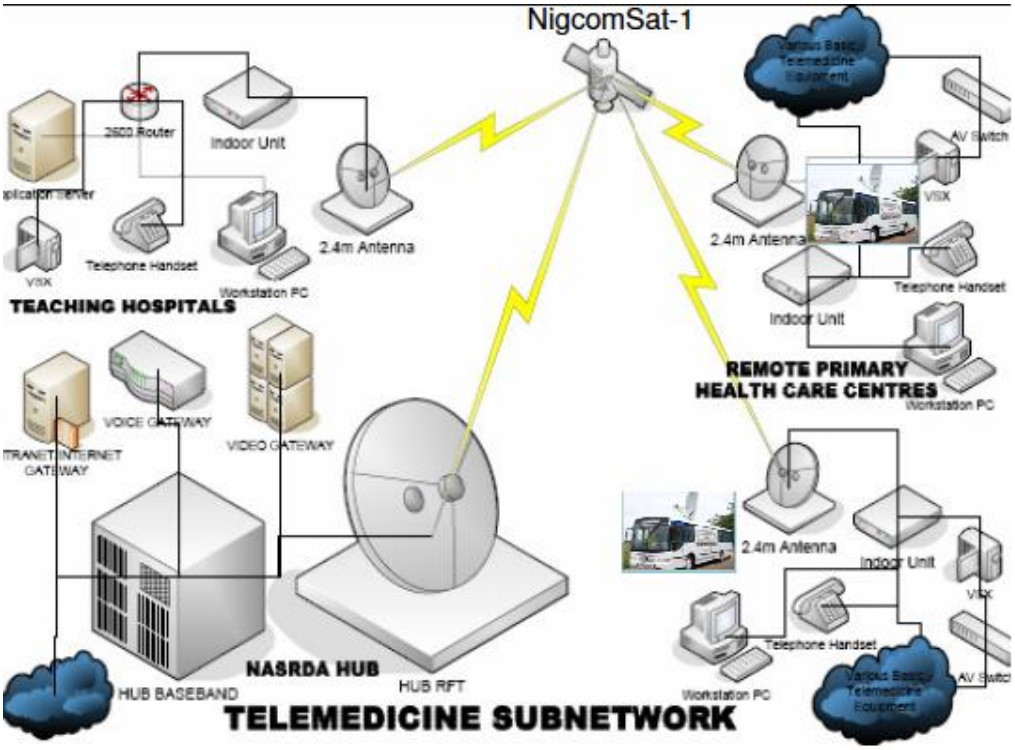
complex technologies; and strategic partnerships with educational and technology companies, are factors which have influenced Telemedicine implementation in Rwanda (Boateng et al., 2010: 1-3). The authors applauded the visible role of the Government of Rwanda in establishing policies and agencies to support the use of ICTs for health care delivery and to attract the local and international strategic partners in the Telemedicine project. In Uganda, attempts to establish a telemedicine infrastructure have been substantive. However, criticisms have been made about using 'high tech' approaches where there are many basic needs (Wamala and Augustine (2013: 6-11). In Ghana, the Novartis Foundation for Sustainable Development (NFSD), in cooperation with the Millenium Villages Project (MVP), the Ministry of Health and the National Health Insurance Agency, Ghana Health Service, and Ghana Medical Association, initiated a Telemedicine Project in the Bonsaaso cluster. The objective of the project was to improve access to primary healthcare by using information and communication technologies (ICTs) to overcome geographical barriers.

Telemedicine was one of the pilot projects of the Nigerian Communication Satellite (NigComSat-1). When it was initiated, it promised the opportunity for improved healthcare delivery to the rural communities. The objective of the NigComSat-1 Telemedicine pilot project was to develop a telemedicine system to improve remote diagnoses and to deliver cost-effective, better-quality specialist services in Nigeria (Figures 2.2 and 2.3 below). However, the project collapsed. Meanwhile, the government is collaborating with the Government of India to provide Telemedicine services in selected hospitals.

2.3.3 Ethical and Legal Guidelines in Telemedicine Practice

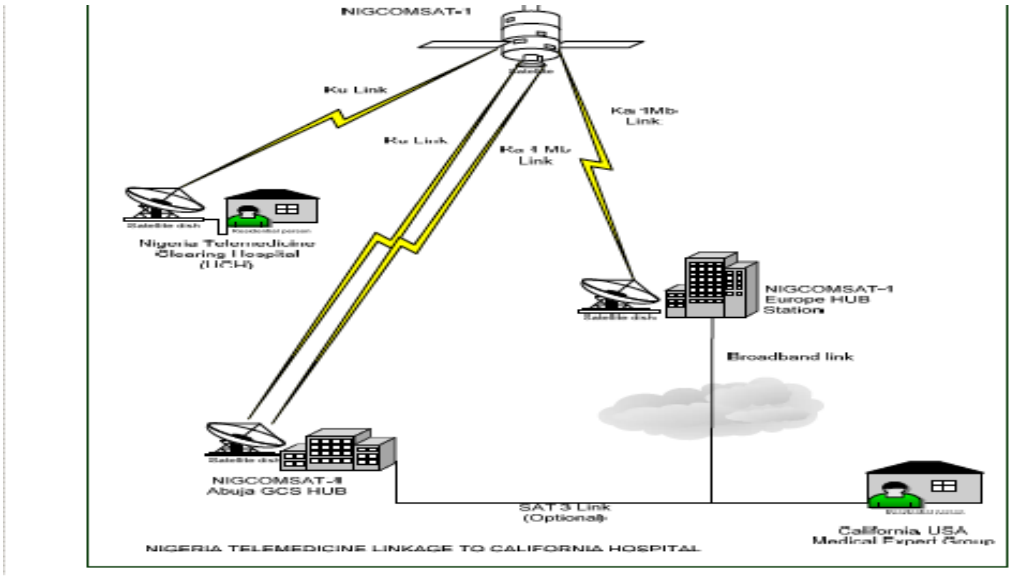
The Internet is making inroads into Africa. Telemedicine is viewed as a new way of offering medical services. While telemedicine provides an attractive solution to the shortage of healthcare practitioners, the way in which it should be practised has not been

Figure 2.2 : Implementation of Telemedicine Pilot Scheme in Nigeria



Source: Godstime J.K. et al. (2012).

Figure 2.3: Nigeria Telemedicine Linkage to California Hospital



Source: Godstime J.K. et al. (2012).

resolved (Jack and Mars, 2006: 61-64). Everyone has the right to privacy, which includes the right not to have privacy of their communication infringed (Dyer, 2001: 23-38; Miller, 2003: 1-7). The WHO resolution of 2005 alluded to ethical matters by acknowledging the need to respect the principles of equality and differences in culture, education, language, physical and mental ability and geographic location (Committee A, 2005: 4-6). It does not, however, address specific ethical questions that are related to telemedicine, such as a lack of direct patient-practitioner contact, informed consent, confidentiality, safety, data security and the legal implications of the cross border, international practice of telemedicine. Nor does it address the question of the vulnerability of people in disadvantaged countries (Edworthy, 2001: 557-60; Rice and Smith, 2001: 256-81).

If telemedicine is to be used to overcome the shortage of health practitioners, it is important that ethical and legal guidelines be developed to protect the rights and interests of the patients. In a study, conducted in South Africa, which aimed to highlight the need for the formulation of guidelines for the ethical practice of Telemedicine, Jack and Mars (2006: 61-64) found that only four countries and one international association had developed ethical guidelines for the specialty. The authors identified a total of 152 relevant peer-reviewed journal papers and obtained twenty-one guidelines. The study concluded that resource constraints and other issues that are relevant to developing countries may require the formulation of guidelines that do not necessarily conform with those in the developed world.

2.3.4 Barriers against Telemedicine

Although telemedicine holds enormous promise for transforming the accessibility of healthcare, there are strong barriers against its ability to reach the far-flung citizens of the world (Mbarika and Okoli, 2003). It is clear that developed nations, with the resources to invest in and develop ICT infrastructure, are reaping enormous benefits from the information age (Beltis and Hitt 1995: 7-9; Porter, 2001: 63-78). However, a number of

African countries south of the Sahara are hesitant to adopt telemedicine as it is deemed to be an expensive venture, but others are making progress.

2.4 Conclusion

In summary, m-Health is gaining ground in all areas of health care delivery in many African countries. With the rapid growth of the means of communications, mobile technologies are playing an important role in the diffusion of health information. As information becomes one of the key resources for any activity, the role of mobile technology-based ICT services is becoming more significant for their users (Peters, 2009). Although, there had been a revolutionary growth in the telephony industry in Nigeria since 2001, its impact has not been felt in the health sector, as it had been in many other African countries. Two years after the introduction of GSM in Nigeria, a study by Idowu et al. (2003) found that medical practitioners in some Nigerian teaching hospitals used their personal mobile phones to facilitate patient care at their own expense. Neither the government nor the hospital management had taken up the responsibility. While there is still a lack of evidence-based research into the effectiveness and efficiency of m-Health interventions, the research materials in the literature that is available are growing and suggest that m-Health may be a promising development for the provision of improved health services in countries with poor resource settings.

Acting within the framework of the African Information Society Initiative, the United Nations Economic Commission for Africa (UNECA) and the African Tele-Health Project, have been promoting the application of information and communication in various sectors, including health. Information and Communication Technologies (ICTs), and this has proven crucial for improved health administration and connectivity within the health sector; for supporting decisions for curative health; and for the improved distribution and reduced cost of medical supplies. However, the health sector in Africa still lags very much behind other sectors in the application of these technologies (http://www.anglefire.com/ok3/peaceportal/tele-Health.html). Telemedicine, though in its

infant stages in sub-Saharan Africa, is potentially a very useful means of solving the problems arising from the continent's poor resources, especially from the effects of the lack of qualified medical specialists.

The need for accurate health information and diagnostic services in underserved, and in rural areas this is critical, and Telemedicine can help solve many of these problems. Teleconsultation practice aims to reduce transportation time and the costs for patients and their families, to increase medical knowledge and safety in primary healthcare facilities and to strengthen local capacities in health. E-health is one of the most rapidly growing areas in health today, offering enormous potential for developing countries. E-health solutions help to better connect people around the world – be they health workers in remote areas who need to consult with their peers and doctors, or patients who need to connect with medical specialists for advice.

CHAPTER THREE

Methodology

3.0 Introduction

In this chapter, I have discussed the aims and objectives of the research study, the types of ICTs and applications on which this study will focus, and the research design. In addition, I also discuss in the chapter the study areas, including the background information on the primary study site, and the approaches that are adopted in gathering data with regard to accomplishing the goals and the objectives of the study.

The study has utilized both quantitative and qualitative methods through its primary methods of data collection. A three pronged approach was adopted in gathering the data with regard to accomplishing the objectives that are enumerated above. These were:

- In-depth interviews
- Focus Group Discussions, and
- The Fielding of Structured Questionnaires

The combined approach was used to obtain a deeper understanding and to ensure validity. The primary study area was the University College Hospital, Ibadan, Nigeria. In order to obtain a wider coverage of the acceptance of ICTs in the health sector, six other institutions were selected from the six geo-political and health zones of the country.

Twelve in-depth interviews were conducted with 10 selected members of both the hospital and the College of Medicine Management Committees, and with two senior members of staff who were involved in an international research project employing ICT applications. Six focus group discussions were conducted, comprising of 8-10 participants in each. The quantitative aspect of the research focused on how I would be able to quantify the relationships between variables in order to construct statistical models to explain social, educational and environmental factors that influence the adoption of ICTs in order to obtain health information and manage health conditions. The questionnaires were comprised of questions concerning the use of emerging information

technologies, as well as questions that related to socio-demographic and personal characteristics. Questions also covered the content use of ICTs, as well as the attitude towards their usage.

There was a little delay in commencing my fieldwork because the University of Ibadan and the University College Hospital Ethics Committee insisted that the proposal must be approved before the commencement of the data collection. It was difficult to book interview appointments with the key members of the management staff within the College and the Teaching Hospital, since they were very busy. Similarly, scheduling venues for some of the interviews was also a major setback, because, in order to conduct and record these interviews, quiet places without any interference were needed. This constituted a problem, as most of the teaching rooms were being used. Gathering participants for the FGD was a great challenge, as some of the health workers were busy with patients and it was difficult for them to spare the time for the discussions. The FGD involving the patients was also a difficult task, as I had to target the pre-natal patients' consultation sessions in order to coax these patients into attending the discussion.

3.1 Aims of the Study

The ultimate goal is to review and determine the level of implementation, not only of the ICT policies of the Nigerian government and the involvement of other stakeholders, but also to investigate the influence and usage of ICTs in the provision of health services in Nigeria. It is envisaged that this study will contribute new knowledge on the policies and usage of Information Communication Technologies (ICTs) in health communications in a developing country. It will examine the findings in the context of theories about the dimensions of the Digital Divide, Social Shaping and Development Communication.

3.2 Research Objectives

1. To determine the interventions that have been used to promote the use of ICTs for health information and patient care by the citizenry, government and non-government organizations, and the private sector in Nigeria.

2. To determine the extent to which the selected ICTs have been used by Nigerian health care workers and "users" in health services, with special attention to the University College Hospital, Oyo State, Ibadan.

3. To discuss the implications of the study's findings in relation to the theories of communication for development.

3.3 Research Questions:

- How have local and global policy makers (e.g., government, pressure groups and health consortiums: WHO, USAID) designed ICT initiatives for the health care sector in Nigeria?
- How have ICTs been used in health care in Nigeria in the context of MDGs? How do Nigerian health workers and their clients perceive the role of ICTs in health care?

- How does this Nigerian case study fit into theories of communication for development that relate to the use of ICTs in the health sector?

3.4 Types of ICTs (technologies/services) and Applications on which this study focused:

Without Information Technology, society as we know it will be incapable of change, although technology *per se* is not the ultimate solution to social problems. However, the availability and the use of ICTs are a pre-requisite for economic and social development in the world today (Castells, 1996). The imperative role of ICTs in stimulating development

has given rise to ICT channels, such as the Internet and various devices, which facilitate the use of the Internet on a mobile platform. The network society has a crucial role, which is to diffuse new ICT (Castells, 1988).

The *Internet* has emerged as a fundamental part of modern society. The emergence of new applications, such as Facebook, as a social networking tool with the current lead population penetration in Nigeria of 29% (IWS 2012) and e-health (as an information tool) now becoming cultural icons. Similarly, new ICT devices have also aided the availability and efficiency of Internet usage, such as smartphones and tablets (ITU, 2009).

The *smartphone* is a mobile phone built on a mobile computing platform, with more advanced computing ability and connectivity than a feature phone. (Smartphone Phone Scoop, 2011). For example, *the Blackberry* is a line of smartphones which were released in 1999 and which were designed to function as personal digital assistants, portable media players, Internet browsers, gaming devices, and much more. They are primarily known for their ability to send and receive (push) email and instant messages, while maintaining a high level of security through on-device message encryption. Blackberry devices support a large variety of instant messaging features, with the most popular being the proprietary Blackberry Messenger service-health

A tablet computer, which is also known as a "Tablet", is a mobile computer which is slightly bigger than a mobile phone, yet is smaller than a laptop or personal computer, and which is integrated into a flat touch screen device with a virtual keyboard. It can also be connected to a manual one with a USB hub (*PC Magazine*, 2010). By the 2000s, Microsoft had developed the first Microsoft PC tablet (Markoff, 1999), which evidently set the pace for other companies, such as Samsung, Apple, Motorola, etc.

The Apple iPad, which is the latest trend in ICT usage in Nigeria, is retailed by the leading network distributor – MTN (*Nigeria Mobile Market* 2012) and is a line of tablet computers that is designed and marketed by Apple Inc., primarily as a platform for

audiovisual media, including books, periodicals, movies, music, games and web content. Its weight falls between those of contemporary smartphones and laptop computers. Nigeria has also recently launched a version of the tablet, known as the "Onye", which retails for half the price of the Apple iPad (Maxsiollun, 2012).

e-Health is a relatively new term in health care practice and it is one the fastest growing areas in health and ICT today. The term encompasses a range of services that involve health care and information technology supported by electronic processes and communication. It allows the use of information and communication technology (ICT) to improve patient care. *Telemedicine* involves the use of medical information that is transferred from one site to another through electronic communications in order to improve a patient's care, including their diagnosis and treatment. It may be as simple as two medical professionals discussing a case over the telephone, or as advanced as using video teleconferencing systems. The virtual physician's visit is becoming a reality. These days, patients have the chance to see a physician through video linkups. A chain of clinics in Houston (USA) has replaced in-person visits to physicians with on-line, webcam enabled visits with doctors across town (Amednews.com 2008). Whereas telemedicine started as a way to remove access barriers, it is now driven by people who value the convenience it offers. However, it has its disadvantages: conducting e-visits with unfamiliar patients will run counter to the policies of most medical associations, as a face-to-face interaction to allow non-verbal communication, and a physical examination is needed for most diagnoses and treatment.

3.5 Research Design

Both quantitative and qualitative methods were through the use of primary methods of data collection. A three pronged approach was adopted in gathering data with regard to accomplishing the objectives enumerated above. These were:

- In-depth interviews
- Focus Group Discussions, and

- The Fielding of Structured Questionnaires

The combined approach was used to obtain a deeper understanding and to ensure validity. This enabled me to test the hypotheses I had generated from my theoretical Model, viz:

H_1: Greater awareness of recent advances in the use of ICTs in the health sector is positively related to the adoption of the applications.

H_2: Organizational structures that promote the development of ICTs are positively related to the acceptance of ICT applications by the health workers.

H_3: Investments in the provision of ICT applications by organizations are positively related to its acceptance by health workers

H_4: Health workers' individual characteristics are positively related to the adoption of ICT applications in the health sector.

H_5: Health workers' adoption of the use of ICT applications are positively related to their acceptance by the clients/patients.

H_6: Policies that favour the development of ICTs, in general, especially with a specific focus on health care, will facilitate the adoption of ICT capabilities in the health sector

3.6 Study Areas

The primary study area was the University College Hospital, Ibadan, Nigeria.

3.6.1 Background Information on the University College Hospital, Ibadan, Nigeria

The Act establishing the University College Hospital (U.C.H.), Ibadan, was passed into law in November,, 1952, following a visitation in 1951 to assess the clinical facilities for the clinical postings of medical students who are registered for the MB, BS. Degree of the University of London. It is a purpose-built built premier teaching hospital that was conceived to serve the need for internationally comparable medical education in Africa. The hospital, which in February, 1956, officially received Queen Elizabeth II and Prince Phillip, the Duke of Edinburgh, admitted its first patient in April, 1957 (Ajayi, 1998).

In more than four decades, the UCH has more than justified the vision of its founders as being the stimulus to medical education in West Africa, a centre of clinical excellence and the bastion of scientific research in the medical sciences. Through UCH, the University of Ibadan has been able to produce over 7,000 doctors and dentists, and twice the same number of scholarly publications through research. The hospital has trained over 8,000 nurses and midwives, and several hundreds of personnel in Medical Laboratory Technology, Medical Record Keeping and Radiography. These are in addition to teachers of Community Health, Environmental Health, Public Health Nurses and Primary Health Care Officers. The hospital runs post-graduate residency training in Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics, Psychiatry, Community Medicine, Dentistry and Laboratory Sciences. The number of beds has grown to 805. There are over 200 Hospital Consultants, and in-patient admissions exceed 10,000, while out-patient clinic attendances approximate to over 200,000 a year.

Today, U.C.H. is the predecessor to over twenty other teaching hospitals and some forty-nine Federal Medical and Specialist Hospitals. The fortunes of these hospitals could not have been divorced from the establishment of U.C.H., be it in the initial clinical staffing and the subsequent staff development and administration. It continues to meet these responsibilities to a wider society of health professionals and an array of health programmes. The hospital has 45 specialty and sub-specialty disciplines, and runs 75

Consultative Clinics a week. With the promulgation of a National Health Policy, U.C.H. has taken up the challenge to foster new directions, especially in medical education and curriculum development. I therefore consider the hospital quite suitable for testing the progress made so far by the Government of Nigeria in implementing its ICT policy in the health sector.

3.6.2 Secondary Study Areas

In order to obtain a wider coverage of the acceptance of ICTs in the health sector, six other institutions were selected from the six geo-political and health zones of the country, viz:

- North-east Zone: University of Maiduguri Teaching Hospital (UMTH), Maiduguri, Borno State
- North-West Zone: Aminu Kano University Teaching Hospital (AKUTH), Kano, Kano State.
- North-Central Zone: University of Jos University Teaching Hospital (JUTH), Jos, Plateau State
- South-West Zone: Obafemi Awolowo University Teaching Hospital (OAUTH), Ile-Ife, Osun State.
- South-East Zone: University of Nigeria, University Teaching Hospital (UNTH), Enugu, Enugu State
- South-South Zone: University of Calabar Teaching Hospital (UCTH), Calabar, Cross River State.

3.6.3 In-depth Interviews

Twelve in-depth interviews were conducted with 10 selected members of both the hospital and the College of Medicine's Management Committees and with two senior members of staff who were involved in an international research project employing ICT applications. Prior to the commencement of the interviews, the respondents were assured of the

confidentiality of their responses and that that their names would not be reflected in the transcriptions. Those interviewed were:

i). The Acting Provost, College of Medicine, University of Ibadan.

The Faculty of Medicine, which has now metamorphosed into the College of Medicine, was one of the first faculties created when the University College, Ibadan, came into existence in 1948. It is the clinical teaching ground for various categories of medical personnel is the University College Hospital, (UCH) Ibadan. The Provost is responsible for the day-to-day running of the College. The current Provost is also a Professor of Radiology and an Honorary Consultant to the hospital.

ii). The Dean, Faculty of Clinical Medicine, College of Medicine.

The Dean of Clinical Sciences is responsible for all of the academic programmes that are related to clinical medicine in the College, and is the alter ego of the Provost for all clinical training programmes. The current Dean is a Professor of Ophthalmology and also an Honorary Consultant to the hospital.

iii). The Director of Clinical Services, Research and Training, and the Chairman, Medical Advisory Committee at the University College Hospital.

As the title suggests, he is responsible for overseeing all matters relating to clinical services, research and training in the hospital. He is the alter ego of, and the deputy to, the Chief Medical Director, who is the Chief Executive of the Hospital. The current occupier is a Professor of Gastroenterology and an Honorary Consultant to the hospital.

iv). The Medical Librarian at the College of Medicine.

She is responsible for the day-to-day running of the Medical Library.

v). The Senior Specialist Analyst, College of Medicine.

She is directly responsible for the management of the Information Technology (IT) Unit of the College, including the management of the server, and the Internet system, including the College website.

vi). The Acting Director, Information Technology (IT), University College Hospital.

Similarly to his counterpart in the College, he is responsible for the management of all IT-related issues within the hospital, including the hospital website.

vii). The Director of the Telemedicine Unit

The Director is responsible for the day-to-day running of the Telemedicine Unit. He prepares the monthly schedules of programmes for the Unit and oversees the management of the equipment.

viii). The Consultant to the Government of India at the Telemedicine Unit, UCH, Ibadan.

A citizen and employee of the Government of India, which has been collaborating with the Federal Government of Nigeria in the establishment and funding of the Telemedicine service.

ix). The Deputy Director, Medical Records Department, University College Hospital, Ibadan.

She is responsible for the day-to-day running of the hospital record department, where all the records of patient care are kept. This department sees to the issuing, care, filling and storage of the patients' index cards and case notes. The department also produces the patients' statistics for the hospital with regard to patients' admission, care, discharge and follow-up appointments.

(x). The Deputy Director, Public Relations Unit, University College Hospital, Ibadan.

He is a top management staff of the Public Relations Department. This unit serves the first point of contact for all patients seeking information at the U.C.H. It also provides public relations services to the hospital. The Unit is the link between the hospital and the public.

xi). Senior Research Nursing Sister at the Fertility Research and Endocrinology Unit, Department of Obstetrics and Gynaecology, U.C.H., Ibadan.

She was selected because of her experience with the use of ICT application (mHealth) in conducting a research on the acceptability of Progesterone Vaginal Pill (PVR) – a new contraceptive method - in Africa being sponsored by the Population Council, New York.

xii). Another Senior Research Nursing Sister at the Fertility Research and Endocrinology Unit, Department of Obstetrics and Gynaecology, U.C.H., Ibadan.

He is top management staff of the Public Relations Department. This unit serves as the first point of contact for all of the patients seeking information at the U.C.H. It also

provides public relations services to the hospital. The Unit is the link between the hospital and the public.

xi). Senior Research Nursing Sister at the Fertility Research and Endocrinology Unit, Department of Obstetrics and Gynaecology, U.C.H., Ibadan.

She was selected because of her experience in the use of ICT applications (m-Health) in conducting research on the acceptability of a Progesterone Vaginal Pill (PVR) – a new contraceptive method - in Africa, which was being sponsored by the Population Council, New York.

xii). Another Senior Research Nursing Sister at the Fertility Research and Endocrinology Unit, Department of Obstetrics and Gynaecology, U.C.H., Ibadan.

She is also involved in the use of an m-Health application for providing health information to family planning patients in a project that was being funded by the Bill and Melinda Gates Foundation in Nigeria. She also uses a Personal Digital Assistants (PDA) to collect client information from clients accepting the Progesterone Vaginal Pill (PVR).

The in-depth interviews (IDI) enabled me to probe the interviewees on issues such as the local capacity that is available to use ICTs effectively and, if not, were there solid plans to strengthen that capacity; the involvement of the beneficiaries and end users in the development of existing ICT-enhanced health information and health-care programmes; the extent to which ICTs were building on, and strengthening, the existing information, knowledge and communication systems; the challenges that were being faced in implementing this type of intervention, and what needed to be in place in order to improve effectiveness. Another major area where IDIs was particularly useful is in determining the roles and collaboration of government (e.g., the Government of India), non-governmental

organizations (such as the Population Council, New York, the Bill and Melinda Gates Foundation, etc.) and other health consortia.

In order to maximize the quality of the information that was to be gathered, leading questions in the IDI Guidelines were designed in line with the study's objectives. All the interviews were tape-recorded by me and were later transcribed.

3.6.4 Focus Group Discussions

Focus group discussions (FGDs) are another form of in-depth interview which requires a group of individuals. A focus group can be defined as " a group of individuals selected by a researcher to discuss, comment on and reflect on issues from personal experience in relation to the topic" (Gibbs, 1997). Zikmund (1997) condensed the advantages and disadvantages of focus group interviews as follows: "groups generate a larger range of information, more views can be expanded on by the process, the interaction of members can create a chain of thought for more ideas from the blue, and since no individuals are required to respond to questions directly, responses might deviate from the topic at hand." The assistance of a co-moderator and a note-taker (transcriber) was sought, so as to ensure that details of the discussions were accurately captured, the discussions were tape-recorded with the approval of the participants. The FGD sessions were particularly helpful in obtaining the perspectives of the health workers and clients about the merits and demerits of ICTs in the health sector, and what they regard as necessary for them to become relevant to the culture of using these emerging technologies.

Six focus group discussions were conducted, comprising of 8-10 participants each. The characteristics of the groups are depicted in Table 3.1 below. The sixth FGD group was necessary in order to explore the experience of those that had used ICTs successfully in their profession, particularly in the banking sector. The Central Bank of Nigeria (CBN) had introduced a "Cashless Policy" (i.e., electronic banking and use of various ICTs for making payments and withdrawals), which is gradually being implemented in Nigeria. The group

Table 3.1: Characteristics of Focus Group Discussants

S/N	Group Type	Group Characteristics
1.	Hospital Consultants	Specialist doctors in various specialties – Medicine, Surgery, Obstetrics & Gynaecology, etc.
2.	Resident Doctors	Qualified medical practitioners undergoing specialist training programmes (Residency Training).
3.	Nurse/Midwives	Practitioners in the nursing profession
4.	Medical Students	Undergraduate students of the University of Ibadan undergoing medical training.
5.	Clients/Patients	Those seeking medical advice and care in the hospital
6.	Successful Users of ICTs in other professions	Included professionals from the banking sector, journalists and IT specialists

volunteered useful information on how the same strategies could be employed in the health sector.

The FGD Guidelines are attached as Appendix 2, but some of the issues had to be varied, depending on the participating groups, as well as on the flow of the discussions.

3.6.5 Fielding of Structured Questionnaires

The quantitative aspect of the research focused on how I would be able to quantify the relationship between variables in order to construct statistical models to explain social, educational and environmental factors influencing the adoption of ICTs to obtain health information and manage health conditions. The questionnaires comprised of questions concerning the use of emerging information technologies, as well as questions that related to socio-demographic and personal characteristics. Questions also covered the content use of ICTs, as well as attitudes to their use.

3.7 Pilot Study

A pilot study was conducted with about 10 percent of the total questionnaires fielded in order to ensure that there was no ambiguity, and all the questions were clearly understood by the respondents. Only a few questions had to be reworded to make them clearer. The distribution of the various questionnaires are depicted in Table 3.2.

Table 3.2: Structured Questionnaires Fielded

Teaching Hospital (Location – City, Health Zone)	**Group/ Number of Questionnaires Distributed**		
	Health Workers	**Medical Students**	**Patients/Clients**
UCH Ibadan	169	102	106
UMTH, Maiduguri, Northeast	43	18	-
AKUTH, Kano, Northwest	37	17	-
JUTH, Jos, North Central	53	17	-
OAUTH, Ile-Ife, Southwest	48	18	-
UNTH, Enugu, Southeast	39	13	-
UCTH, Calabar, South-South	53	18	-

The questionnaires allowed personal matters to be reflected upon while detailed questions were being asked. The significant disadvantage of questionnaires is the likelihood of the misinterpretation of the questions asked and the answers sought (Jacqueline et al., 1970).

3.8 Challenges Encountered During Data Collection

3.8.1 Delay in obtaining Ethical Approval

I had a little delay in commencing my fieldwork because the University of Ibadan and the University College Hospital Ethics Committee insisted that my proposal must be approved before I could start the data collection. I finally obtained written approval.

3.8.2 Scheduling Issues:

It was difficult to book interview appointments as these are key members of the management staff, with very busy schedules within the College and the Teaching Hospital.

I had to deal with many re-scheduling issues, as some of these appointments were booked weeks in advance.

Scheduling a venue for some of the interviews was also a major setback, because in order for me to conduct and record these interviews, I needed a quiet place without any interference. This constituted a problem as most of the teaching rooms were being used. I resorted to conducting these interviews in the staff's offices.

3.8.3 Focus Group Issues (FGD)

Gathering participants for the FGD was a great challenge, as some of the nurses were busy with patients and it was difficult for them to spare the time for discussions.

With regard to the Resident Doctors, I had to secure their daily schedule from a key member of staff in order to invite those who were not "on call duty". However, despite this, a few were paged and had to exit intermittently to attend to their patients.

The FGD involving the patients was also a difficult task, as I had to target the pre-natal patients' consultation sessions in order to coax these patients into attending the discussion. The majority of the group were reluctant to participate.

To avert these disruptions of groups in future or related studies, it is suggested that interviews and FGDs should be conducted away from the hospital premises. A room or hall situated near the hospital could be more suitable.

3.8.4 Questionnaire Issues

In order to get more coverage of the country for this study, I had to distribute questionnaires to 6 other teaching hospitals in Nigeria, but outside Oyo State - my primary area of study. The country has six health zones and a teaching hospital was selected from each zone.

The prevailing political state of Nigeria deterred my plan to personally visit these hospitals as there was a general state of unrest (due to the Boko Haram terrorist bombings) across the country. This evidently stopped me from travelling outside Ibadan. I therefore contacted some senior staff, mainly specialist Consultants within these various hospitals, who helped with the fielding of my questionnaires. This seemed daunting, as I needed people I could trust with this task. These questionnaires were sent by courier mail in order to have a safe and secured delivery. This proved to be very expensive, because I had to enclose return-paid delivery envelopes for the safe return of these questionnaires via courier. I was privileged to brief these coordinators during the national postgraduate medical examinations that held in Ibadan while I was conducting the in-depth interviews.

3.9 Data Analysis

The study utilized both quantitative and qualitative methods of data analysis, as appropriate for each objective.

The analysis of the quantitative data, consisting of words, was done manually by adopting Hawe et al.'s (1990) four basic steps to analyze qualitative data. The first step was to organize the data by transcribing notes from the tape recording of the discussions and interviews. The product of this activity was carefully compared with notes taken during the discussion, and a final comprehensive list of the ideas raised by the participants. The second step was shaping the data information by assessing themes that emerged from the guides. At this stage, various views that had been expressed on each objective in the different groups were listed. This was done by sorting and noting the different categories of responses that were found under the specific objectives. The third step involved interpreting and summarizing the information by looking at individual perceptions and attitudes towards the usage of ICTs to access health information and/or manage health conditions. The fourth step was the explanation of the findings from the qualitative data analysis.

The quantitative data were computer processed and analyzed with a Statistical Package for Social Sciences (SPSS Version 18). The appropriate and applicable statistical method, which is the Z Test, was conducted. A Z-test is a hypothesis test based on the Z-statistic, which follows the standard normal distribution under the null hypothesis. A Z test is usually used when the data is approximately normally distributed. A Z test is used when the sample size is greater than 30; data points are independent from each other and are normally distributed. However, for large sample sizes (over 30) this does not always matter. The data should be randomly selected from a population, where each item has an equal chance of being selected.

For example, in determining if there is a difference in proportion between health workers and medical students in U.C.H. about awareness of the Radio as a type of ICT.

Comparison of 84.6 (143/169)*100 and 70.6 (72/102)*100 representing, respectively, the proportions of health workers and medical students that regard radio as being an ICT.
Let p_1 be the proportion of all health workers in U.C.H. who regard radio as an ICT (awareness of radio as ICT). Let p_2 be the proportion of all of the medical students in U.C.H. who regard radio as being an ICT.

The null (H_0) and alternative (H_a) hypotheses are:

$H_0 : p_1 = p_2 \quad vs \quad H_a : p_1 \neq p_2$ (Two sided alternative)

i.e., **H_0** : There is no difference between health workers and medical students in relation toan awareness of radio as an ICT.
H_a: There is a difference between health workers and medical students about the awareness of radio as an ICT.
Test statistic: Z-test
Level of significance: 5%

Evaluation of the test statistic
The test statistic to evaluate the hypothesis about two proportions is:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_1(1-\hat{p}_1)/n_1 + \hat{p}_2(1-\hat{p}_2)/n_2}}$$

where $\hat{p}_1$ and $\hat{p}_2$ are sample proportion estimates from each group (84.6% and 70.6%) and n_1 and n_2 the corresponding sampling seize (169 and 102).

The sample proportion estimates are:

$\hat{p}_1$=0.846 and $\hat{p}_2$=0.706 and n_1=169 and n_2=102

So $z = \frac{0.846 - 0.706}{\sqrt{0.846(1-0.846)/169 + 0.706(1-0.706)/102}} = 2.64$

And so the p-value is 2P(Z>2.64)=2P(Z<-2.64)=2*0.0040=0.008.

P-value=0.008<0.05,

Decision: H_0 is rejected in favour of H_a.

Conclusion: Thus, there is evidence that there is a difference between Health workers and Medical students in U.C.H. about the awareness of Radio as an ICT at a significance level of 5%.

3.10 Ethical Considerations

Ethics in research is about the responsibility to respect the right of others. There were no physical risks involved in this study.

3.10.1 Voluntary Participation

All of the participants were provided with clear information and asked if they would be willing to participate or not. Only those who were willing to participate were involved and written consent was obtained.

3.10.2 Confidentiality

All information provided by the participants was kept strictly confidential. Responses collected were kept in confidence.

3.10.3 Beneficence

There were no financial requirements or demands from the participants. The results will be part of ongoing worldwide research to improve communications in the health sector in Nigeria and Africa.

3.10.4 Non-maleficence

The study did not involve any invasive procedures and therefore there was no undue discomfort to the participants.

In addition, I, as the researcher, did not visit areas that were in political distress and could cause harm to me or to others during the field work.

3.11 Conclusion

With the cooperation of the FGD coordinator, transcribers, interviewers and those interviewed, the objectives of the data collection process were accomplished within a period of four weeks, in March and April, 2013. It is important to note the deep cooperation of the management, staff and students of the College of Medicine and the U.C.H., despite their busy schedules. Likewise, the cooperation of the faculties, staff and students in the other six teaching hospitals, spread across the country, is also noted.

CHAPTER FOUR

Findings from In-Depth Interviews, Focus Group Discussions and Survey

4.0 Introduction

In this chapter, I have described the findings of the various research methodologies used to gather information on how Information and Communication Technologies (ICTs) have influenced access to health care in Nigeria, especially at the University College Hospital and the College of Medicine, University of Ibadan, Ibadan, Nigeria, which are the flagship of the country's medical education. A three-pronged approach was adopted in gathering information. In the other six teaching hospitals, only questionnaire surveys were conducted, for reasons that were stated in Chapter 3.

First, twelve in-depth interviews (IDIs) were conducted with 10 selected members of both the hospital and the College of Medicine's Management Committees and two senior members of staff who were involved in an international research project employing ICT applications. Secondly, six focus group discussions were conducted, comprising of 8-10 participants each. The FGD sessions were particularly helpful in obtaining the perspectives of the health workers and clients about the merits and demerits of ICTs in the health sector, and what they regard as being necessary for them to replicate the culture in using these emerging technologies. Thirdly, a self-administered questionnaire was randomly distributed to different cadres of health workers, including health administrators, within the hospital. Similarly, another questionnaire was administered to members of the community who either had used, or were yet to use, the services available at the hospital. These were an effort to obtain the perceptions of the employees, users and non-users of hospital services.

The reports of the analysis of the in-depth interviews, focus group discussions (FGDs), as well as that of the questionnaire survey. are described in this chapter. The report has been structured into three main sections:

- Report of the analysis of the In-depth interviews
- Report of the analysis of the Focus Group Discussions
- Perceptions of various cadres of staff, users and non-users of hospital services, on how Information and Communication Technologies (ICTs) have influenced access to health care in the medical school and the hospital.

4.1 REPORT OF IN-DEPTH INTERVIEWS WITH MEMBERS OF THE COLLEGE AND THE HOSPITAL MANAGEMENT COMMITTEE

4.1.1 Types of ICTs available in the facilities.

Several types of ICTs were reported to be in use by the respondents. These included different types of computers, including desktops, laptops, i-pads and tablets. Some respondents mentioned cell phones, which they claimed that "everybody has." Others were smart phones, Internet and emails, and the intranet, "which connects all the staff members." The Chairman, Medical Advisory Committee (CMAC), also remarked that the hospital was making use of "electronic record systems." In addition to these, the hospital employs the use of "e-radiology", which enables the images of radiological investigations to be accessed from different selected sites within the hospital, and "e-pharmacy", which enables the doctor to prescribe drugs from his consulting room desk and directs the patient to collect them at the hospital pharmacy, without necessarily writing a prescription form. A Consultant stated:

> "There are cell phones – something everybody has, smart phones, i-pads, laptops and emails. We also have the intranet – actually, which connects all of us. We do not have pagers here. Of course, Internet includes social media."

The Dean of the Faculty of Clinical Sciences, in his contribution, said:

> "We virtually use all kinds of ICTs available to us, ranging from computers, laptops and what you have, ranging to things like Telemedicine..... We use electronic presentations (projectors) for teaching. The telemedicine facility enables us to exchange ideas with other medical teachers in other parts of the world on subjects (diseases) which are not particularly common in this environment."

However, the Provost of the College of Medicine was more optimistic in her contribution when she stated that:

> "In the near future, and I think we are getting there gradually, we want the boardrooms to be filled with computers. We are hoping for more linkages where students can come from abroad and run exchange programmes."

The contributions of other respondents varied with their job descriptions. For instance, those in the Medical Records Department would need "e-record electronic systems", while a good number of the Consultants would prefer video-conferencing (with patients, and colleagues and other health workers), and for training purposes. This was corroborated by the Head of the hospital's ITU, who said that:

> "If a digitizer is made available for the radiologist, he can report the x-ray to anywhere in the hospital."

The Head of the Telemedicine Unit also supported this idea, when he stated that:

> "I think there are some handsets that doctors need to have, as well as their patients, with special software where the doctor can communicate with the patient from his/her home, without necessarily coming to the hospital, but for now, we do not have the facility. We just make use of the general computer systems."

For research, nursing officers at the Fertility Research Unit and Endocrinology seemed to be interested in Personal Digital Assistants (PDAs) and software that would make the services that are being rendered in the Unit more efficient. One of them remarked that:

> "Where I worked before, there was a software developed for the clinic called 'IITA Medical Unit Software' which is used to capture the data of clients/patients on a daily basis. It makes it easy for whoever is taking over from you to continue management, even when you are not there."

Regarding the importance of the technical knowledge of the users, as a pre-requisite for effectiveness, the Head Librarian corroborated this when she lamented that "it helps with research and write-ups, but that is only for those who know how to use the library facility."

4.1.2 The existence of ICTs within the establishment

With regard to the duration of use of various ICTs, the responses varied among the respondents, depending on their designations, their years of service within the establishment and their daily responsibilities. There was no reasonable consensus among the respondents, but the Head of the ITU put it succinctly when he affirmed that:

> "Well, if we are looking at the usage of computers, networking, use of Internet practically, I would say it has been in existence since 1998. I joined the system in 2000, but there were some efforts already on ground. They were using modems, dial-up connections to send emails. We are beginning to see computers on many tables. These were also in use at the time we were setting up servers for Internet connectivity. So I would say that, other than dial-up, I would think 1998 or thereabouts."

4.1.3 The effectiveness of ICTs in the College and Hospital

Many of the respondents were of the opinion that ICTs were not being effectively used in the hospital, or in the College of Medicine. However, the most widely used were the desktops and laptops, for the administrative services, scientific research, teaching/training and email services. As a Research Nursing Officer declared:

> "The PowerPoint presentation is highly effective because it makes the teaching and learning experience easy and more interactive. Regarding PDAs, it makes collection of data easy and efficient."

However, she quickly added that, as useful as they are, she could not draw a conclusion about the general effectiveness of the ICTs in the system. She was of the opinion that they are not yet effective, as they have not been fully employed. She remarked that:

> "I can't say very effective, because out of five service providers in this Unit, only 2 have access to mobile health (m-health). If it were to be the five providers that have access to m-health, I think counselling sessions would have been made easier, more convenient, and clients would benefit greatly from them."

From nearly all the respondents, it would appear that the effectiveness of ICT in the establishment depends greatly on the availability of the equipment, software and distribution within the hospital and the College of Medicine. This is well illustrated in the

advent and current status of the Telemedicine Programme in the hospital. It was established by the Federal Government of Nigeria and was nicknamed "NASRDA" (National Space Research and Development Agency). It was stopped because the satellite went missing. Thereafter, the National Telemedicine Programme was discontinued. As the Head of the Unit said:

> "Now, we are trying to link certain centres from U.C.H. by making use of a satellite dish being provided by NASRDA. When this starts, we can continue but, now, we use the one provided by the Government of India to connect U.C.H. to different hospitals. Now, all African centres are connected to U.C.H. and can log into classes in India."

He added that:

> "We have been doing teleconferencing, which is under the Pan African Telemedicine Programme. There is a hospital in Germany which we normally log into for training doctors through teleconferencing every Friday of the month."

4.1.4 Acceptance of ICTs by Health workers

There was divided opinion among the different cadres of health workers as to how widely accepted ICT applications were within the establishments. While most of the health workers claimed to be happy about the introduction of the applications into the system, some were more objective in their assessment. As the Head of ITU stated:

> "Not every professional embraces ICTs. They may embrace the gadgets, but when it comes to IT, they see it as a threat to their profession."

Quite a number of the respondents would seem to agree with the Head of ITU as to the potential threat that is posed by ICT applications to their employment. The Head of ITU continued:

> "They are of the opinion that if you bring 'this thing', it will make the management relieve them of their jobs. The user perspective is the major problem we are facing."

Other workers are of the opinion that ICTs are embraced more at U.C.H. than "nationally", and that the population of uneducated Nigerians is too high to allow ICTs to

be widely accepted by the stakeholders. However, not all the respondents were that pessimistic. As a consultant declared:

> "The only way to make progress is by using these technologies."

4.1.5 Obstacles against the use of ICT Applications

Several obstacles were mentioned by the respondents. These included poor funding, lack of manpower and of power (electricity) supply. The hospital, and the nation generally, have had an erratic power supply in the last twenty years, with incessant power failures. However, as to which is the greater obstacle between the power supply and the funding, the respondents were widely divided. As the CMAC remarked:

> "Mainly, it is funding because this is a public hospital. Our funding comes from the Federal Government and budgetary allocations are dwindling. They are unstable and unpredictable, so funding is the main issue."

A consultant, who expressed himself very passionately during the IDI, did not seem to agree that funding was a greater obstacle than power supply. He said:

> "I know I sound like a broken record but it is mainly power supply and infrastructure that you need to provide the kind of ICT services available in other parts of the world. We are not investing in it. Yes, it could be power and funding, but I think more of the first.*"*

Other obstacles that were mentioned as inhibiting the development/growth of ICT in the health `sector are: confidentiality, abuse of patients' privacy by health workers and the lack of political will on the part of the government. Some respondents believed that, if not properly managed, health workers may abuse the rights of the patients to privacy and confidentiality, since the information about them can be easily accessed. A consultant said that "you don't want to give others information they can use negatively." In the opinion of the Dean of the Faculty of Clinical Sciences, these should not be referred to as obstacles. He stated:

> "I won't call them obstacles, I will just call them challenges.*"*

However, he was quick to admit that the major "issue" is the lack of a reliable power supply. As he confirmed:

> "To have a versatile ICT Unit, and for ICTs to run efficiently, we need a constant electricity supply and, without this, ICTs cannot work."

Most respondents agreed that funding and power are central to the development of ICTs in the health sector. Another respondent believes that the main obstacle is the perception of the user. He remarked that:

> "I would say it is a user perspective. People don't want to change. They believe in paper work and that's what they have been doing for the past 50 years! They want to be left alone to continue with it. But if you want to distribute tablets and laptops, they will gladly collect them. However, try to change the process they are used to and make them use the applications in their work, they will resist! The only thing that can change that is a federal government policy."

4.1.6 Health workers' perspectives on how ICT Applications can improve their practice.

Despite the views that were reported earlier by different respondents during the IDIs, it was quite heartening to note that there was a general consensus that the use of ICT applications in the health sector would improve the practice of health professionals, if these applications can be fully employed by them. Some of the benefits cited by the respondents were:

- "With ICTs, the work of doctors and nurses will be so much more enjoyable, and communication will be easy and efficient."
- It will decrease the waiting time for patients, which is a major issue in the hospital.
- Nursing education, administration and clinical practice "will be easier and faster."
- "Patients will be able to send messages to me."
- It will hasten the analysis of research data.
- Regarding teaching: "ICT is an enabler, if you don't use IT, you may not be able to fit into future development processes."
- "It creates the platform for dispensing broader and more flexible knowledge."
- Students' performance can be measured easily and faster.

- Reports of laboratory investigations, including haematology and clinical pharmacology, could be accessed in the clinics, wards and theatres.
- It makes teaching and learning easier for lecturers, resident trainees and students. As expressed by the Provost of the College of Medicine:

  > "Before lectures are delivered, ICTs will enable the students to have gone on the Internet to study around the subject, read about it and broaden their knowledge, so that when they come to class, communication will be easy and a meaningful lecture can be given."
- It can improve the records system for easy retrieval of patients' case files, easy on-line retrieval of previous management note/records, and the reduction of storage space.

It is not without significance to note that nearly all of the IDI respondents recognised that there are enormous benefits in the use of ICTs for improved and efficient communication within the health sector. They all believed that it would make their work more flexible. As one of the consultants remarked:

> "It is very important for health care delivery and practice. Being able to communicate with people, especially patients; being able to access information about patient care; being able to make information available to patients themselves – it certainly helps with patient management."

Although the Dean of the Faculty of Clinical Sciences was quick to pronounce that "the institution has a very robust ICT Unit, practically in every department and faculty," most respondents are of the opinion that the usage of ICTs is not as high as one would expect. As another IDI respondent, acknowledged "it (usage) is a pyramid upside down." The probable interpretation of this is that ICTs were more employed by the consultants than the resident trainees, postgraduate and undergraduate students. These are followed by the group of administrators, nurses and, lastly, the laboratory technicians/technologists. This is understandable, as the consultants and resident trainees "use them for research and the teaching of graduate and undergraduate students." As remarked by the Head Librarian: "the library is always full of them."

The respondent was probably considering the percentage population of each cadre of health workers within the hospital, and felt that the consultants and resident doctors are a small fraction of those who should be able to employ ICT applications in their work. Another striking benefit of ICT applications that was mentioned was the promotion of distance learning, as this is very useful for e-learning.

4.1.8 Perspectives of Respondents on ICT Policy in Nigeria

It was very regrettable that almost all the respondents were not aware of the existence of the National ICT Policy. Those who had a faint idea of its existence were quick to comment that it had never been operationalized. The Nigerian ICT Policy, which was launched in January, 2012, was developed in support of the development of Nigeria's Vision 2020 (FGN, 2012). The following statements and remarks from the respondents absolutely reflects the poor dissemination of the policy:

> "Do we have a policy? The only one I'm aware of is to patronise made-in-Nigeria goods. There may be one, but it is not glaring. I do not think we have a national policy."

> "I am not aware of it. Can you tell me something about it?"

> "The policy is there, I think. It is just being implemented at the federal level for now. The state and local governments have not really embraced it, and those who have embraced it at the federal level have not done so thoroughly."

Prior to the launch of the ICT Policy, effort made by the government towards ICT development in Nigeria included the launching of the National Telecommunication Policy in 2000, and the development of a comprehensive Science and Technology Policy in 2001; the development of the National Information Technology Development Agency (NTDA) in 2001. It will appear that these efforts were not widely publicised, as is reflected in the statements of the IDI respondents, above. It is worrisome that the policy may not achieve its goal, which is "to create a conducive environment of the rapid expansion of ICT networks and services that are accessible to all at reasonable costs, and

for the transformation of Nigeria into a knowledge-based economy (FGN, 2012: 8-10). As succinctly remarked by the Provost of the College of Medicine and a Research Nursing Officer, respectively:

> "The ICT Policy is nothing until it is implemented, and it needs to be linked to various sectors.'

> "The ICT Policy is actually encouraging, but the issue is that we have policies in Nigeria and do not implement them."

4.1.9 The disadvantages of ICT Applications to both Health Professionals and Patients

There was a consensus among almost all of the IDI respondents that the issue of confidentiality is the most worrisome. Generally, across the country, Nigerians do not want information about their health conditions shared with the public. With the use of ICT applications, there is a general belief that this information will leak, considering the degree of Internet hacking in the country and in many other parts of the world. It is believed that the systems can be hacked, and unauthorised individuals or groups may have access to sensitive information. Another major disadvantage that was mentioned by the respondents is that damage to information can occur if it is not properly stored. As the Chairman of the Medical Advisory Committee suggested:

> "The patients are not sure if this information will be made available to the whole world, as we are using the worldwide web, which means it can be accessed if the password is compromised. So that is a major disadvantage."

The fear regarding confidentiality has been experienced by the Research Nursing Officers when using their PDAs to capture data from clients participating in a research study on the acceptability of a new contraceptive, the Progesterone Vaginal Ring (PVR), being introduced by The Population Council, New York, USA, into Nigeria and a few other African countries:

> "Confidentiality is the main issue that bothers clients. As you bring out the PDA, they instantly think that the information is going to America! The patients are sometimes scared of exposure."

The Director of the Medical Records Department also confirmed this, when he stated that:

> "Our patients are afraid because people know how to hack the system, so that is one of the problems we have. It is indeed a threat and a headache for us."

This also brings onto the front burner the issue of the literacy level of the populace and its effect on the general adoption of ICT applications. The literacy level of those in the rural areas is poor. Coupled with this is the lack of access to an electricity supply. As surmised by a Research Nursing Officer:

> "It is very poor. Right in the rural areas, there is no existent power supply. There are some villages with no access to electricity supply. To do anything there, you need to go with a generating set. It is a major constraint."

She concluded that to encourage the use of ICT applications in the rural areas and among the scared villagers, there is a need to create awareness, to improve the infrastructure, to establish rapport and to build a strong relationship. However, the Head of ITU was more optimistic in his contribution. He remarked that "there is nothing that has advantages without disadvantages." He would rather see them as "challenges."

Another disadvantage mentioned was overdependence, as the health workers may depend more on ICTs than on their clinical acumen, and especially, they may ignore the "human element"! As one of the consultants to the ITU identified:

> "I have heard of developments where you could actually have a robot diagnose your illness and talk to you. There is a tendency to depend on these applications, and you won't have to do anything anymore. Someone joked and said that if there was a system that could bathe him, he won't have to do it! So there can be overdependence."

The fear of health workers losing their positions reared its ugly head again during the interview about the disadvantages of ICT applications. There is indeed a morbid fear among some of the health workers that, with these applications, many positions in the hospital will become completely obliterated. A staff member of the ITU shared his experience on the development of software that was introduced to the units within the hospital:

> "A particular unit was meant to have this software, and some staff members were threatened that this might make them lose their jobs. So that sort of misconception can be a disadvantage and a problem. ICTs cannot replace humans, although it can limit the number of workers in a particular section, but if you develop yourself to use the ICT tools, then, you can remain relevant."

In his opinion, the workers need to be educated and carried along, so that such misconceptions can be dispelled. He believed that when workers are carried along, "they will see that it will enhance their work."

4.1.10 Perspectives of health workers on selected factors that can affect the adoption of ICT Applications

The IDI respondents were requested to provide their opinions on four selected factors that may affect the adoption of ICT applications for effective and efficient communication, both within the system and between health workers and their clients/patients. he selected factors were:

- Awareness of ICT applications in the health sector
- The availability of the applications
- The affordability, and
- The mind-set of the potential users of these applications.

a) Awareness of ICT Applications

All the respondents agreed that awareness is crucial for the adoption of ICT applications for communication within the health sector. The general consensus was that it is only when both the health workers and patients/clients are aware of their existence that they will think of adopting them. However, it was also emphasized that human beings are resistant to change. Furthermore, use of these applications will require a degree of literacy. According to the Director of Medical Records:

> "The public should be educated. Even with the bank ATM cards, you find that most people do not want to use them. They would prefer to queue in the bank halls for hours rather than use the cards to withdraw cash! It has to do with our level of education – most people are illiterate. They need to be educated."

b) Availability of ICT Applications

Most participants also agreed that the adoption of ICT applications in the health sector will be affected by their availability. However, a few were of the opinion that availability does not necessarily influence the utilization – that there are more important factors, such as the lack of an electricity supply and the willingness to change attitudes.

c) Affordability of ICT Equipment/Tools

Affordability of these tools/equipment was also considered a major factor in their adoption by the respondents. It was generally agreed that ICT tools are very expensive, and many Nigerians cannot afford the necessary gadgets or tools. Financial constraint is therefore considered a major hindrance to the adoption of these applications in the health sector. As the Head of ITU lamented:

> "They are not affordable at all, looking at our salaries (earnings). How can someone who takes home a salary of only N40,000.00 (Forty Thousand Naira) monthly buy an i-pad worth N150,000.00 (One Hundred and Fifty Thousand Naira). This is unrealistic.

d) Mindset of potential users

The mindset of the potential users is also considered to be a major factor, and "this is also affected by our culture and literacy level." It was widely accepted that the level of education affects the mindset of an individual – that the greater the individual's exposure, the more positive the mindset is. As stated by a consultant:

> "I do not think people are averse to it – well, those I come across. The only problem could be the level of education; the non-educated segment of the society is more likely to have a negative attitude towards the adoption of ICTs for communication in the health sector."

Though it was widely accepted that the mind-set is crucial, some respondents are also of the opinion that it can be changed through proper training. According to a Research Nursing Officer:

> "It is not easy to change attitudes in Nigeria. We already have a mindset about how we do things. To make health workers adopt ICTs in the health sector, proper training would be required, especially for the older hands, who believe that they can get along without computers."

4.1.11 Suggestions from IDI participants to the hospital management and the government.

It was generally agreed that the hospital has a major role to play in overcoming the non-use of ICTs, especially for enabling health workers to communicate with their patients/clients. They were of the opinion that the use of ICT applications should be encouraged and funded by the hospital. Adequate funding was regarded as a major necessity for the government in order to promote the use of ICTs. In addition to this, there must be adequate infrastructure to support ICT development in the health sector, especially, the provision of a regular electricity supply. It was also recommended that the ICT Policy be efficiently and effectively implemented "if there was one in existence."

4.2 REPORT OF FOCUS GROUP DISCUSSIONS (FGDs)

4.2.0 Six focus group discussions (FGDs) were conducted, each comprising of 8 to 10 participants. The groups were comprised of hospital medical consultants, resident doctors, nurses/midwives, medical students, clients/patients, and professionals who have successfully used ICT applications in their professions. The FGD sessions were particularly helpful in obtaining the perspectives of the various groups about the merits and demerits of the ICT applications that are available in the health sector.

The reports of the findings of the FGD sessions have been sub-structured into four groups:

(i) Findings from the group of certified and registered professionals, including medical consultants, resident doctors and nurse/midwives, i.e., the report of three FGD groups are merged here.

(ii) Findings from medical students who are yet to be certified or registered as health professionals; they are still in training.

(iii) Findings from patients using the services of the hospital; and

(iv) Findings from a group of journalists and bankers who are conversant with the use of ICTs in their professions, and who have successfully employed them.

4.2.1 Findings from FGDs with certified and registered health professionals (Medical Consultants, Resident Doctors and Nurses/Midwives)

(a) Types of ICTs available

The major ICT applications being used by the three groups of discussants for communication in their professions were mobile telephones, computers (I-pads, desktops, tablets, laptops) and Telemedicine. The common applications being used were short message system (SMS) alerts, video calling, tele- and video-conferencing and social networking. The resident doctors described ICTs in the hospital setting as "a form of medium through which information can be disseminated about patient care, right from when he/she plans to visit the hospital, while in the hospital and after leaving the hospital." The three groups of professionals had similar opinions on the types of ICTs that can be applied in the health sector. A resident doctor was particularly fascinated by the potentials of Telemedicine, and stated that:

> "Telemedicine is one of the biggest inventions in terms of medical communicating technology, in which an operation that is performed on a patient can be watched live in other parts of the hospital, and even outside the hospital itself, and there is real communication and collaboration. It can be used to train while the surgery is being performed, and the procedure can be recorded for teaching purposes."

However, another resident doctor was quick to follow up on the opinion of his colleague, when he lamented that:

> "You know that we have not really explored this in this part of the world, but I agree with you that it is real in the developed countries. Such was the case of a cardio-thoracic surgery that was being performed in the USA some time ago, and the lead surgeon was far away from the USA. Yet he was giving instructions to the surgeon in the operating theatre who was performing the surgery! That is one area we can explore, but we have not got there yet."

Most of the discussants agreed that Telemedicine has really improved medical care and communications in the advanced countries, between doctors, other health workers and patients. The management of difficult cases can be discussed with other professional colleagues around the world. It has helped to bridge the gaps between doctors, their colleagues and the patients. It has made consultation and patient care relatively easier.

The use of emails and text-messaging were also found very useful by the discussants in the three groups, especially in communicating between health workers and patients. According to them, these means of communication have prevented repeated visits by the patient to the hospital as a report of investigations and prescriptions can be communicated through both means.

(b) Duration of Use of ICT Applications

The discussants in the three groups stated that ICT applications, especially Telemedicine, has been in existence at the hospital for about eight years. The College of Medicine network, according to the consultants, started in 1999, although the server was not purchased until 2002. The University College Hospital network started much late, in 2005. The electronic medical record system was started between 2004 and 2005 but "there had been some hitches." It is yet to take off! According to the nurses/midwives, they started using computers in their various departments/units since 2007, although the personal data assistant (PDA) was introduced a year ago. However, they all agreed that the mobile handsets had been in use for over ten years. A medical consultant remarked that:

> "The hospital supplied doctors in all the departments with cell phones, without any financial obligation to the individual as a form of Closed Users' Group (CUG); so we can contact doctors on call, and nurses can talk to doctors and vice versa. I think that is an improvement. We call it "CUG."

(c) Effectiveness of ICTs and their applications

According to the nurses/midwives, the cell phones have been useful in communicating with patients. Sometimes, patients request that health workers send the results of their investigations to them as text messages. Some have also claimed that the use of Power

Point and video presentations at the Ante-natal Clinic have been very effective in getting information across to the patients. A Research Nursing Officer remarked that:

> "The use of the projector and Power Point has been effective. The use of the PDA during interviews with the clients helps to capture the data 100% without missing anything out."

Another nurse/midwife narrated her experience on the use of the mobile phone:

> "For example, a patient who was bleeding called me on the phone and I passed the message to a doctor who prescribed some drugs for her through the telephone. She used the drugs and felt better. So it makes communication easier between us and the patients."

Other discussants were of the opinion that ICT applications have not been effective in the hospital, and the issue of the medical electronic record system re-surfaced! A medical consultant made this comment on the Medical Record Unit:

> "The Central Medical Record Unit has many computers but I cannot really assess the efficiency of the Unit when it comes to keeping data. I find that most of the time, everybody is struggling with hard copies of the case-notes of the patients. They don't even want to accept ICTs in that Unit; they are still very dogmatic. Yes, we can have the hard copies, if necessary, but we can have them along with the electronic format, even if it is just a summary of what is in the case-notes. They surely need a lot of improvement."

Another resident doctor observed that the health workers are not maximizing the opportunities offered by audio-visuals. He observed that even though televisions are available in most clinics, the health workers "do not show health-related films or programmes; sometimes, they play or show something irrelevant."

(d) Benefits of ICT Applications to health workers and patients

The discussants in the three groups had similar thoughts on the benefits of these applications for their practice and the patients. The benefits are in the areas of scheduling appointments for patients, dispensing drugs, and sometimes offering on-line treatment. Other benefits, as expressed by the health workers, are:

- Telemedicine can improve our practice in the area of training;

- Telemedicine can prevent overcrowding in the operating theatre (room) as observers outside can watch the surgery and benefit maximally as if they were inside the room.
- "ICTs will enhance training and skill acquisition."
- Telemedicine can aid in problem-solving. The discussant explained the problem-solving issue as follows:

  > "If a surgeon is performing a procedure and he runs into trouble, through this technology he can easily contact another surgeon who can guide him through the problem.",

Other benefits highlighted were:

- "Teleconferencing helps to broaden the knowledge of health workers."
- ICTs reduce the time spent by patients in the hospital and enhances prompt treatment and, indeed, the overall care of the patient also.
- ICTs help to make the work of health workers far less strenuous or stressful.
- ICTs also save costs to the patient.
- "ICTs, in general, allow health workers to broaden their knowledge."
- ICTs can solve the problems of missing case-notes and save time for the patient.

The overall benefits of ICT applications fpr the health workers and their patients were well summarised by a nurse discussant, who stated that:

> "The ICT applications bring health to the doorsteps of the patients. Instead of patients coming to the hospital, we can communicate with them; doctors can get information from, or about, them, which they may not have to come over in person to supply. ICTs help to conserve our energy and strength. ICTs will be very efficient in clinical practice."

(e) Challenges being experienced by health workers in the use of ICT applications

The obstacles or challenges to the effective use of ICT applications that were mentioned by the discussants in the three groups were: illiteracy, the high cost of acquiring the equipment, accessing the Internet, the low level of the development of ICT infrastructure in the country, and erratic supply of electricity. These were quite similar to those expressed by the IDI respondents. A medical consultant had this to say about the status of the electricity supply in the country:

"Like the issue of electricity, it is a national problem, and the hospital is part of Nigeria."

(f) Perspectives of health workers on selected factors that can affect the adoption of ICT applications

(i) Awareness

Awareness was identified as an important factor that can determine the acceptability of ICT applications for communication in the health sector. The nurse discussants were of the opinion that "people must know about something before they can use it." It is suggested that the awareness should not be limited to the health workers but must be extended to the public. ICTs should be included in the curricula of all educational establishments, including nursing, medical, secondary and public primary schools. The public should be taught how to use the ICT applications to access their health status from their offices and homes. A nurse discussant remarked:

"The patients have to know about these ICTs. We must take the campaign to the markets, churches and schools. We should use the mass media. They just need to know and must be encouraged."

Most of the discussants believed that once patients and health workers were aware of the benefits of ICTs for communication in the health sector, they would be encouraged to use them. Some concerns were expressed about the illiteracy level of those in the rural areas but most discussants were not distracted by these comments as they were quick to cite examples of situations where illiteracy did not hinder the use of such applications:

"Let us consider the use of mobile hand phones. Most of these people we call illiterates, they are aware and use mobile phones; they call their neighbours, relatives and friends. They request their children and grandchildren to help them in using these appliances to make these calls. By doing so, they are learning in their own little way. When they are aware of the use of ICTs in the heath sector, they will not only learn to use them, they will use them."

Another example cited was the use of mobile phones that were handed to pregnant women in the rural areas to alert health workers in cases of emergency. The women were able to use them successfully. This led to a significant reduction in neonatal and

maternal morbidity and mortality in the rural areas where CUG (closed circuit group telephone system) was introduced.

(ii) Mindset and the use of ICT applications

Nearly all the discussants in the three groups thought that mind-set was a major factor influencing the use of ICT applications in the health sector. The medical consultants were of the opinion that to reduce the effect of the mindset on the acceptance of these applications, ICT training should be a pre-requisite for employment in the health sector. According to a discussant:

> "Making it a pre-requisite for employment would have set the employee thinking so that when he/she gets into the system, accepting to use these applications is easier because his/her mind is opened already."

Another colleague agreed with him, and opined that: "It is more of not knowing what to do due to lack of training rather than the mindset." However, the general consensus was that the training must not be a one off issue, because the health sector employs staff "all the time." It was agreed that the training must be built into the system. Other discussants were more worried about those already in the system, and they suggested that the hospital should develop an institutional policy on ICTs. In their opinion, every department in the hospital should be empowered to develop its ICT Unit and to "link up to the centre, rather than the centre running it for all the departments." However, the issue of unstable electrical power supply came up again, and the discussants agreed that there should be a back-up system in place. A robust discussion on whether the development and adoption of these ICT applications in the hospital should be started centrally or from the departments ensued. While some discussants opposed the idea of a centralised ICT system, one discussant reminded the others that:

> "This is a very big hospital. You will get systems that are scattered all over the hospital, but they can't really talk to each other. The main thing about IT is communication; IT is about communication! If you do not start centrally, you will need a policy that can put everything together."

She was reluctantly supported by a colleague who remarked that:

"I know that the central one can work, but you will have to modify it according to the individual peculiarities of the departments."

Another consultant brokered peace, when he remarked that:

"We just have to start somewhere; it will take time but we have to crawl until we are able to run."

However, another consultant was more pessimistic. Although he thought that "ICTs drive down the cost of business and ensure efficiency," he believed that this is only acceptable in the private sector of the economy. He was convinced that there is so much corruption in the public sector that the use of ICTs will certainly limit the dubious award of contracts. He stated that:

"The problem with the public sector is corruption, because they want to make sure that they can create an opportunity to steal money, i.e., being able to award contracts. How can you steal money when you don't have the opportunity to supply paper again? ICTs will take care of so many things, efficiency will increase, and the public sector is not ready for that."

In his group discussion, a resident doctor was of the opinion that the effect of the mindset is dependent on the computer literacy of the workers and the patients. He remarked that:

"Accepting these things we are discussing is really about being computer literate. There are some health workers that belong to the 'old blocks,' they don't want to change. They are so rigid; so it will be difficult to change their mindset. As for the patients, as long as it does not cost them money and they are aware that it will improve the quality of their health care, they will readily accept the use of the applications."

Some discussants also felt that the threat of health workers losing their positions, with the introduction of ICT applications for communicating in the health sector, is related to their mindset. A nurse discussant stated that "this is a real issue that can affect one's mindset." To buttress this new correlate, another nurse/midwife cited the events that occurred when the Central Bank of Nigeria introduced the "Cashless System," i.e., all facets of electronic banking, in the Nigerian banking sector. She reminded all pf the other discussants in her group that:

> "We have seen it in the banking sector when workers were laid off after the introduction of the electronic banking in Nigeria. It was discovered that where hitherto eight or ten workers were needed, with computerization, the number was grossly reduced."

However, surprisingly, she quickly added that "this should not be a constraint.

(iii)Availability and other factors

Availability was also cited as a major factor affecting the adoption of ICT applications by health workers and their patients. A research nursing officer gave an example of how the lack of a particular application has affected her nursing practice. She lamented that:

> "I can give a practical example. There was a software developed for the care of patients in the IITA Medical Unit, where I used to work. When you attended to patients, be it as a doctor or a nurse, all details are entered in the data base. So when you are off duty, the patient's care can continue. but getting to UCH, there's nothing like that! So availability is key to the use of ICTs in the health care sector."

Another factor that might affect the adoption of ICTs arose during the FGD with nurse/midwives. It had to do with the maintenance culture and the level of technological development in Nigeria. She remarked that:

> "Some workers do not have a good maintenance culture because the equipment and materials were not bought by them. In addition, they don't care about them; they just pack them up as soon as anything goes wrong - but some workers do care, they are willing to go the extra mile to put them right when they develop faults."

Meanwhile, another discussant tried to downplay this attitude of the workers when she urged "the maintenance unit to respond on time as soon as it is notified that any ICT application requires its attention."

(g) Suggestions as to what the government can do to facilitate the adoption of ICTs in the heath sector.

- Ensure that there is an adequate power supply.
- Government must fund ICTs in the health sector.

  > "In a hospital like this, we know that nothing comes from the centre (the Federal Ministry of Health). The hospital is expected to fund itself, the only thing the government does is to pay the salaries of workers."

- Government must regulate IT service providers in terms of cost.

  > "Those companies (IT service providers) post massive profit in the country; that already tells me that they are charging too much. Do you know that a BBM (Blackberry messenger) subscription is cheaper in the United Kingdom than in Nigeria. How can that be? That is definitely a failure of regulation!"

- Change the orientation of Nigerians: "ICTs are not just about computers and Internet access."

  > "Even in some hospitals and universities, when you talk about ICTs, they think it is Internet access and computers. It is more than that."

- Ensure that policies that are developed and adopted get to the end-users.
- Both the government and the hospital will need to invest in the training and re-training of staff "because newer tools and applications are being introduced every day." As the resident doctor offering this suggestion said:

  > "Because it is one thing to have all the gadgets, if the staff cannot use them effectively, it is a waste."

- Confidentiality of the patients' records must be strictly maintained. The use of "codes" was suggested by a resident doctor discussant.

4.2.2 Findings from focus group discussion with medical students

The objective of conducting an FGD with medical students was two-fold. First, it might be possible to confirm or refute the information gathered in the IDIs whose participants were principal officers in key positions and who may thus want to protect the image of the establishment. The second objective was to determine whether there were any

generational gaps between the perspectives of the young and budding professionals and those of qualified, registered and practising senior colleagues.

(a) Types of ICTs available and duration of use

The views of the medical students were similar to those of the registered professionals with regard to the availability of ICTs. However, they had a slightly modified opinion as to what ICTs are. To them, "they are technological inventions through which people exchange pieces of information. It could be over long distance or it could be remote." One of the discussants alluded to the fact that the word "technology" in the acronym (ICT) is "just a way of helping." According to him:

> "There are local ways whereby people can get and disseminate information but when you attach the word 'technology', that means it is advanced and fast. Originally, we Africans have a culture. In my community, I know we have a town crier who, in his own way, can use a metal "gong" to call the people to give information. But now we have access to more advanced approaches, like the Internet, radio and television."

He was aptly supported by another student, who stated that:

> "ICTs ease communication. It came out of the need to overcome the long distance problem when communication is necessary. You see, writing letters and posting them take days! But we have e-mail, Internet, "skype," even video conferencing."

Two major applications which the students seemed to have found very useful are the social media networks, and the computer Power Point presentations from their lecturers. They also applauded the provision of an Internet service by the College of Medicine to both staff and students, albeit it had many challenges. According to them, "the server tends to get up and down!" However, by and large, compared to other Universities in Nigeria, the students studying Medicine at Ibadan have been privileged to "enjoy the use of the Internet." According to them:

> "Apart from getting resources, we can also learn. We can also get information from the "Skype," we can store information on our computers, laptops and tablets."

The discussants stated that the ICT applications had been in existence since they crossed over from the main campus of the University of Ibadan (where they studied Basic Medical Sciences) to U.C.H. and the College of Medicine, where they are presently studying Clinical Sciences – that was 2 to 4 years ago, depending on the class of each student. Surprisingly, unlike the qualified professionals, the medical students did not mention Telemedicine until much later in the discussion.

(b) Effectiveness of ICTs and their applications

The perspectives of the students on the effectiveness of ICTs for communication in the health sector was very similar to those of the registered professionals. A student put it succinctly when she made this contribution:

> "The question of effectiveness is, like many sectors in the country, not very effective. Most of them are dependent on light (electricity supply) and this is a major problem. It is quite epileptic."

However, they had more positive comments about the transfer of their lectures (in Power point Presentations), the telephones (GSM) and the social networking among the students:

> "Transfer of lectures through e-mail from the lecture theatre or through flash has been working fine. When you talk about the telephone, which is also an ICT, I think it is fairly effective."

Another student appraised the use of the social media networking as follows:

> "… but social media networking among students is as effective as anything. All of us have group pages. This is a medical school, we have different postings, and belong to different units, but we still have effective communication among ourselves, because when you go on the group page, you obtain common information. We use "WhatsApp," some are on the Blackberry pages. So we just open it and everybody is part of the team. So any information that you want to get across to everybody, just put it on the page. Most of us subscribe with our individual network; that is why we have been able to maintain the communication line."

(c) How effective use of ICTs can improve the practice of health professionals.

The student discussants are of the opinion that ICTs provide health professionals with an opportunity to have "well-catalogued patient information." As a discussant said:

> "We know how things work out in the western world, where you have well-catalogued information; everything comes out on the screen and you have the information to work with."

According to the students, this prevents the overcrowding of the clinics and saves the patient's time. With an effective and available Internet services, the students believe that they "can perform better." As one said:

> "As a medical student, there is some information you want to access, but because you don't have these things, or they are not available, we are actually not meeting up with some of the standards that are expected of a 21st century medical student."

The teaching hospital has three basic functions – teaching, research and service, in that order. The students are of the opinion that effective ICTs will not only make training easier, but will also promote research. A student lamented:

> "When you look at a typical sub-Saharan African hospital, it is not that we are not training well, but we are not doing enough research. We depend on the research findings from Europe and North America, and the data they give us emanates from their environment and may not be applicable here. So, if we have a good ICT, we will do a lot of research and our development will be faster."

The students also noted that ICTs will ease the stress on the doctors, especially the house officers (interns), who are always castigated by their consultants for missing the results of investigations and the case notes of patients during the ward rounds. They are of the opinion that the "house officer does not have to run to the laboratories to get results, if there is a system in each ward, the results can be sent to the ward." They also believed that ICTs will improve the care "we give our patients." As one of them remarked:

> "Patients are sent to the Central Records Department to retrieve their case notes and bring them to the clinics. Why? I think this is needless stress on the patients and their relatives. It would have been easier if each consultant has something to access from his consulting room – just type in and you find all you want. I think in that regard, it can make things work."

Effective use of ICTs can also benefit the patients as they can learn more about the conditions of their disease conditions and what would be involved in their care. In a student discussant's opinion, sometimes the doctor may be wrong, and the patient believes in the information he or she has been given. This may not be beneficial to the patient. Furthermore, in this part of the world, because of the large number of patients to whom they have to attend to, doctors do not really have much time to give information to their patients. However, according to the discussant:

> "Access to ICTs can really help the patient to understand more about the disease. It will help her to read about the condition and not just take what the doctor says at face value. Doctors cannot just expect patients to take whatever they do to them as if they were are God. But when patients check this up, they can challenge their doctors."

Another advantage of ICTs, which only the students' group have exposed so far, is the improvement in the relationship between the students and their lecturers. It is the opinion of the discussants that effective use of ICTs will certainly improve the interaction between medical students and their trainers. A student discussant put it succinctly when he stated that:

> "Most of the time, there is no good relationship between students and their lecturers. But with the use of ICTs now, may be the students will be able to relate to with the lecturers, as some students find it difficult to relate to with them. Also, when you have suggestions, you can bring them up."

(d) Challenges being experienced by students in the use of ICT Applications.

The medical students had earlier alluded to the challenge that is caused by the irregular electricity supply and how it had affected their access to the Internet. This has been a recurrent issue in all the FGDs as it was in the IDIs. Another challenge that was mentioned by the students is the lack of an opportunity to have some of their lecturers trained in the development of Power Point presentations and the use of some ICT applications. As remarked by a discussant remarked:

> "Some of our teachers themselves don't really have the technical know how to operate these devices. Some of the lecturers don't know how to effectively use the Power Point to prepare lectures. It is sad. We know that Power Point is not all in all when it comes to the way we learn, but if they must use the technique, then I think that there should be training for them so as to get things done properly."

A student was not particularly pleased with the software being employed by the lecturers for their presentations. As he remarked:

> "There are many softwares that can be used for presentations, but among the commonly used one is the Microsoft Power Point, but how effective is that for lecturing, particularly for medical students? There are better ones, like Macromedia Flash, which can be used to illustrate better than Power Point. But even with the Power Point, some lecturers are still struggling with it, talk less of using other softwares."

A very puzzling comment that was made by the students was the fact that lecturers in some departments do not release their Power Point presentations to the students. The Department of Paediatrics was cited as an example:

> "Different departments and lecturers have different policies when it comes to having access to these Power Point presentations. Some lecturers don't have problems when it comes to giving them to students while in some departments, it is forbidden. They will never give them out (like the Department of Paediatrics)."

Another major challenge to the students is the cost of equipment and services, especially Internet access. At present, a student pays N1,000.00 (equivalent to USD 6.00) a month to be able to access the College of Medicine's network. While some students have suggested that this should be reduced to N200.00 (the equivalent of USD 1.00) a month, others argued that Internet access to medical students should be free. A student discussant remarked:

> "In developed countries, these things are available and free, you get access to a wireless network anywhere you are, but here in Nigeria, it costs you a lot of money to access the Internet."

Another robust discussion ensued when a student cited the example of a third generation university in Nigeria where students "connect and browse free anywhere on the campus." This was at the Federal University of Technology, Akure (FUTA). Another student quickly cited another University in Benue State:

> "Once you are a student of the University, you just have to submit your laptop to the ICT department and they will quickly configure it. So what do they do? The server is available for the students to browse from 6:00 p.m. to 6:00 a.m., because of the bandwidth problem – overload. So the administration makes use of the

Internet from 6:00 a.m. to 6:00 p.m., and the students take over throughout the night. So that way, nobody needed to pay!"

(e) Perspectives of medical students on the disadvantages of ICTs in the health sector.

The students observed that ICT applications may have their own drawbacks, in the sense that a patient may read the wrong information on the Internet. This may lead to confrontation with the doctors and result in conflict in the health sector. It was also observed that the introduction of ICT applications may lead to retrenchment in the health sector. A student presented this scenario:

> "For instance, if there is equipment that can measure the packed cell volume (PCV), perform urinalysis,, etc., then why do I need to employ a medical laboratory scientist? I can as well slot the blood or urine sample into the machine and it will give me the results I want."

The issue of the Medical Records Department came up again when another student expressed concerns about those working in that Department who might be retrenched with the introduction of the electronic medical record system – the same fear that was expressed by the nurses. However, most of the discussants did not accept that this would create room for retrenchment. As far as they are concerned, the introduction will "create jobs in other ways." As one of them remarked:

> "I do not subscribe to what my mate has said - that they may lose their jobs. I think it is going to create jobs in other ways. It is a 'win-win' situation. They will be trained to use the ICT applications and move on in their professions."

(f) Perspectives of medical students on selected factors that can affect the adoption of ICT applications.

(i) Mind-set

Unlike the qualified health workers, who considered the mind-set was a major factor influencing the use of ICT applications in the health sector, the medical students had a different opinion entirely. This is reflected by this remark from one of the discussants:

> "Usually when a new thing is introduced, you cannot expect 100% acceptance, but, over time, people's myths will be debunked. They will realise that the new

invention has more advantages than disadvantages, and will readily accept it. The results cannot be doubted, they will speak for themselves."

However, the students were quick to emphasize that before ICT applications can work effectively to eliminate the issue of the mind-set, there must be adequate maintenance.

"The gadgets must be checked regularly to ensure that they do not break down, and even when they break down, they should be repaired on time. You know, we Africans do not have a proper maintenance culture."

(ii) Availability and affordability

The students are of the opinion that availability and affordability are major factors affecting the adoption of ICT applications in the health sector. This was similar to the opinion expressed by their trainers. The handsets (phones) were generally available, but that could not be said of the Internet access, which costs money and is not widely available in their hostels. As a student remarked:

"As a student in this University, I am supposed to be in my room and be able to browse from my bed in my room. But in ABH (Alexander Brown Hall – the medical students' hostel), that does not happen. Some blocks in the hall have stable Internet access, but in some blocks, you need to move to where the Internet connectivity signal is very strong. There are times the server will be down in all the blocks, so you have to leave the hall to be able to browse."

(j) Suggestions as to what the Government can do to facilitate the adoption of ICTs in the health sector

- The allocated budget to the education and health sectors should be increased.
- The College and Hospital Management should seek the opinions of students before some decisions are taken.
- Digital notice boards should replace the conventional boards.

"Also, we prefer the digital boards instead of the notice boards we have, so that every latest information will be projected as you enter the hall."

4.2.3 Findings from focus group discussion with patients/users of hospital services

The discussants were eight women drawn from the Antenatal Clinic's attendees. The aim of the FGD was to obtain the perspectives of the users of hospital services about the merits and demerits of ICT applications that are generally available for communication in the health sector.

(a) Types of ICTs available and duration of use

The discussants did not appear to be familiar with the different types of ICTs that were available in the health sector. They mentioned only telephones, computers and the television. However, they were able to define ICT reasonably as "a means of communication – ways through which people can communicate with us and it involves the use of phones and computers." The discussants stated that the ICT applications have been in existence for 2 to 10 years.

> "They call us through the phones. In some cases like the Blood Bank, if you are a voluntary donor, they send SMS to encourage you to come to donate voluntarily. They give health talks on television. Receiving text messages has been on for more than ten years but talking to my doctor started about a year ago."

(b) Effectiveness of ICTs and their applications.

There were divergent opinions on the effectiveness of the ICTs by use of which the patients can communicate with the health workers. A discussant appraised the mobile phone as being very effective, when she said:

> "It is effective. Sometimes you call and you are asked to come and see the doctor at the office. At other times, the doctor could ask you to explain what was actually wrong with you, after which he prescribed medication for you to use, and if you did not see any change after days or a few weeks, then he would ask you to come to his office."

However, another discussant had a very different perspective, as she experienced difficulties while trying to reach the doctor on the phone. She narrated her experience as follows:

> "Sometimes, you want to talk to your doctor. If he doesn't know you, you cannot talk to him on the phone, because he doesn't remember you. Even if you state

> your name, you are not the only one bearing that name. If you do not have a very personal relationship with him, he will not know the particular person he is talking to. You have to describe yourself – I am tall, fat, dressed like thi,s the last time I saw you, etc., before he can know who he is talking to, because he deals with many patients."

(c) Availability

Again, there were divergent opinions with regard to availability. A discussant said that it was "always available," as her doctor gave her two different telephone numbers. According to her:

> "If you call one line and it does not go, so call the other. So I can say that it is effective."

However, other discussants were of the opinion that not all doctors would want patients to "just call them on the phones and talk to them like that." One discussant stated that her doctor once told her that:

> "You come and see me and I will know your problem."

In her opinion, African doctors believe that you cannot just call them on the phone. If you need to see them, you must come to the clinic.

(d) Affordability

The perspectives of the discussants with regard to the affordability of ICT applications were no different from those of other discussants. A discussant put it neatly, when she stated that:

> "For me information technology in Nigeria is very expensive. If you want to communicate with your doctor through email or phone, or any other form, it costs so much money. And with all the phones we are using now – Android phones, Windows phones, you have to buy megabytes that cost N3,000.00 (the equivalent of USD 17.65) or N4,000.00 (the equivalent of USD 23.50). It is not reasonable at all."

(e) Other Challenges being expressed by patients in the use of ICT applications

The poor telephone network in the country was cited as another major constraint. The network is epileptic; it is "so bad, your money will be deducted by the telephone

company when you don't even get through," said the patient. A discussant narrated her experience as follows:

> "I remember when my daughter was just put to bed and she needed the services of a doctor because of a little complication. I just told her to hold on, so I could call the doctor, but I could not get him for two hours because of the network."

Another discussant suggested that the use of email might be better, as it has other advantages, since the doctor can forward literature reviews to be read on a disease pattern. A pleasant discussion developed among the discussants on which mode of communication would yield the appropriate results in the health sector. A discussant stated that sending emails would be easy, and another quickly suggested that using SMS would be much easier. She immediately responded that the email would be cheaper. This was immediately counteracted by another discussant, who responded that:

> "It is not everybody that is online. You may send an email, but it is not everybody that has a computer in Nigeria. The only common thing is a mobile phone and the network system is not quite okay."

Her argument was quickly supported by others, who preferred the use of SMS, since "not everybody has time to send emails;" and some argued that the doctor might not have time to read an email until later in the day, and he would be too busy to find time to send a response.

Another major challenge of ICTs, when used to communicate in the health sector, is the financial implication to the patients. In their opinion, the telephone tariff is very high and they advocated that the government should reduce the tariff. The example of the emergency telephone lines in developed countries was cited:

> "Abroad, let us take for instance, if something happens to a child, you can call 911 and will get immediate help. You don't need money; you don't need to have money on that phone before you call. So it would be nice if they can do that here in the health sector in Nigeria. The line should be free."

The issue of the epileptic electricity supply was also considered a major deterrent to the use of ICTs for communicating in the health sector. Some discussants stated that they had to keep three different phones due to the lack of electricity to charge the batteries. The

illiteracy of the population was also considered a challenge to the adoption of ICTs in the health sector. A discussant, while giving her candid opinion on illiteracy, ended up summarizing the challenges to the use of ICTs in the health sector. She said:

> "I meet so many of these illiterate women who have phones and yet cannot search for contacts on their phones. They also come to me for help. So how do you deal with that level of illiteracy, with this level of poverty in this society? And we want to encourage everybody to use ICTs like they do in America, where they are so advanced. It will take us some years before we can move to that level. But there is no doubt that ICTs have many advantages. However, the Nigerian factors, like poverty, lack of education, illiteracy, even electricity, will be stumbling blocks."

(f) Benefits of ICTs

An important benefit which had not been expressed in the other FGDs was mentioned by the discussants. This has to do with how ICT, and its applications, can improve the relationship between the patients and their carers – the health workers. It was believed that ICTs would enable a good interaction between the patients and the health workers. As stated by one of the discussants:

> "It creates a good interaction between you and the doctor and you can tell him anything about yourself. If there is a relationship between you and your doctor, he sees you as a sister, your information is safe with your doctor; the doctor can always conceal it."

This absolute trust in the doctor which is expressed by the patients in regard to the confidentiality of their records, contrasts with what the health workers themselves have offered with regard to the use of ICTs. This idea that doctors would always keep their secrets was buttressed by another discussant, who stated that:

> "Doctors always keep our secrets. They do that very well. What I discuss with him is different from what others would discuss with him. I think they are okay. It is an oath they have sworn to – they must keep our secrets."

In general, the discussants are of the opinion that the use of ICTs to communicate in the health sector would "save the doctor's time, as well as that of the patients." It will also reduce the stress on the health workers, considering the number of patients that throng to the out-patient clinics daily and the disease burden in the country. Unfortunately, similarly to what had been obtained in the other FGDs, the patients were not aware of any

national ICT Policy, neither did they make any reference to the Telemedicine Unit in the hospital.

(g) Suggestions as to what the hospital and the Government can do to facilitate the adoption of ICTs in the health sector

- A toll free telephone line should be created by U.C.H. to allow patients to contact their doctors. Similarly, a national emergency line, like the '999' in the United Kingdom, should be established by the government.
- The doctors should be more tolerant when communicating with patients on ICTs.
- The GSM tariff in the country should be reduced, considering the level of poverty.
- The government should fast-track the eradication of illiteracy in the country, especially among the girl-children.
- Awareness should be created in both the rural and urban areas before ICTs can be adopted for communication in the health sector in Nigeria.

4.2.4 Findings from focus group discussion with professionals conversant with the use of ICTs in their workplaces (Bankers and Journalists)

In March, 2012, the Central Bank of Nigeria (CBN) introduced a new policy on cash-based transactions which aimed to reduce the amount of physical cash (coins and notes) circulating in the economy, and to encourage more electronic transactions (payments of goods, services, transfers, etc.). The Cashless Policy was also introduced to drive the development and modernization of the payment system in Nigeria, to reduce the cost of banking services, and to curb some of the negative consequences that are associated with high usage of physical cash in the economy, including robberies and other cash-related crimes. The policy led to the proliferation of banking ICT applications, such as the Automated Teller Machines (ATM) and Point of Sales (POS) card acceptance services.

The aim of conducting the FGD with bankers and a few journalists was to gather their views on the implementation of the ICT applications that were introduced to implement this policy and, more importantly, to identify the lessons learnt in the process by all the stakeholders.

(a) Types of ICTs available and duration of use

The types of ICTs being employed in the banking sector are computers (including desktops, laptops and i-pads), mobile phones, ATM and Point of Sales (POS) card acceptance services. According to the discussants, the computer-based technologies have been available for over two decades, but the ATM was introduced about 2005/2006. The consensus was that, following the high influx of computers into Nigeria in the 1990s, all the banks "had been online since 2000."

The discussants were requested to give their opinions on which ICTs should be employed in the health sector. A discussant suggested "network-based technology," like the Internet. According to him:

> "The Internet can disseminate useful information. For instance, I have a health problem and I need further information on the issue, all I need to do is go to a hospital website (if one is available); then I can log on via my computer at home, via my mobile GSM, or android phone, etc."

He was quickly supported by another discussant, who was more concerned about record keeping in a hospital. She suggested that:

> "I also think that there should be a software on line that will have a database of patients in the hospital, so that when patients come in for complaints, they don't have to come with their cards. The doctor only needs to log on to a system with the name or card number of the patient and sees all he needs."

The discussants were of the opinion that these options are readily available in the developed countries. However, one remarked that, in Nigeria, the SMS is being used to get health information across to the public, albeit that this is still at the "teething stage'! Another discussant cited examples from two other institutions that are already engaged in getting the results of investigations of patients to them using ICTs. A discussant, who is a

journalist, reminded all of the others that these suggestions can only be useful in the urban areas. As she said:

> "I think, in this context, this ICT as regards the medical field, is it restricted to the urban areas, or you are forgetting those in the rural areas where there is no GSM and no basic amenities?"

A bank worker suggested that the health sector should follow the footsteps of the banks, which have "brought financial services to the doorsteps of their customers for their convenience." As he said:

> "It is not only when you get to the hospital that you can get treatment. You should be able to send a mail to a doctor, or call him and get attention. So what I am saying is the ease of access to information, ease of access to medical attention. I am just putting it in parallel with the banking sector, because that is what we are trying to do now. Customers don't need to walk into a bank before you enjoy banking services. So I am thinking of such for the health sector, you don't need to get to the hospital to get treated, After all, the basic point of ICT is to make life easy and to get access to whatever you are looking for."

Another ICT application which was alluded to by the discussants was Telemedicine, but many of them were not aware of its existence at UCH. They also believed that the public is equally unaware of its existence anywhere in the country, and therefore concluded that "there are needs for sensitization and dissemination of information." Another discussant expressed a different opinion, when he said that:

> "There are lots of people who do not have access to an Internet facility, but they still need medical attention. I will suggest such things as radio broadcasts and jingles to ensure that the information gets to them. If you limit it to Internet alone, I don't know when last I checked something pertaining to my health."

(b) Effectiveness of ICTs and their applications.

The general consensus among all the discussants was that the use of ICT applications has been very effective in the banking sector. A discussant more or less summarised the general discussion that ensued when he remarked that:

> "It has made life easier; it has made banking easier and very attractive. I can sit in the comfort of my house now and effect a transfer. I don't have to go to the bank to make a deposit into another person's account. I am able to avoid the long queues at the counter. I can pay my DSTV subscription, recharge my phones, and

check my account balance from home. I can do everything on line now. So I will say it has made life easy for me.*"*

The acceptance was said to have been very impressive. However, the discussants did not deny the fact that even today, not everybody in the society has taken on the culture of using the ATM, probably due to 'negative experiences." However, in their opinion, customers know that "it offers better services than what they had previously enjoyed."

(c) Steps taken by the banking sector towards the adoption of ICTs by the Nigerian public

The banking sector adopted different strategies to get the public to adopt ICT applications. These included:

- Segmentation of the markets, since not all the strategies can be applicable to all of the markets. As a discussant stated:

  "What is applicable to market 'A' is not applicable to market 'B'. We have to use different strategies. Information can be distributed verbally, through reading, and for those who cannot read, through the radio. We use the English version for those who understand it, and Yoruba for those that do not speak English."

- Another strategy was to obtain feedback and use the content to improve the products and services that will suit each market.

  "Allow the people to indicate what they want. There are some banks that now send their SMS in the local language of the area they serve."

- Establishment of a regulatory body to ensure that the goals are met.

  "The first thing is to have a regulatory body to ensure uniformity and proper coordination. So there should be a regulatory body that will establish the objective: what we want to achieve with it should be well spelt out."

- The ICT solution being introduced must be efficient.

  "If it is not efficient, the people tend to get discouraged; so as much as possible, we must ensure that the ICT solution we are introducing is efficient."

- There must be enforcement and penalties.

"Then, you have to enforce it. People generally do not like changes. If I notice that when I use my ATM card, the service is free, but when I collect money at the counter, I am charged N200.00, then I'll quickly exit the banking hall and queue up at the ATM. So that is a means of enforcing it."

- There must be a wide array of products from which service users can choose.

  "If you don't like this product, you'll probably pick another. So the more the products, the more the options you give people. Each person decides to choose what he/she likes. When you have various options people can choose from, that is what is making it work in the banking sector."

- The effort of the Government and the hospital management to introduce and get the stakeholders to adopt ICTs in the health sector must be consistent and persistent.

  "Let me start by saying that at the beginning of the Cashless Policy, I thought it was unrealistic. How will it work? But with consistency and persistence in trying to implement the policy, it is working! Even the bank core staff, then, some of them did not believe in the workability of the ATM but, over time, it worked and everybody was able to key into it. We have to start from somewhere."

(d) Challenges being experienced by the banking sector in the use of ICT applications.

According to the discussants, the first, and the major, obstacle that was encountered was illiteracy, due to the level of development in the country. Another major challenge is fraud. The banking sector is having a big headache in averting fraudulent practices in electronic banking. As one of the discussants expressed it:

"I don't know how fraud could creep into medicine, but I know that there will be a way, because fraudsters are ever coming up with new ideas. So it is prone to fraud. Some will say that I did not make any transfer of funds, but I don't know how this money left my account. Now it can happen in two ways: it is possible she doesn't know, as she said, and it is possible she knows!"

Another major challenge to customers is the inefficiency of the ATM, mostly due to a lack of Internet access. Sometimes, this is attributed to poor Internet connectivity and also, to the epileptic supply of electricity due to the poor infrastructure.

(e) Perspectives of the discussants on selected factors that can affect the adoption of ICT applications

(i) Awareness

The discussants had earlier alluded to awareness being an important factor in the adoption of ICT applications, both in the health and banking sectors. The general consensus was that there must be sensitization and effective dissemination of information

(ii) Availability

The discussants were of the opinion that availability is a major factor that will determine the acceptability of ICTs for communication in the health sector. This is similar to what had obtained in all the groups. As one of the journalists remarked::

> "It has to be available, accessible and close to where the people are. That means you may have to segregate people/community so that you can place those facilities there to be within their reach."

(iii) Affordability

The discussants had divergent opinions with regard to affordability. To one of them, this should be at no cost to the 'caller.' However, as she was quickly interrupted by another discussant:

> "There are no toll-free lines in Nigeria. At the end of the day, someone is paying."

However, another discussant came to the rescue of the earlier one and canvassed for a toll-free line, when he said that;

> "Medical services are not like other services. You know that before you buy an MTN re-charge card to load your phone and make calls, it means you are rich and you can afford it. It is not a necessity to chat on the phone, but the medical service is like food and water, which you cannot do without. I agree that providing these services will require money, but the people you want to serve may not be able to afford them."

Another discussant was more rational in his contribution. He said:

> "I think it depends on the level of technology we decide to use that will determine the affordability. Like Telemedicine, I know that I don't have Internet on my phone, so I cannot use it. But some churches these days use SMS to notify their congregation of church programmes. I think that the level of technology will determine the affordability."

(iv) Mind-set

Retrospectively, the discussants, especially those from the banks, felt that the mind-set was a major factor that influenced the introduction of the electronic banking system in Nigeria. As one of the discussants said:

> "When the ATM was introduced, a lot of bank workers were scared, especially the operations staff. The ATM would be doing the work of 'Tellers', meaning that, automatically, the bank would down size! I don't know much about the health sector, but someone at the Record Department, or a receptionist will be scared that once these things are put in place, I will lose my job. Such a person will be averse to change and sabotage, whatever you are planning."

He was supported by a colleague, who stated that not everyone will buy into using ICTs for communication in the health sector initially, but with time, both the health workers and the patients would want them. According to him, despite persistent pleas to a bank customer to obtain the ATM card, it took him eight years to convince him. In general, the discussants were of the opinion that mind-set may be a factor at the beginning, but when the stakeholders are aware of the benefits that ICTs bring in the way of comfort and convenience, all of them will buy into it. As concluded by a discussant:

> "Compared to the banking industry, we are talking about health, life! When a bank is located close to a residential building, the people see it as a disturbance, but if it is a health clinic, they see it as close proximity to a health facility, except if the products being introduced are not accessible to the patients."

Another discussant rationalised that:

> "It is a gradual process and, in the health sector, ICT applications must be introduced with the understanding of the target market in mind. You are targeting different categories of people."

(f) Suggestions as to what the Government and the hospital can do to facilitate the adoption of ICTs in the health sector

- All stakeholders must be open-minded.

  "Keep using them as if you don't have alternatives. When they see them, they will know what you are selling. And the fact you are using it will encourage and give confidence to others."

- The health workers must be the first to use them, to improve on their skills, educate themselves so that they will be able to answer other stakeholders when they are confronted with questions by their clients.

  "The workers in the health sector should be the 'service champions'."

- The health workers must relate to service users in the language they understand.

  "When using ICTs, the health workers must use a layman's language, because they must go to the site to read and understand. So, many times, you pick up a prescription and you don't understand what has been written on it. So it is not a question of having access, it is my understanding of what is written that matters."

- The health workers must see problems that are encountered during the introduction of ICT applications for communicating to others in the health sector as "feedback."

  "And when you see it as a 'feedback,' take it and improve on it."

- The government and health workers should buy into the idea that introducing ICTs for communicating in the health sector will not reduce staff strength; otherwise, all efforts will be sabotaged.

Unfortunately, the discussants were not aware of the national ICT Policy. As a discussant stated:

> "If the government has a policy, it was not disseminated and it is not being implemented."

4.3 Findings From a Survey of Health Workers, Medical Students and Users and Non-Users of Hospital Services in the University College Hospital, Ibadan.

4.3.1 Findings from the survey of health workers at U.C.H., Ibadan.

(a) Socio-demographic characteristics of the health workers

One hundred and sixty-nine health workers from various professional backgrounds were surveyed at the University College Hospital, Ibadan. They included eighty-one males (47.9%) and eighty-eight females (52.1%). The majority of the respondents were in the age bracket of 31 to 40 years (45.6%) and the mean age of all the workers was 38.5 (sd = 7.7) years. The medical practitioners formed the largest proportion (44.4%), followed by the nursing practitioners (26.6%). The majority of the workers had been practising their professions for periods of between 1 and 20 years (89.4%). Only 12 workers (7.1%) had

Table 4.1: Socio-demographic Characteristics of Respondents

Characteristics	Number	Percentage
Sex (n = 169)		
Male	81	47.9
Female	88	52.1
Age (n = 169)		
20 – 30 years	87	51.5
31 – 40 years	64	37.9
41 – 50 years	2	1.2
Above 50 years	2	1.2
Not stated	6	3.6
Occupation (n = 169)		
Medical Practice	75	44.4
Nursing Practice	45	26.6
Physiotherapy	17	10.1
Pharmacy	13	7.7
Social Work	7	4.1
Radiography	7	4.1

Laboratory Science	5	3.0
Years of Experience in Profession (n = 169)		
1 – 10 years	87	51.5
11 – 20 years	64	37.9
21 – 30 years	7	4.1
Above 30 years	5	3.0
Not stated	6	3.6

been in practice for more than 20 years (Table 4.1).

(b) Awareness and use of ICTs by the health workers

Quite a good number of the workers claimed to be aware of the use of ICTs in the health sector. Over eight out of every ten workers were aware of the ICTs shown in Figure 4.1, except GPRS, knowledge of which was fairly poor (56.8%) if compared to others. However, regarding the use of ICTs in their work, the figures dropped. The Internet was the most adopted ICT (81.1%), closely followed by the mobile phone (78.7%). Others commonly used by at least six out of every ten workers were the television (67.5%), smart phones (63.9%) and the radio (62.1%). The poorly adopted ICTs were Telemedicine, PDAs and the GPRS.

(c) Knowledge of ICT terminologies

The health workers at the U.C.H. were quite knowledgeable about ICT terminologies, as depicted in Figure 4.2. More than nine out every ten health workers were aware that ICTs included all telephones, computers and net-worked based technologies (97.0%); that e-health encompasses a range of ICTs that is supported by process and communication (94.7%), and that Telemedicine can be used for the education of the patient or health care provider for the purpose of improving patients' care ((4.1%). Among the other listed terminologies in Table 4.2, over eight out of every ten health workers answered them correctly.

Figure 4.1: Distribution of Respondents by Awareness and Use of ICTs in their work

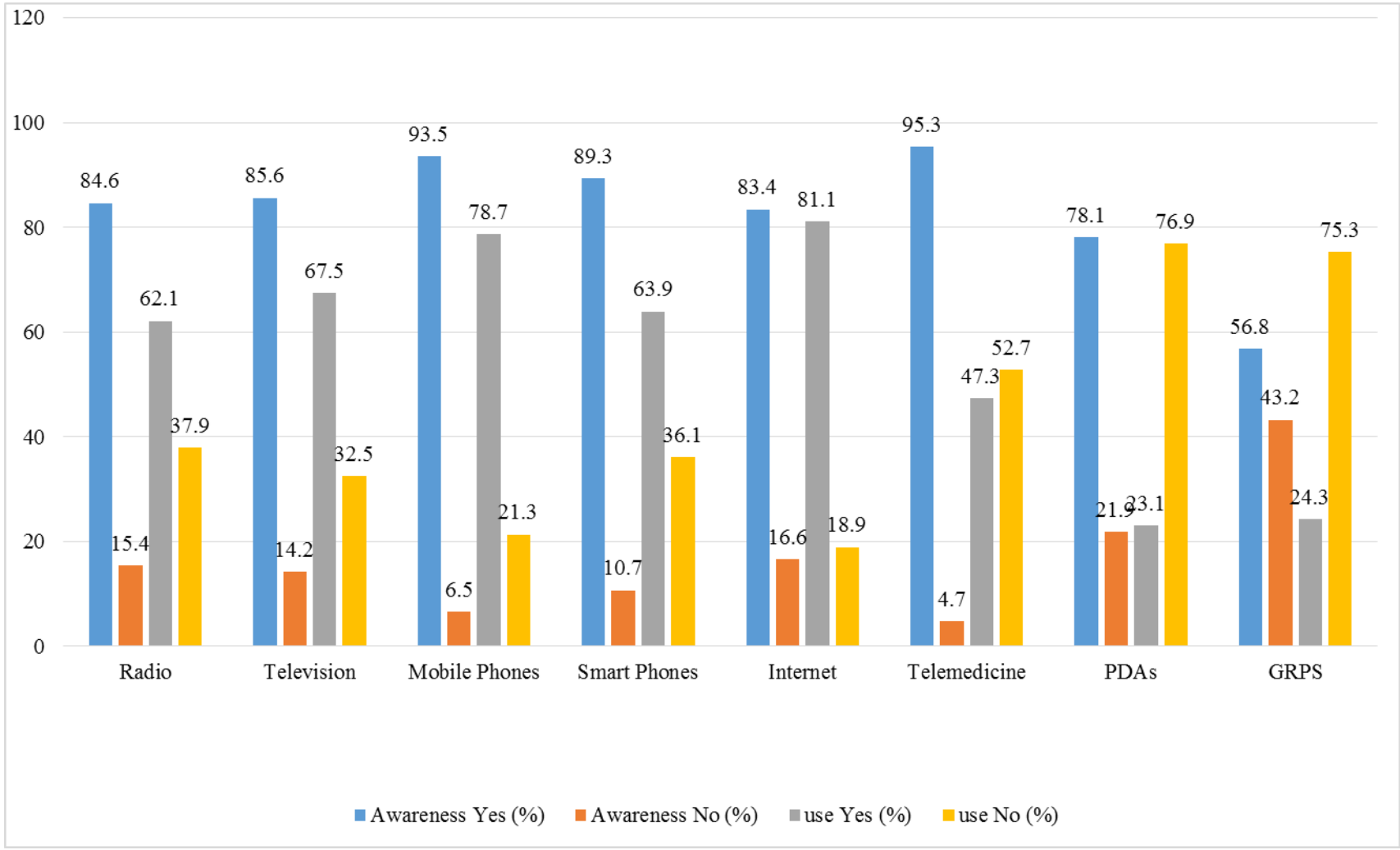


Table 4.2: Distribution of Health workers by knowledge of ICT terminologies

ICT Terminologies	True (%)	False (%)	Don't Know (%)
ICTs include all telephones, computers and network based technologies, e.g., Internet.	97.0	1.2	1.8
e-Health encompasses a range of services that involve health care and ICT supported by processes and communication.	94.7	1.8	3.6
m-Health is the use of mobile technology to support the achievement of health objectives.	89.3	1.2	9.5
Telemedicine is the use of medical information transferred from one site to another through electronic communication to improve patient's care, including diagnosis and treatment.	88.8	2.4	8.9
Telemedicine can be used for education of the patient or health care provider for the purpose of improving patients' care.	94.1	1.2	4.7
m-Health is a component of e-Health.	81.7	1.8	16.6
Telemedicine is a component of e-Health.	89.9	4.1	6.0

(d) Types of m-Health initiatives adopted by health workers in their practice

Despite their good knowledge of ICT terminologies, the health workers were slow in adopting m-Health initiatives, as shown in Figure 4.2. The most widely adopted were the provision of health information to patients (89.3%), and colleagues (83.4%); building the capacity (training) of other health workers, including patients (79.3%); reminding patients of their appointments (78.1%); ascertaining treatment compliance by patients

Figure 4.2: Distribution of health workers by types of m-Health initiatives adopted in their practice.

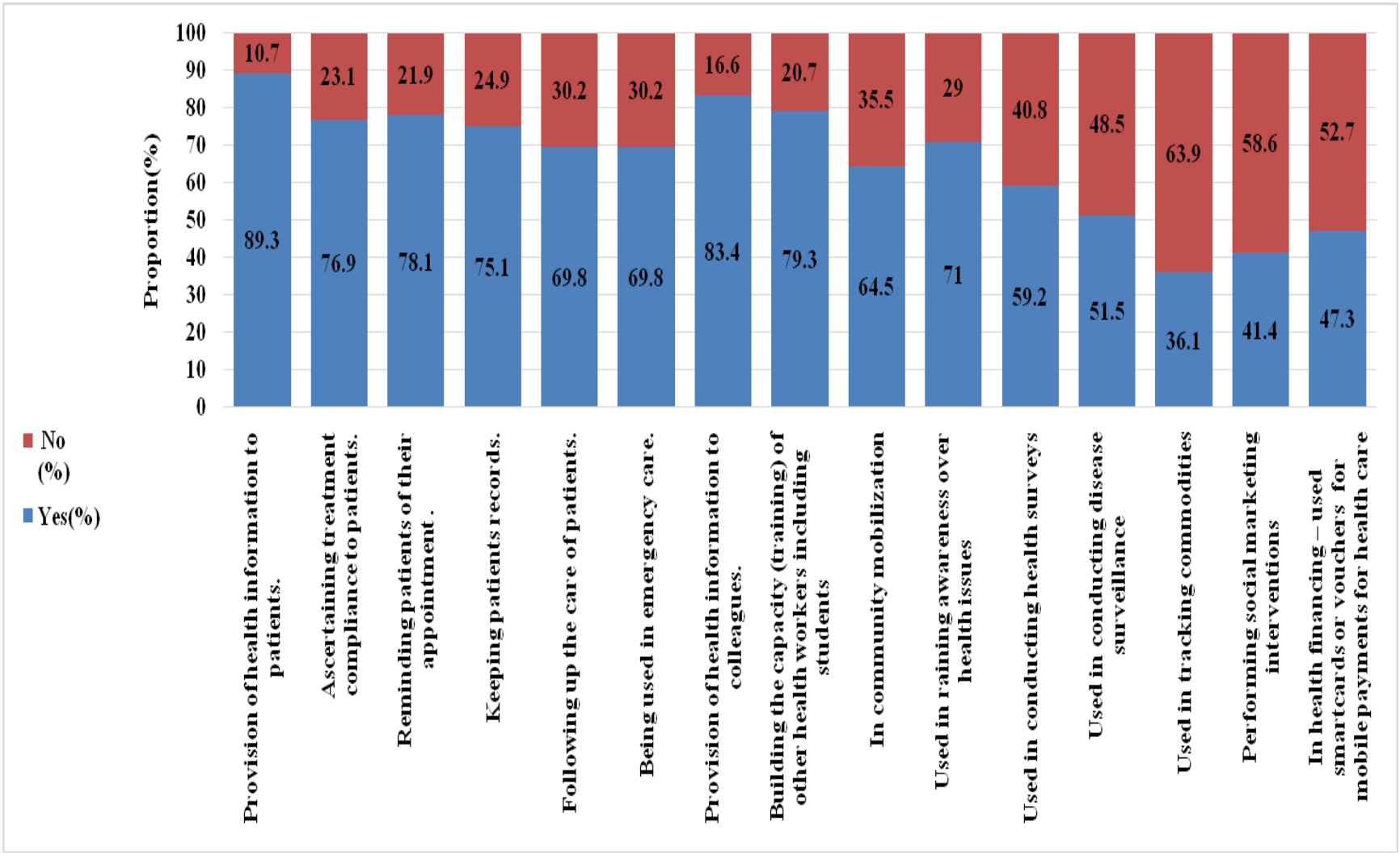
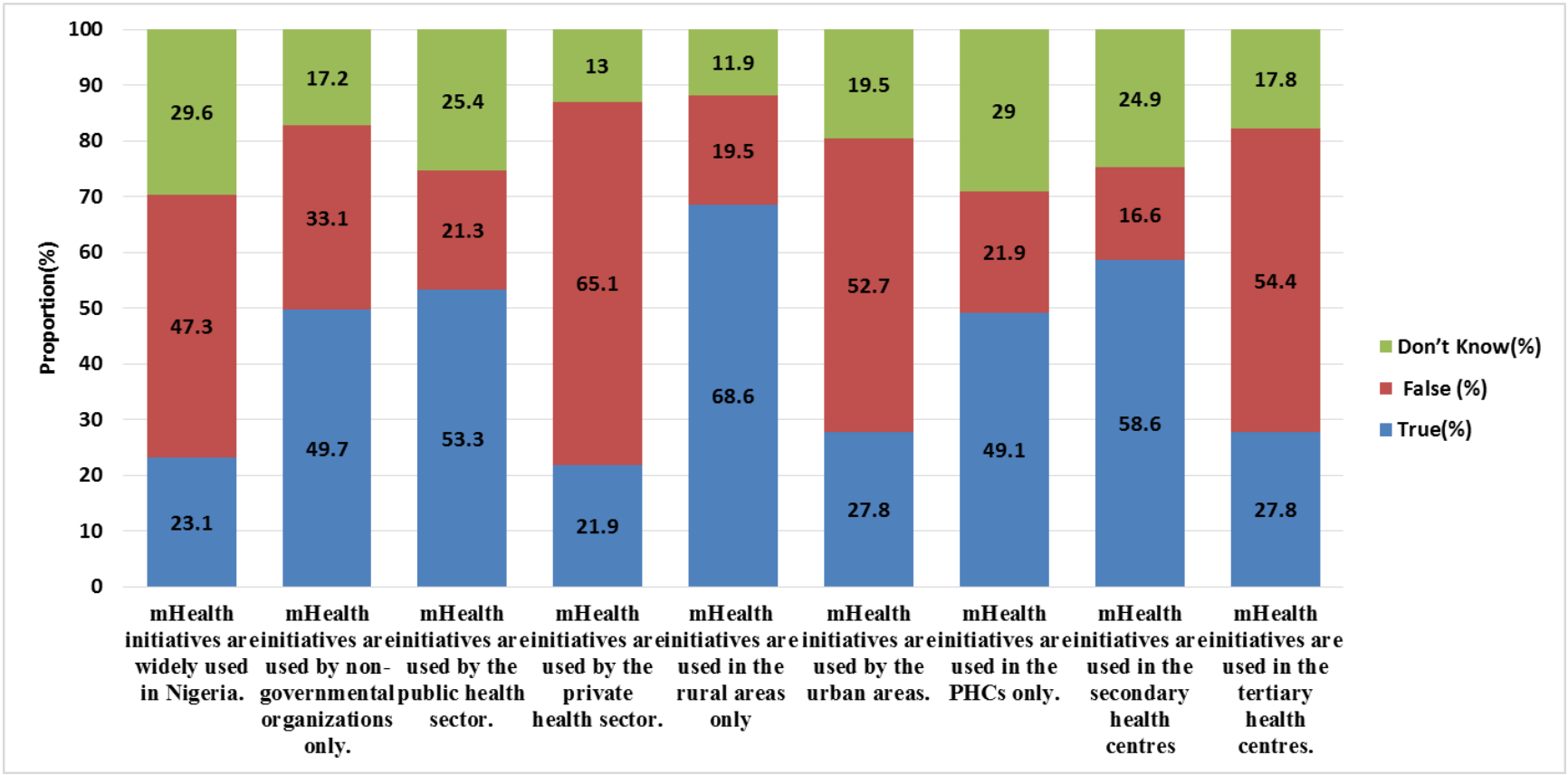


Figure 4.3: Distribution of Health workers by knowledge of availability of m-Health Initiatives in Nigeria



(76.9%), and keeping patients' records (79.3%).

(e) Knowledge and availability of m-Health initiatives in Nigeria

The knowledge of the health workers about the availability of m-Health initiatives in Nigeria was very poor. The only facts about m-Health initiatives that were well known to more than 50% of the health workers were that m-Health initiatives are used by the public health sector (53.3%), in the rural areas (68.6%), and in the secondary health facilities. Surprisingly, only 27.8% of the health workers were of the opinion that m-Health initiatives were used in the tertiary health centres (Figure 4.3).

(f) Knowledge and availability of Telemedicine initiatives in Nigeria

It was the opinion of the health workers that Telemedicine was generally available in

Table 4.3: Distribution of health workers by knowledge of the availability of Telemedicine initiatives in Nigeria

Statements regarding Telemedicine Initiatives in Nigeria	True (%)	False (%)	Don't Know (%)
Telemedicine is generally available in Nigeria.	72.8	6.5	20.7
Telemedicine is available in UCH Ibadan.	18.3	68.6	13.1
Health professionals do not generally trust ICTs or Telemedicine.	26.6	66.9	6.5
Health professionals generally do not care about using Telemedicine.	74.0	17.2	8.8
Health professionals generally accept Tele-medicine if they are specialty- related.	55.0	27.8	17.2
Health professionals are usually hesitant to adopt new ICT or Telemedicine applications.	55.0	27.8	17.2

Nigeria (72.8%), but health professionals generally do not care about using Telemedicine (74.0%). In fact, 26.6% of the respondents were of the opinion that health professionals do not generally trust ICTs or Telemedicine (Table 4.3). Again, surprisingly, only 18.3% of the health workers at the U.C.H. were aware that Telemedicine is available in the health facility.

(g) Knowledge and advantages of Telemedicine

Despite the slow adoption of ICTs by the health workers, those at U.C.H. were very knowledgeable about the advantages of Telemedicine, as shown in Table 4.4. Nine out of every ten respondents were aware that Telemedicine will result in more timely advice and interventions (94.7%), improve collaboration between health care providers (93.5%), reduce waiting time in the clinic (92.3%), increase access to care (92.3%), and improve the knowledge and clinical acumen of health professionals. Regrettably, only

Table 4.4: Distribution of health workers by knowledge of the advantages of Telemedicine

Advantages of Telemedicine	True (%)	False (%)	Don't Know (%)
Telemedicine will increase access to care.	92.3	5.3	2.4
Telemedicine will reduce waiting time in the clinic.	92.3	3.6	4.1
Telemedicine will result in more timely advice and interventions.	94.7	4.1	1.2
Telemedicine will improve follow-up care patients.	92.9	4.7	2.4
Telemedicine will decrease unnecessary referrals to tertiary health centres.	84.6	8.3	7.1
Telemedicine will improve collaboration			

among health care professionals.	93.5	5.3	1.2
Telemedicine will save the costs for patients and health care providers.	81.1	11.8	7.1
Telemedicine increases costs of care to patients.	42.6	47.9	9.5
Telemedicine will reduce the revenues of the hospital.	43.8	47.9	8.3
Telemedicine will improve the knowledge and clinical acumen of health professionals.	91.1	4.7	4.2
Telemedicine will reduce the time and effort of health care professionals.	79.9	14.2	5.9
Use of the Telemedicine facility in UCH	38.5	54.4	7.1

38.5% of the health workers at U.C.H. claimed that Telemedicine is being used at the health facility.

(h) Knowledge and potentials of ICTs in the health sector

Again, despite their slow adoption of ICTs in the health sector, the health professionals at U.C.H. were knowledgeable about the potentials of these technologies in their work (Figure 4.4). More than nine out of every ten were aware that ICTs would improve practice through accessible and continuing education, training and continuing professional development (93.5%), and would save the worker's time and effort (91.1%).

(i) Obstacles to the use of ICTs in the health sector

Almost all the health professionals surveyed affirmed that the obstacles listed in Figure 4.5 are great impediments to the use of ICTs in the health sector. The major obstacles, according to the health workers, were an inadequate supply of electricity in the urban (94.1%) and the rural (91.7%) areas, and inadequate Telemedicine facilities in the health

Figure 4.4: Distribution of health workers by knowledge of the potentials of ICTs (all e-health including m-Health and Telemedicine)

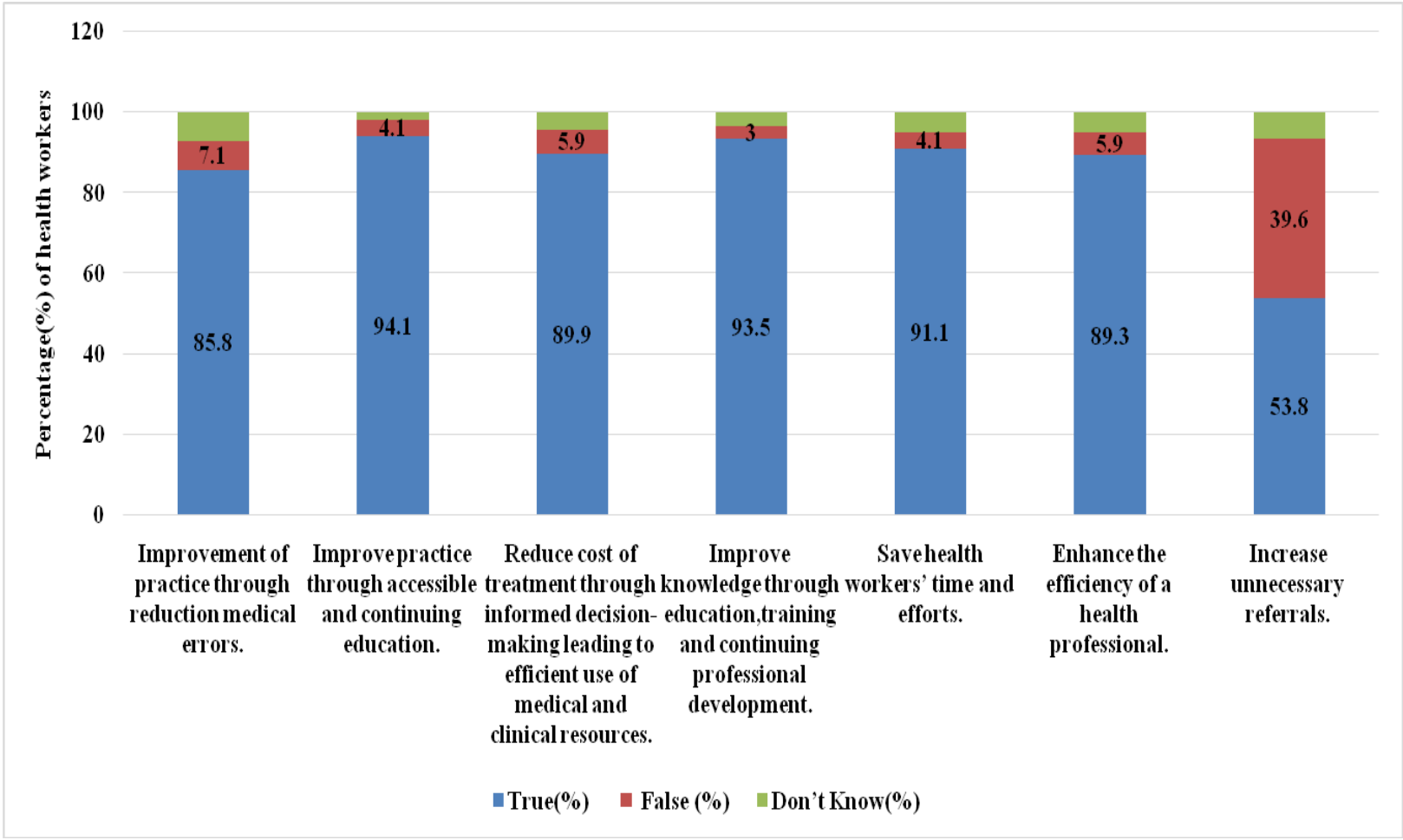
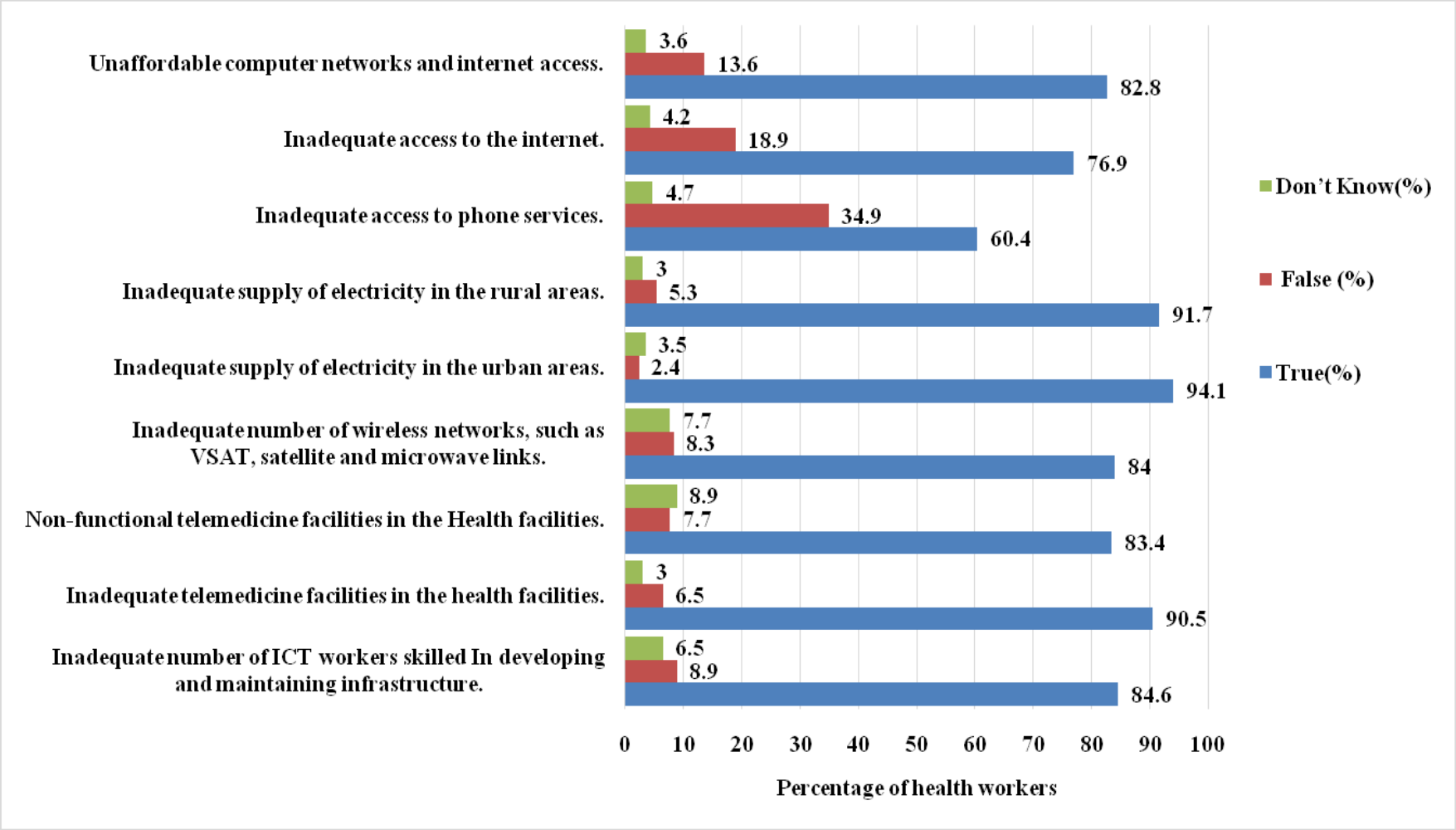


Figure 4.5: Distribution of health workers by knowledge of obstacles to the use of ICTs in the health sector



Centres (90.5%). However, only 60.4 % of the respondents affirmed that inadequate access to phone services was an obstacle to the use of ICTs.

j. Knowledge of ICT Policy

It was apparent that nearly all the health workers at U.C.H. were unaware of the ICT Policy in Nigeria (Table 4.5). Only 30.8% of the respondents were aware that the Nigerian government has an ICT Policy, while only 27.8% of them affirmed that the government promoted the use of ICTs in the health sector. As to all the other statements depicted in Table 4.5, only about two of every ten responded in the affirmative.

Table 4.5: Distribution of health workers by knowledge of ICT Policy in Nigeria.

Statement	Knowledge of ICT Policy in Nigeria. True (%)	False (%)	Don't Know (%)
The Nigerian Government has an ICT Policy.	30.8	21.3	47.9
The Nigerian Government promotes the use of ICTs in the health sector	27.8	40.2	32.0
The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients.	21.9	47.3	30.8
The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector.	17.2	48.5	34.3
The government generally ensures standardi-zation and availability of legal measures in ICT-related activities.	21.3	40.2	38.5

4.3.2 Findings from a survey of medical students at U.C.H., Ibadan.

a. Socio-demographic characteristics

One hundred and two medical students were interviewed at U.CH., comprising of 70 (68.6%) males and 32 (31.4%) females. Their average age was 38.5 (range 20 to 40 years. Most of the students were in the "500 level" of their medical school education, i.e., had one more year to qualify as doctors, as shown in Table 4.6.

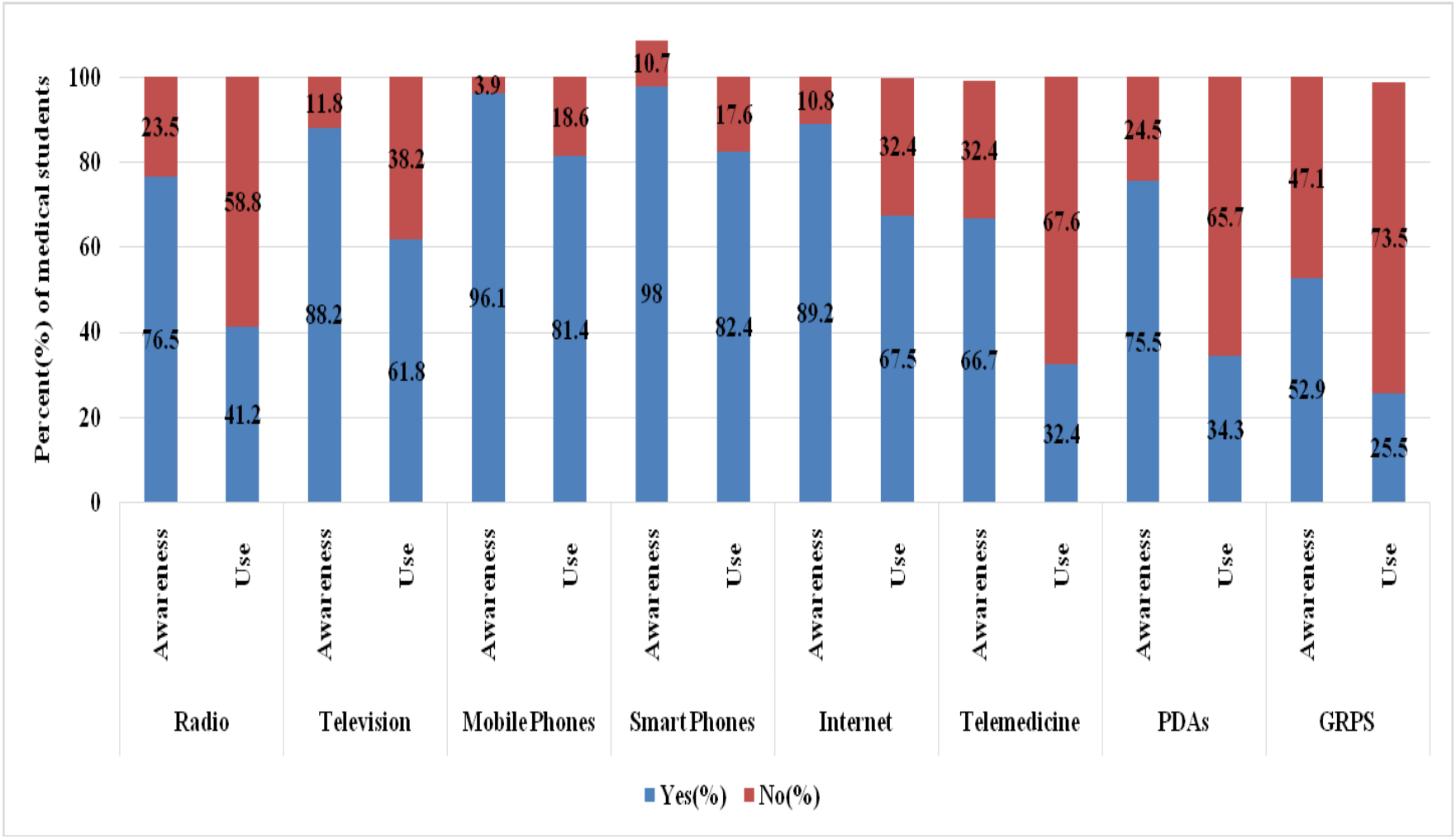
Table 4.6: Socio-demographic Characteristics of Medical Students (UCH)

Characteristics	Number	Percentage
Sex (n = 102)		
Male	70.0	68.6
Female	32.0	31.4
Age (n = 102)		
Less than 20 years	4.0	3.9
21 – 30 years	90.0	88.2
31 – 40 years	1.0	1.0
Above 40 years	-	-
Not stated	7.0	6.9
Years spent in Medical School (n =102)		
4 years (400 level)	31.0	30.4
5 years (500 level)	45.0	44.1
6 years (600 level)	25.0	25.5

b. Awareness and use of ICTs in training programmes

Telemedicine (95.3%), the Internet (96.1%0 and smart phones (89.3%) attracted the greatest awareness of ICTs that are useful in the health sector from the medical students. However, the medical students at U.C.H. appeared to have very good knowledge of the

Table 4.6: Distribution of Medical Students (UCH) by Awareness and Use of ICTs in their training programme



different types of ICTs listed in the questionnaire (Figure 4.6). With regard to use, only smart phone (82.3%), and mobile phones (81.4%) were being widely used. These were closely followed by the Internet (62.5%) and television (61.8%). All other types of ICTs listed in (Figure 4.6) were not widely used by the students.

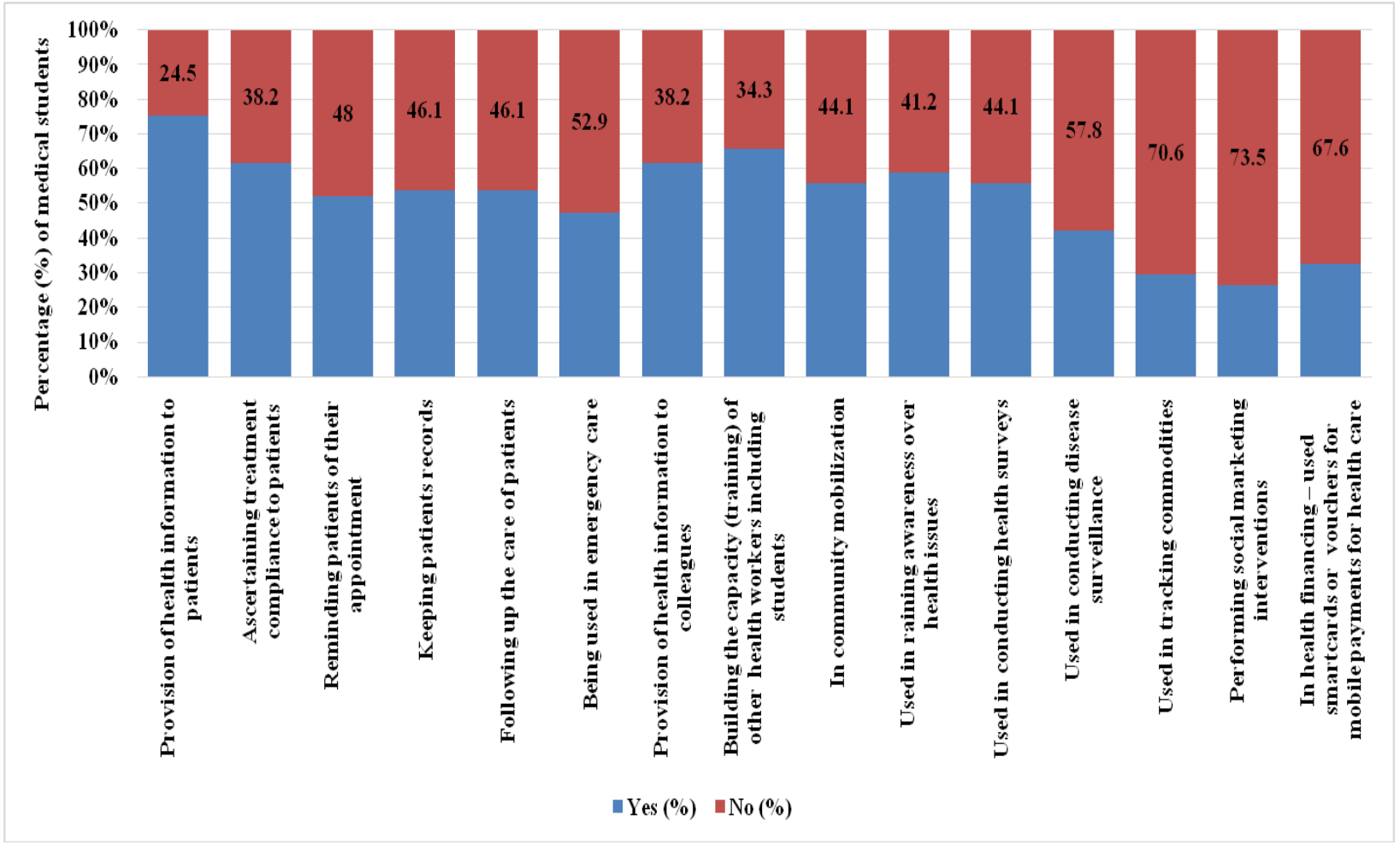
c. Knowledge of ICT terminologies and m-Health Initiatives by medical students

The medical students at U.C.H. seemed to be quite familiar with all the ICT terminologies depicted in Table 4.7, as their performances ranged from 70.6% to 95.1%.

Table 4.7: Distribution of Medical Students by knowledge of ICT terminologies

ICT Terminologies	True (%)	False (%)	Don't Know (%)
ICTs include all telephones, computers and net-work based technologies, e.g., Internet.	95.1	2.9	2.0
e-Health encompasses a range of services that involve health care and ICT supported by processes and communication.	90.2	3.9	5.9
m-Health is the use of mobile technology to support the achievement of health objectives.	77.5	2.0	2-0.5
Telemedicine is the use of medical information transferred from one site to another through electronic communication to improve patient's care including diagnosis and treatment.	89.2	2.9	7.9
Telemedicine can be used for education of the patient or health care provider for the purpose of improving patients' care.	87.3	1.0	11.7
m-Health is a component of e-Health.	70.6	2.9	26.5
Telemedicine is a component of e-Health.	83.3	3.9	12.8

Figure 4.7: Distribution of Medical Students at UCH by knowledge of type of m-Health initiatives adopted in the health sector.



However, with the knowledge of ICT initiatives, their performances were poorer (Figure 4.7). More than seven out of ten students were aware that ICTs can provide health information to patients. However, less than three out of ten students knew that ICTs could be used for tracking commodities, or performing social marketing information.

d. Availability of m-Health Initiatives and Telemedicine in Nigeria

The medical students' knowledge of the availability of m-Health initiatives were very limited. Many of the true statements regarding m-Health initiatives were answered as being false (Figure 4.8). Similarly, despite the availability of Telemedicine at U.C.H., the students' knowledge of the services of the ICT application was also poor. In fact, only 50.0% of the students were aware that the Telemedicine application was available in their hospital (Figure 4.9). Over five of every ten students were of the opinion that health professionals generally accepted Telemedicine if it were specialty-related, but were also hesitant to adopt new ICT or Telemedicine applications.

Figure 4.8: Distribution of Medical Students at UCH by knowledge of availability of m-Health initiatives in Nigeria

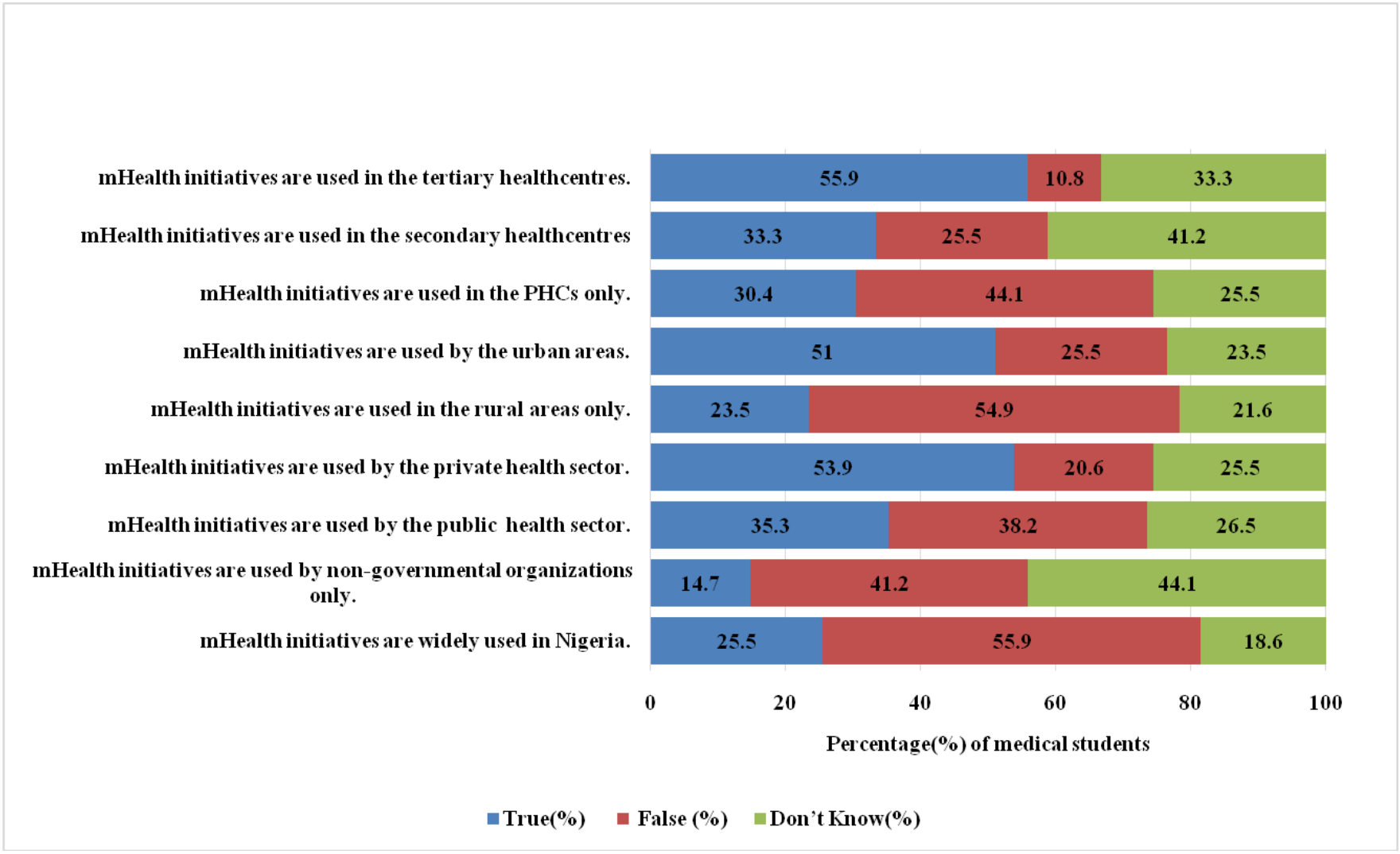
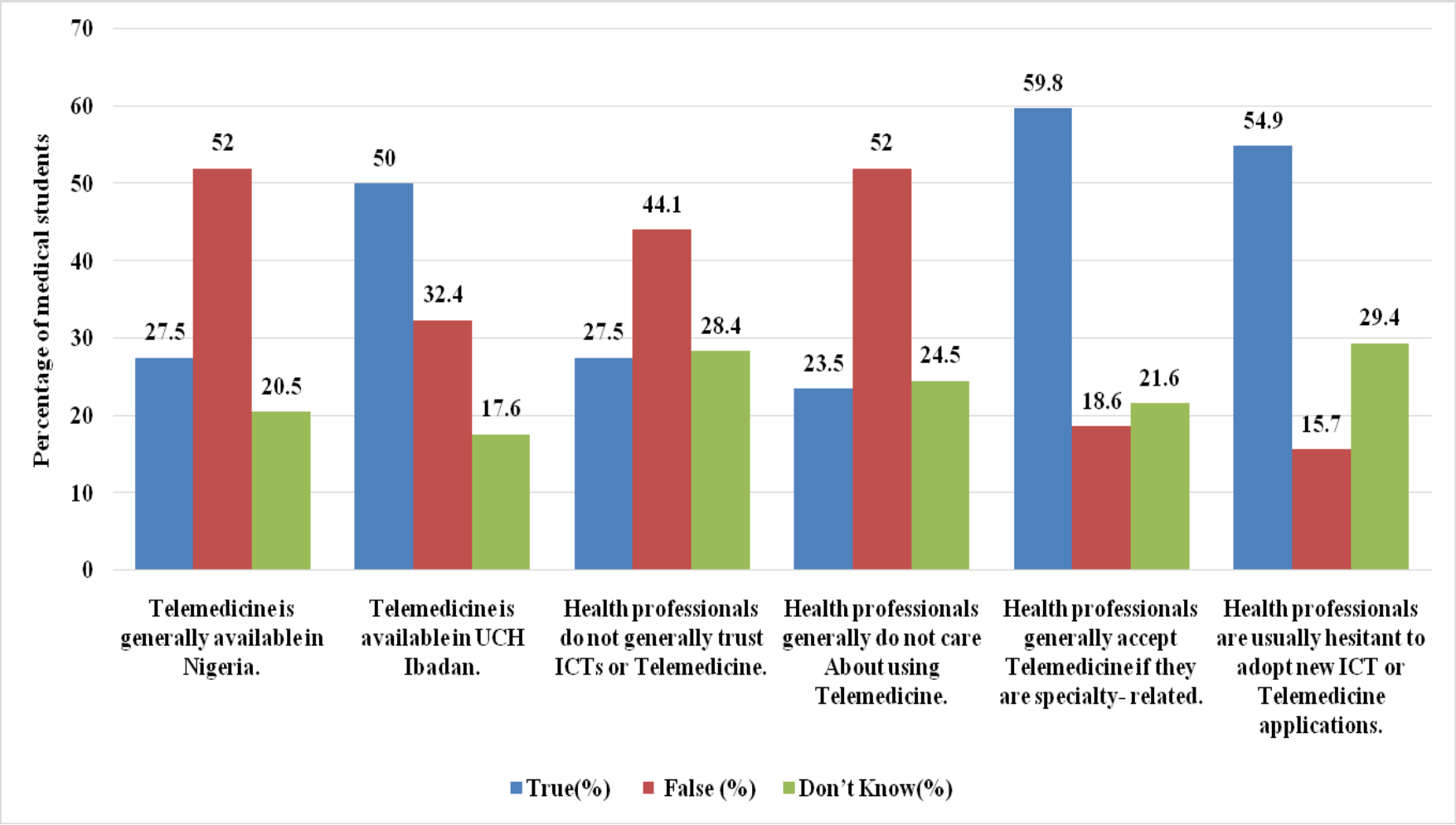


Figure 4.9: Distribution of Medical Students by knowledge of availability of Telemedicine initiatives in Nigeria



e. Knowledge of advantages of Telemedicine

Surprisingly, despite their poor knowledge of the availability of Telemedicine, the medical students at U.C.H. had a good knowledge of the advantages of ICTs in medical practice (Table 4.8). While more than six out of ten students were of the opinion that Telemedicine would save costs to patients and health care professionals. However, over seven out of ten students were of the opinion that Telemedicine would improve the knowledge and clinical acumen of health professionals while also reducing their time and effort. However, only 39.0% of the students surveyed had used the Telemedicine facility in the hospital.

Table 4.8: Distribution of Medical Students by knowledge of advantages of Telemedicine

Advantages of Telemedicine	Responses (n = 106) True (%)	False (%)	Don't Know (%)
Telemedicine will increase access to care.	73.5	15.7	10.8
Telemedicine will reduce waiting time in the clinic.	87.3	3.9	8.8
Telemedicine will result in more timely advice and interventions.	88.2	3.9	7.9
Telemedicine will improve follow-up care patients.	88.2	4.9	6.9
Telemedicine will decrease unnecessary referrals to tertiary health centres.	75.5	10.8	13.7
Telemedicine will improve collaboration health care professionals.	92.2	2.0	5.8
Telemedicine will save the costs to patients and health care providers.	67.6	18.6	13.8

Telemedicine increases costs of care to patients.	43.1	39.2	17.7
Telemedicine will reduce revenues of the hospital.	39.2	33.3	27.5
Telemedicine will improve the knowledge and clinical acumen of health professionals.	72.5	12.7	14.8
Telemedicine will reduce the time and effort of health care professionals.	72.5	12.7	14.8
Use of the Telemedicine facility in UCH	39.0		

f. Knowledge of potentials of Telemedicine

The medical students were very knowledgeable on the potentials of Telemedicine, as depicted in Figure 4.10. More than eight out of ten students were aware that Telemedicine would improve knowledge and practice, reduce the cost of treatment, save health workers' time and effort, and enhance the efficiency of health professionals.

g. Knowledge of obstacles to the use of ICTs in the health sector

As shown in Figure 4.11, over seven out of every ten medical students affirmed that the obstacles listed in this table were impediments to the adoption of ICTs in the Nigerian health sector. Among the frequently cited obstacles were the inadequate supply of electricity in the urban (87.3%) and rural (83.3%) areas, non-functional Telemedicine facilities (81.4%) and inadequate Telemedicine facilities in the health centres (80.4%).

Figure 4.10: Distribution of Medical Students by knowledge of the potentials of ICTs (all e-Health, including m-Health and Telemedicine)

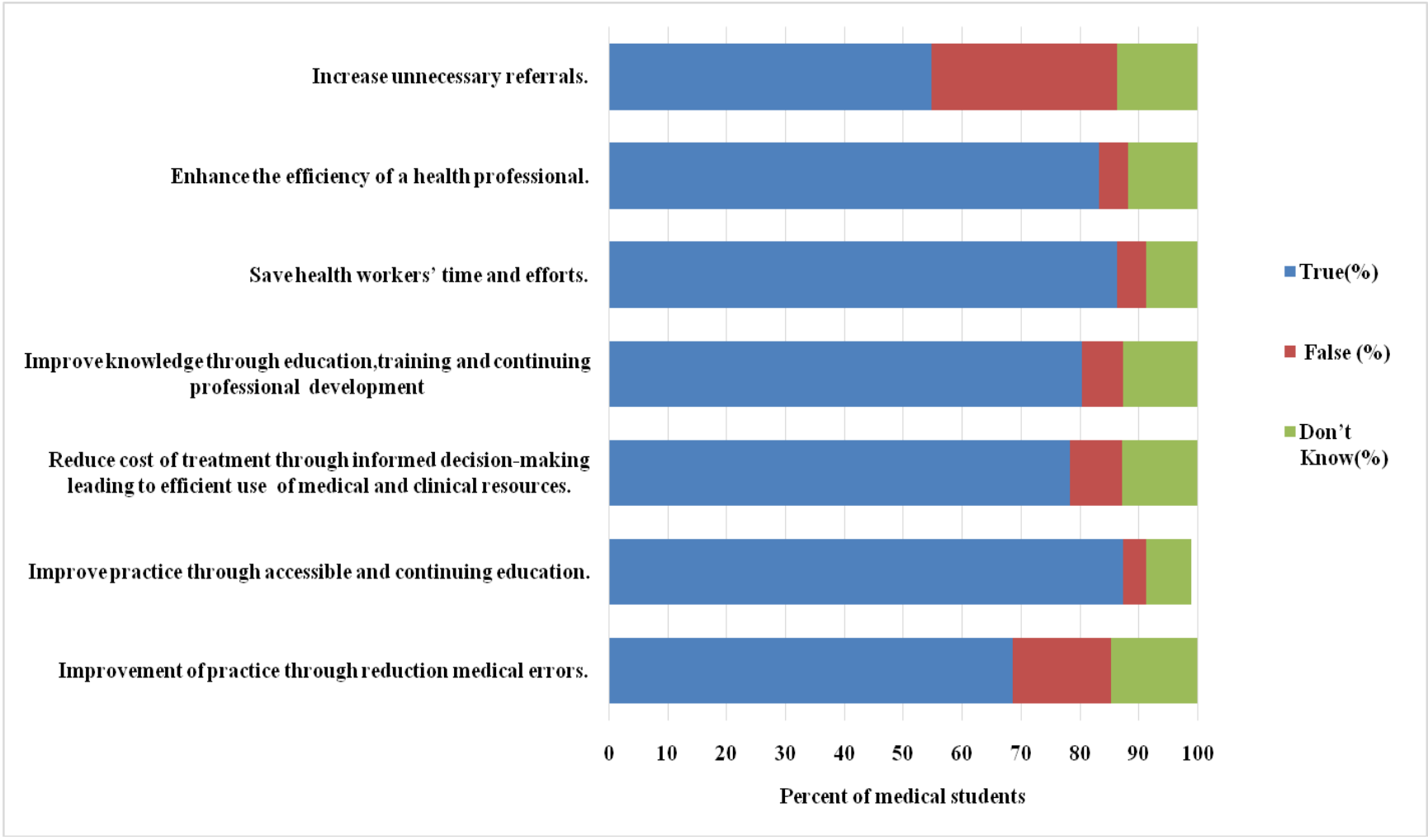
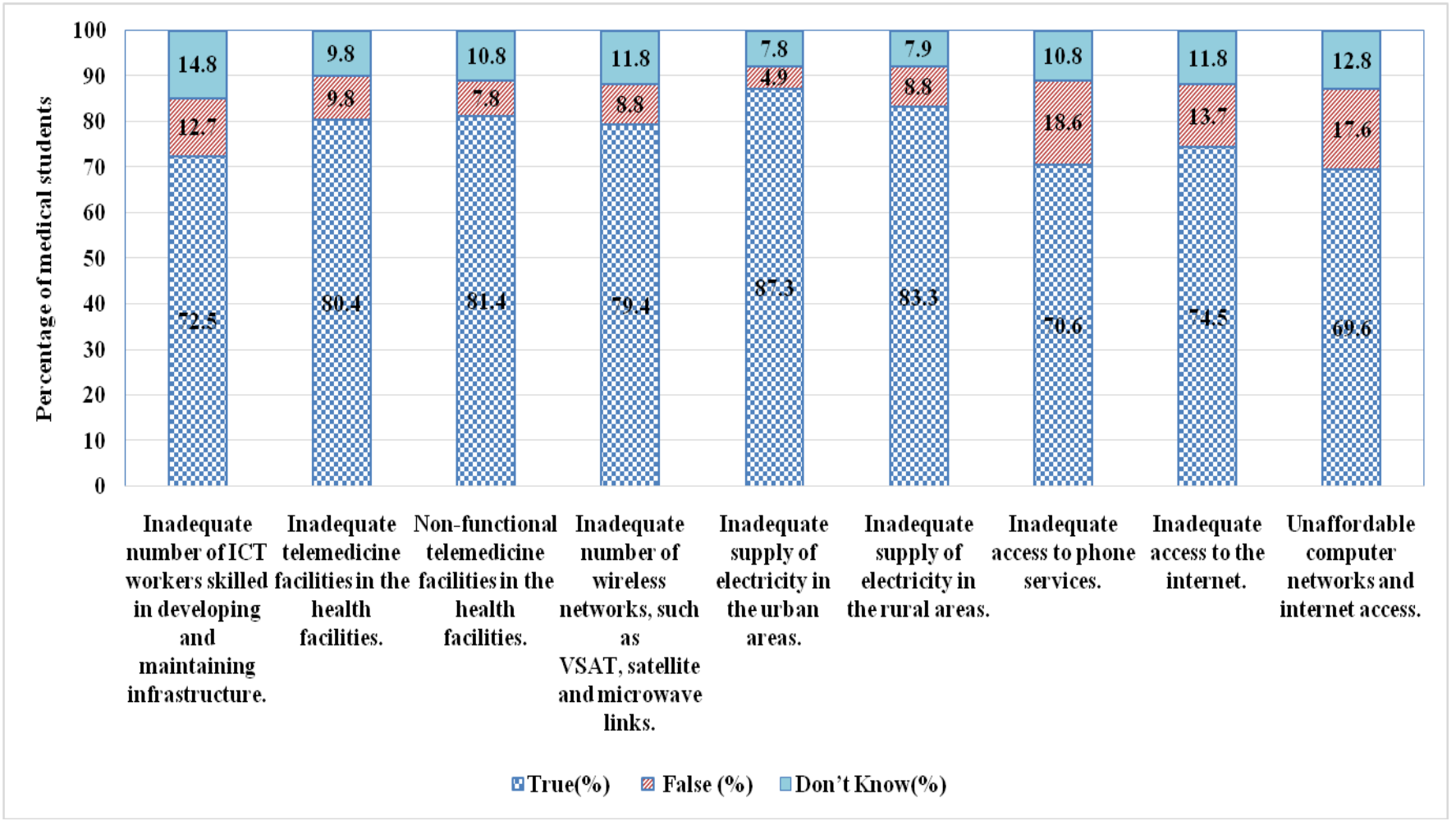


Figure 4.11: Distribution of Medical Students by knowledge of the obstacles to the use of ICTs in the health sector



h. Knowledge of ICT Policy

The knowledge of the medical students on the Nigerian ICT Policy was rather poor. Only 39.2% of the students surveyed were aware of the existence of the policy. Regarding the roles of government in promoting or creating awareness of the policy, only three out of every ten students answered in the affirmative. A similar ratio of students were of the opinion that the government actively supports ICT-related projects and capital expenditure, or ensures the standardization and availability of legal measures in ICT-related activities (Table 4.9).

Table 4.9: Distribution of Medical Students by knowledge of ICT Policy in Nigeria.

Statement	Responses (n = 106)		
	True (%)	False (%)	Don't Know (%)
The Nigerian Government has an ICT Policy	39.2	19.6	41.2
The Nigerian Government promotes the use of ICTs in the health sector	34.3	31.4	34.3
The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients.	34.3	34.3	31.4
The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector.	30.4	40.2	29.4
The government generally ensures standard-ization and availability of legal measures in ICT-related activities.	30.4	38.2	31.4

4.3.3 Findings from the survey of users and non-users of health services.

a. Socio-demographic characteristics

Seventy-eight females (73.6%) and 28 (26.4%) males were interviewed, and the majority were in the age bracket of 20 to 40 years (71.7%). Only 18 (17.9%) of them were above 50 years of age. They were mainly senior civil servants/professionals (26.4%), petty traders/labourers/manual workers (25.4%), primary school teachers/artisans (18.9%), and students (18.9%). Over eight out of ten respondents had completed secondary education, while 56.6% had completed tertiary education (Table 4.10).

b. Awareness and use of ICTs for communication in the health sector

Despite the range of awareness of the ICTs shown in Figure 4.12, there was a poor use of these innovations by the users and non-users of the hospital services for communicating in the health sector. The most frequently used were the mobile phones (71.7%), television (68.9%), radio (67.0%) and the Internet (61.3%). Surprisingly, 50.0% of the respondents indicated that they used telemedicine for communicating in the health sector.

c. ICT applications frequently used to obtain health information by users and non-users of health services

The smart phones (49.1%) and television (48.1%) were the equipment that was most frequently cited by the respondents (Figure 4.13). Others were mobile phones (45.1%) and the Internet (42.5%). The least frequently used were GRPS (14.2%), Telemedicine (14.2%) and PDAs (15.1%).

Table 4.10: Socio-demographic Characteristics of Users and Non-Users of health services

Characteristics	Number	Percentage
Sex (n = 106)		
Male	28.0	26.4
Female	78.0	73.6
Age (n = 106)		
20 – 30 years	46.0	43.4
31 – 40 years	30.0	28.3
41 – 50 years	12.0	11.3
51 – 60 years	8.0	7.6
Above 60 years	10.0	9.4
Occupation (n = 106)		
Senior Civil Servant/Professionals	28	26.4
Primary School teachers/Artisans	20	18.9
Petty trading/Labourers/Manual workers	27	25.4
Students	20	18.9
Unemployed/Housewives	5	4.7
Retirees	6	5.7
Laboratory Science		
Highest Educational Level Attained (n = 106)		
None	-	-
Completed Primary School Education	91.0	85.8
Completed Secondary School Education	86.0	81.1
Completed Tertiary School Education	60.0	56.6

Figure 4.12: Distribution of Users and Non-Users of health services by Awareness and Use of ICTs for communicating in the health sector

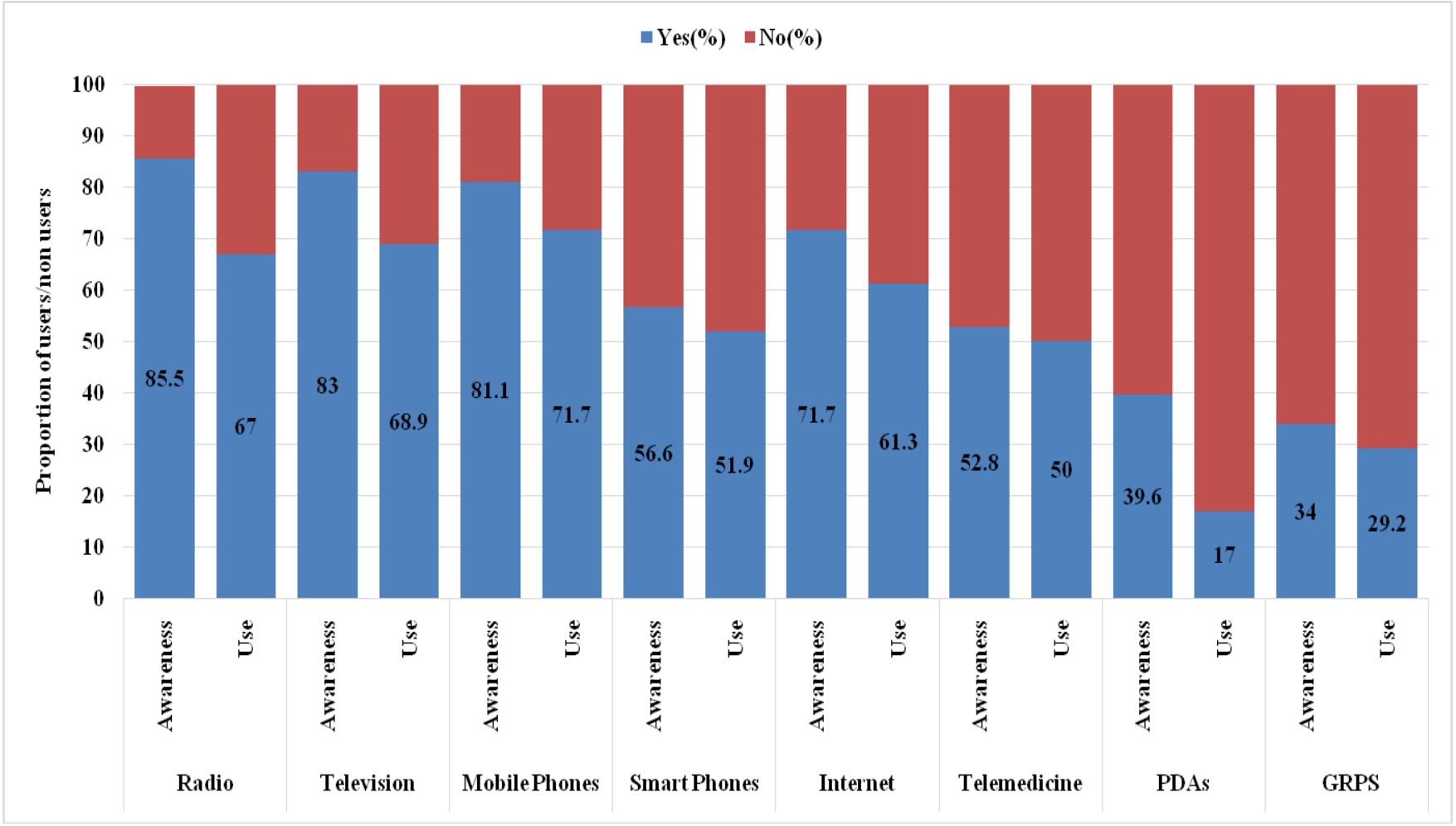


Table 4.13: Distribution of Users and Non-Users of health services by ICTs Applications frequently used to obtain health information

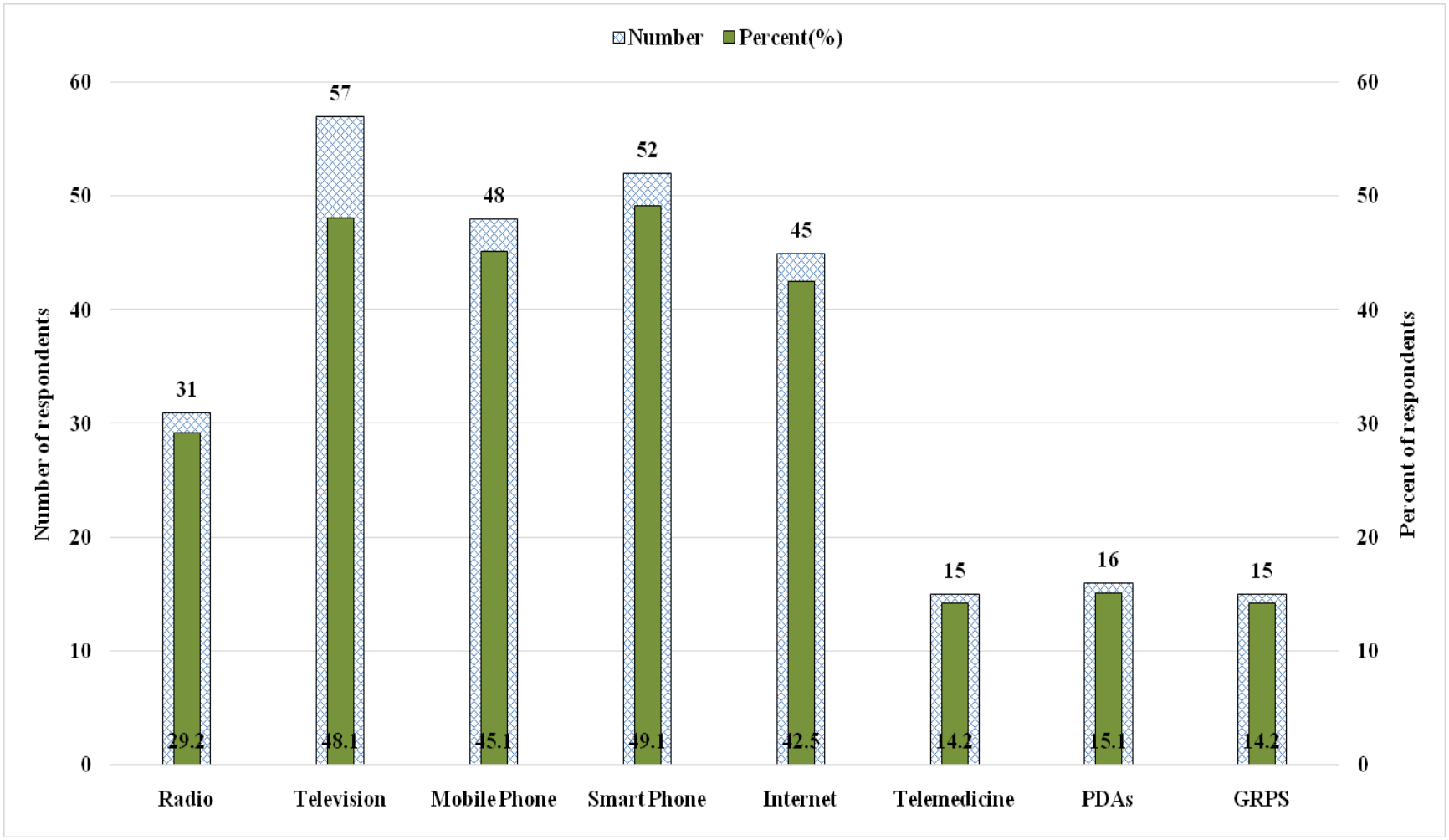
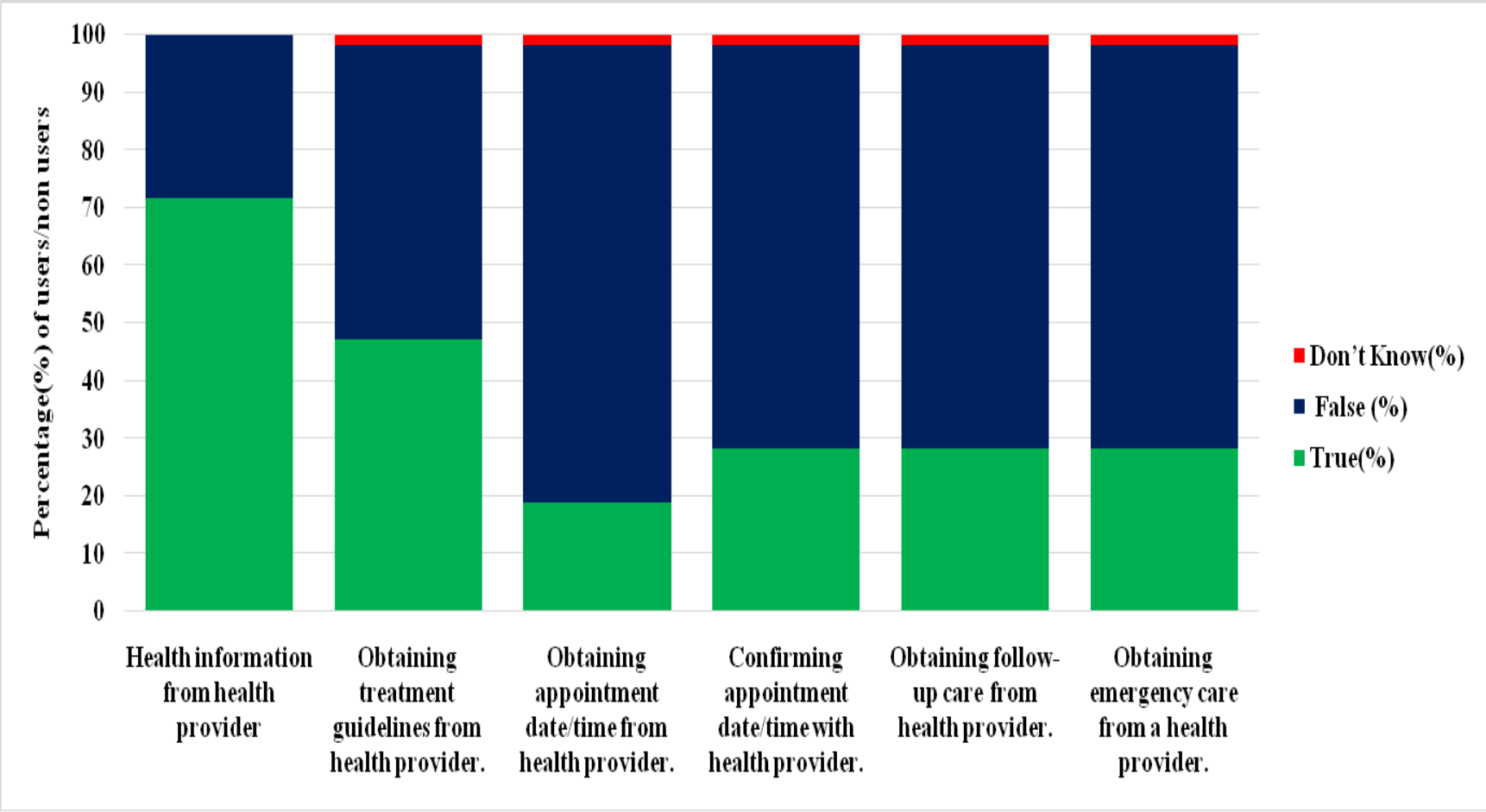


Table 4.14: Distribution of Users and Non-Users by types of health information that they usually obtained from the use of ICTs.



d. Types of health information the users and non-users of health services usually obtained from the use of ICTs in the health sector

The most frequently sourced information obtained by the respondents were health information (91.7%), and treatment guidelines (47.2%) from the health providers. Of the other types of information shown in Figure 4.14, less than three out of ten respondents claimed have used ICT applications in these areas, the least being obtaining appointment date/time from the health provider (18.9%).

e Knowledge of types of services that can be provided with ICT applications

The most frequently cited types of services in Table 4.11 were the provision of information to the community (67.9%), the obtaining of health information from health providers (60.4%), the provision of appointment reminders to patients, obtaining treatment guidelines from the health provider (54.7%), and the provision of follow-up care to the patients (52.8%). As expected, the least frequently cited types of uses of ICT applications by the users and non-users of hospital services were conducting disease surveillance (34.0%), raising awareness over health issues (34.0%), and conducting health surveys (28.3%).

Table 4.11: Distribution of users and non-users by their knowledge of the types of services that can be provided using ICT applications.

Type of Health Services	Yes (%)	No (%)	Don't Know
Provision of health information to the community.	67.9	13.2	18.9
Provision of appointment reminders to patients and clients	52.8	28.3	18.9
Provision of follow-up care to patients.	52.8	30.2	17.0

Obtaining health information from health providers.	60.4	15.1	24.5
Obtaining treatment guidelines from health provider.	54.7	20.8	24.5
Obtaining appointment date/time from health provider.	45.3	34.0	20.8
Confirming appointment date/time with health provider.	41.5	34.0	24.5
Obtaining follow-up care from the Health provider.	45.3	28.3	26.4
Obtaining emergency care from a Health provider.	39.6	28.3	32.1
Obtaining emergency care as an emergency response system.	35.8	24.5	39.6
Training of other health workers.	37.7	11.3	60.0
Community mobilization.	37.7	11.3	51.0
Awareness raising over health issues.	34.0	17.0	49.1
Conducting health surveys.	28.3	17.0	54.7
Conducting disease surveillance.	34.0	13.2	52.9
In health financing – use of smart cards or vouchers, making use of mobile payments for health care.	37.7	11.3	60.0

f. Knowledge and potentials of ICT applications in the health sector

In general, the knowledge and potentials of ICTs for communicating in the health sector and held by the users and non-users of hospital services were rather poor, as depicted in Table 4.12. Less than five out of every ten respondents were aware of the potentials listed

in the table, the highest being the reduction of waiting time in the clinics (49.1%), increase in patient access to care (47.2%), resulting in more timely advice for interventions (45.3%) and improvement in follow-up care of patients (45.3%). More than eight out of every ten respondents were not aware that Telemedicine had potentials for communicating in the health sector.

Table 4.12: Distribution of Users and Non-Users by knowledge and potentials of ICTs for communicating in the health sector.

Potentials of ICTs	True (%)	False (%)	Don't Know (%)
ICTs are widely used for providing health Services in Nigeria.	34.0	22.6	43.4
Health professionals use ICTs for health Services in Nigeria.	39.6	20.8	39.6
Telemedicine is available at UCH, Ibadan.	35.8	9.4	54.7
Telemedicine is generally available in Nigeria.	18.9	22.6	57.5
Health professionals in Nigeria are hesitant to adopt new ICTs or Telemedicine applications.	22.6	18.9	58.5
Use of ICTs will increase patient access to care.	47.2	17.0	35.9
Use of ICTs will reduce waiting time in clinics.	49.1	24.5	26.4
Use of ICTs will result in more timely advice and interventions.	45.3	20.8	33.9
Use of ICTs will improve follow-up care of patients.	45.3	20.8	43.4
Use of ICTs will improve collaboration among health care professionals.	35.8	20.8	43..4
Use of ICTs will save costs for patients and			

health workers.	39.6	26.4	34.0
Use of ICTs will increase costs of care to the patient.	20.8	37.7	41.5
Use of ICTs will reduce revenues to the hospital.	28.3	30.2	41.5
Use of ICTs will reduce the time and efforts of health care professionals.	32.1	30.2	37.7
Use of ICTs will enhance the efficiency of a health workers.	37.7	28.3	34.0

g. Knowledge of users and non-users about the obstacles to the use of ICTs for communicating in the health sector

Similar to the opinions the health workers and medical students expressed with regard to the obstacles to the use of ICTs in the health sector, the users and non-users of hospital services also cited the inadequate supply of electricity in the rural (64.2%) and urban (62.3%) areas, inadequate ICT equipment in the health centres (54.7%) and the lack of an ICT Policy by the government (52.8%), as depicted in Table 4.13.

Table 4.13: Distribution of Users and Non-Users of health services by knowledge of the obstacles to the use of ICTs in the health sector

Obstacles to the use of ICTs	True (%)	False (%)	Don't Know (%)
Inadequate number of ICT workers skilled In developing and maintaining infrastructure.	49.1	11.3	39.6
Inadequate ICT facilities in the health centres	54.7	3.8	41.5
Non-functional ICT facilities in the			

health centres.	45.3	5.7	49.1
Inadequate number of wireless networks	39.6	13.2	47.2
Inadequate supply of electricity in the urban areas.	62.3	11.3	28.4
Inadequate supply of electricity in the rural areas.	64.2	17.0	18.9
Inadequate access to phone services.	45.3	32.1	22.0
Inadequate access to the Internet.	50.9	18.9	30.2
Unaffordable computer networks and Internet access.	49.1	15.1	35.8
Lack of an ICT Policy by the Government.	52.8	17.0	30.2
Lack of promotion of the use of ICTs in the health sector by the Nigerian government.	41.5	15.1	43.4
Inability of government to create awareness of the concepts and benefits of ICTs in the health sector for providers and patients.	43.4	11.3	45.3
Inability of government to support ICT-related projects (equipment, training) & capital expenditure in the health sector.	39.6	17.0	43.4

4.4 Findings from the survey of health workers and medical students in seven Nigerian teaching hospitals.

4.4.0 Apart from the University College Hospital, Ibadan, Oyo State, where most of the data for this study were collected, questionnaires were sent to six other different hospitals – one in each of the six geographical/political zones of the country, namely:

(i) Aminu Kano University Teaching Hospital (AKUTH), Kano, Kano State – located in the North West Zone;

(ii) Jos University Teaching Hospital (JUTH), Jos, Plateau State, North Central Zone;

(iii) Obafemi Awolowo University Teaching Hospital (OAUTH), Ile-Ife, Oshun State – located in the South West Zone;

(iv) University of Calabar Teaching Hospital (UCTH), Calabar, Cross River State – located in the South-South Zone;

(v) University of Maiduguri University Teaching Hospital (UMTH), Maiduguri, Borno State – located in the North East Zone, and

(vi) University of Nigeria Teaching Hospital (UNTH), Enugu, Enugu State – located in the South East Zone.

Only the health workers and medical students were interviewed in these hospitals.

4.4.1 Findings from the survey of health workers in seven university teaching hospitals in Nigeria

a. Socio-demographic characteristics of the health workers

While one hundred and sixty-nine health workers were interviewed at U.C.H., Ibadan, the numbers varied from 37 to 53 in the other six hospitals. The proportions of male to female respondents ranged between 36:17 to 20:19, in the six teaching hospitals. The health workers in the age bracket 31 to 40 years (range 24.5% - 50.9%) were the majority of those interviewed, except at OAUTH, where those in the age bracket (41 to 50 years) were more. This was closely followed by health workers in the age bracket 41 to 50 years (range 15.1% - 37.5%) in the other six hospitals (Table 4.15).

In all the hospitals except OAUTH, the medical practitioners formed the bulk of those interviewed. In OAUTH, the nursing practitioners had a greater percentage (35.4%).

Table 4.14: Socio-demographic Characteristics of Health workers in Seven Nigerian University Teaching Hospitals

Characteristics	Socio-demographic Characteristics of Health workers in Seven Nigerian University Teaching Hospitals University Teaching Hospitals													
	UCH (n = 169)		AKUTH (n = 37)		JUTH (n = 53)		OAUTH (n = 48)		UCTH (n = 53)		UMTH (n = 43)		UNTH (n = 39)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
Sex)														
Male	81	47.9	16	43.2	24	45.3	20	41.7	36	67.9	18	41.9	20	51.3
Female	88	52.1	21	56.8	29	54.7	28	58.3	17	32.1	25	58.1	19	48.7
Age														
20 – 30 years	26	15.4	9	24.3	11	20.8	11	22.9	8	15.1	9	20.9	6	15.4
31 – 40 years	77	45.6	16	43.2	13	24.5	12	25.0	27	50.9	17	39.5	17	43.6
41 – 50 years	45	26.6	7	18.9	13	24.5	18	37.5	8	15.1	11	25.6	8	20.5
Above 50 years	13	7.7	-	-	13	24.5	2	4.2	6	11.3	2	4.7	2	5.1
Not stated	8	4.7	5	13.5	3	5.7	5	10.4	4	7.6	4	9.3	6	15.4
Occupation														
Medical Practice	75	44.4	16	43.2	22	41.5	16	33.3	36	67.8	16	37.2	19	48.7
Nursing Practice	45	26.6	9	24.3	16	30.2	17	35.4	8	15.1	13	30.2	12	30.8
Physiotherapy	17	10.1	5	13.5	-	-	3	6.3	-	-	3	7.0	-	-
Pharmacy	13	7.7	4	10.8	11	20.8	9	18.8	-	-	7	16.3	6	15.4
Social Work	7	4.1	-	-	-	-	-	-	3	5.7	3	7,0	2	5.1
Radiography	7	4.1	-	-	-	-	-	-	-	-	1	2,3	-	-
Laboratory Science	5	3.0	-	-	-	-	-	-	1	1.9	-	-	-	-
Others	-	-	3	8.1	3	5.7	3	6.3	5	9.4	-	-	-	-

Years of Experience in Profession													
1 – 10 years	87	51.5	22	59.5	23	43.4	20	41.7	28	52.8	21	48.8	25	64.1
11 – 20 years	64	37.9	8	21.6	17	32.0	15	31.2	14	26.4	14	32.6	8	20.5
21 – 30 years	7	4.1	2	5.4	8	15.1	9	18.7	5	9.4	5	11.6	3	7.7
Above 30 years	5	3.0	1	2.7	3	5.7	3	6.3	1	1.9	2	4,7	2	3.1
Not stated	6	3.6	4	10.8	2	3.8	1	2.1	5	9.4	1	2.3	1	2.6

Apart from U.C.H., Ibadan, and UMTH, Maiduguri, the laboratory scientists were not interviewed in the other five hospitals. Similarly to what obtained at the U.C.H majority of the health workers in other teaching hospitals had been in practice for one to ten years (Table 4.14).

b. Awareness of use of ICTs in their work

Despite a wide range of awareness of ICT applications (except PDAs and GRPS), there seemed to be poor use of them, except the mobile phones, smart phones and the Internet (range = 75.6% to 81.0%). Most of the respondents were not familiar with the use of the PDAs and GRPS in the health sector, except at the U.C.H. and JUTH. However, their use was equally poor in these centres (Figure 4.15).

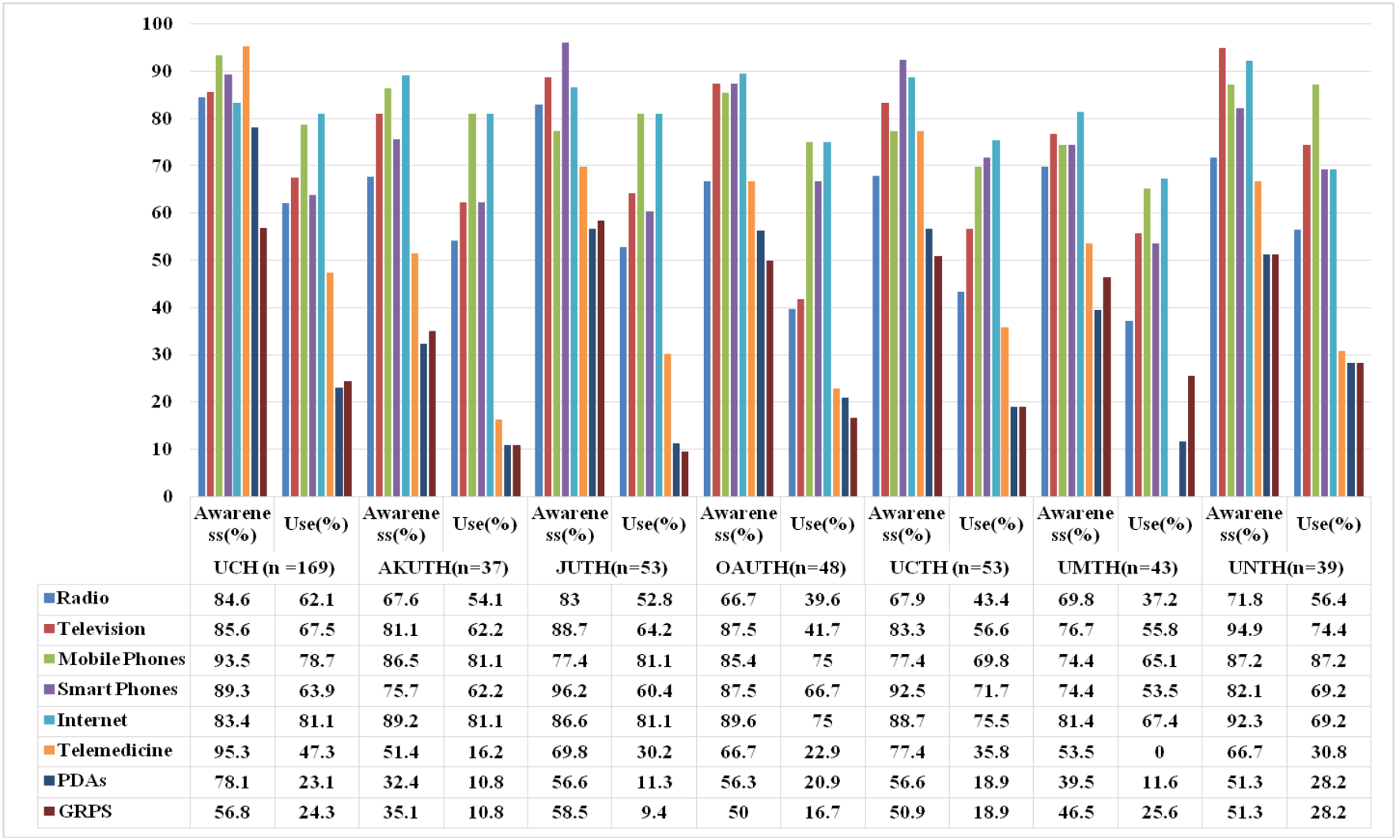
c. Knowledge of ICT Terminologies by the Health Workers

As demonstrated at the U.C.H., Ibadan, the health workers in the other six teaching hospitals were quite knowledgeable about ICT terminologies. However, slightly lower percentages were observed in UMTH (69.6%) and UNTH (64.1%) on the definition of m-Health, as the "use of mobile technology to support the achievement of health objectives." Similar lower scores were observed in four teaching hospitals regarding "m-Health as a component of e-Health (Table 4.15).

d. Adoption of m-Health Initiatives by the Health Workers

On the use of m-Health initiatives, the percentages dropped and varied widely between hospitals. However, the workers at U.C.H., on the average, recorded higher percentages than other hospitals (Table 4.16).

Figure 4.15: Distribution of Health workers in Seven Nigerian University Teaching Hospital by Awareness and Use of ICTs in their work



	UCH (n =169)		AKUTH(n=37)		JUTH(n=53)		OAUTH(n=48)		UCTH (n=53)		UMTH(n=43)		UNTH(n=39)	
	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)
Radio	84.6	62.1	67.6	54.1	83	52.8	66.7	39.6	67.9	43.4	69.8	37.2	71.8	56.4
Television	85.6	67.5	81.1	62.2	88.7	64.2	87.5	41.7	83.3	56.6	76.7	55.8	94.9	74.4
Mobile Phones	93.5	78.7	86.5	81.1	77.4	81.1	85.4	75	77.4	69.8	74.4	65.1	87.2	87.2
Smart Phones	89.3	63.9	75.7	62.2	96.2	60.4	87.5	66.7	92.5	71.7	74.4	53.5	82.1	69.2
Internet	83.4	81.1	89.2	81.1	86.6	81.1	89.6	75	88.7	75.5	81.4	67.4	92.3	69.2
Telemedicine	95.3	47.3	51.4	16.2	69.8	30.2	66.7	22.9	77.4	35.8	53.5	0	66.7	30.8
PDAs	78.1	23.1	32.4	10.8	56.6	11.3	56.3	20.9	56.6	18.9	39.5	11.6	51.3	28.2
GRPS	56.8	24.3	35.1	10.8	58.5	9.4	50	16.7	50.9	18.9	46.5	25.6	51.3	28.2

Table 4.15: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by knowledge of ICT terminologies

ICT Terminologies	Percentage knowledge of ICT Terminologies by their knowledge of ICT terminologies University Teaching hospitals						
	UCH (n = 169) (%)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
ICTs include all telephones, computers and network based technologies, e.g., Internet.	97.0	83.8	88.7	95.8	86.8	97.7	89.7
e-Health encompasses a range of services that involve health care and ICT supported by processes and communication.	94.7	83.8	84.9	95.8	90.6	93.0	89.7
m-Health is the use of mobile technology to support the achievement of health objectives.	89.3	70.3	73.6	85.4	77.4	69.6	64.1
Telemedicine is the use of medical information transferred from one site to another through							

electronic communication to improve patient's care including diagnosis and treatment.	88.8	86.5	94.3	91.7	90.6	88.4	84.6
Telemedicine can be used for education of the patient or health care provider for the purpose of improving patients' care.	94.1	86.5	88.7	91.7`	92.5	81.4	79.5
m-Health is a component of e-Health.	81.7	59.5	84.2	77.1	64.2	60.5	56.4
Telemedicine is a component of e-Health.	89.9	73.0	73.6	91.7	88.8	79.1	74.4

Table 4.16: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by type of m-Health Initiatives adopted in their practice.

Type of m-Health Initiative	Percentage of adoption of m-Health Initiatives by Health workers University Teaching Hospitals						
	UCH (n = 169) (%)	**AKUTH (n = 37) (%)**	**JUTH (n = 53) (%)**	**OAUTH (n = 48) (%)**	**UCTH (n = 53) (%)**	**UMTH (n = 43) (%)**	**UNTH (n = 39) (%)**
Provision of health information to patients.	89.3	86.5	60.4	79.2	67.9	72.1	76.9
Ascertaining treatment compliance to patients.	76.9	81.1	50.9	64.6	54.7	53.5	69.2
Reminding patients of their appointment .	78.1	59.5	58.5	58.3	50.9	55.8	53.8
Keeping patients records.	75.1	67.6	49.1	62.5	50.9	62.8	51.3
Following up the care of patients.	69.8	70.3	50.9	52.1	49.1	51.2	61.5
Being used in emergency care.	69.8	62.2	45.3	50.0	54.7	44.2	53.8
Provision of health information to colleagues.	83.4	73.0	75.5	77.1	73.6	62.8	71.8
Building the capacity							

(training) of other health workers including students	79.3	81.1	60.4	68.8	62.3	67.4	66.7
In community mobilization	64.5	56.8	41.5	56.3	47.2	34.9	53.8
Used in training awareness of health issues	71.0	59.5	60.4	60.4	62.3	58.1	56.4
Used in conducting health Surveys	59.2	62.2	43.4	52.1	45.3	53.5	48.7
Used in conducting Disease surveillance	51.5	43.2	28.3	43.8	35.8	34.9	43.6
Used in tracking commodities	36.1	35.1	9.4	29.2	32.1	9.3	15.4
Performing social marketing interventions	41.4	40.5	13.2	31.3	26.4	14.0	23.1
In health financing – used smart-cards or vouchers for mobile payments for health care	47.3	48.6	13.2	33.3	34.0	30.2	23.1

Table 4.17: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by knowledge of availability of m-Health Initiatives in Nigeria

Statements regarding m-Health Initiatives in Nigeria	Percentage knowledge of availability of Telemedicine in Nigeria University Teaching Hospitals						
	UCH (n = 169) (%)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
m-Health initiatives are widely used in Nigeria.	23.1	16.2	20.8	25.0	20.8	18.6	20.5
m-Health initiatives are used by non-governmental organizations only.	49.7	35.1	17.0	6.3	20.8	44.2	46.2
m-Health initiatives are used by the public health sector.	53.3	48.6	32.1	41.7	28.3	44.2	51.3
m-Health initiatives are used by the private health sector.	21.9	29.7	56.6	45.8	45.3	7.0	12.8
m-Health initiatives are used in the rural areas only.	68.6	48.6	15.1	4.2	13.2	58.1	61.5
m-Health initiatives are used in the urban areas.	27.8	21.6	54.2	56.3	52.8	16.3	12.8
m-Health initiatives are used in the PHCs only.	49.1	27.0	13.2	8.3	22.6	41.9	38.5

m-Health initiatives are used in the secondary health centres	58.6	54.1	34.0	31.3	24.5	55.8	64.1
m-Health initiatives are used in the tertiary health centres.	27.8	27.0	45.3	52.1	47.2	16.3	28.2

e. Knowledge of the availability of m-Health Initiatives in Nigeria

As observed at U.C.H., Ibadan, the health workers' knowledge on the availability of m-Health initiatives in Nigeria was very poor. However, there were two areas in which the health workers in all the seven hospitals demonstrated reasonable knowledge. These were 'building the capacity (training) of other health workers, including students" (range 60.4% to 79.3%) and "creating awareness of health issues" (range 56.4% to 71.0%) (Table 4.17).

f. Availability of Telemedicine in Nigeria

Apart from U.C.H., Ibadan and UMTH, Maiduguri, the health workers demonstrated poor knowledge on the general availability of Telemedicine in Nigeria. They were also of the opinion that health professionals did not generally trust ICTs or Telemedicine, nor care about using the latter. However, on average, half of the health workers in all the teaching hospitals were of the opinion that health professionals generally would accept Telemedicine if they were specialty-related, but are usually hesitant to adopt new ICTs or Telemedicine applications (Table 4.18).

g. Knowledge of advantages of Telemedicine by the Health Workers

Despite their hesitancy to adopt Telemedicine, the health workers in the seven teaching hospitals were very knowledgeable about the advantages of Telemedicine, as shown in Table 4.19. It is obvious from the table that Telemedicine was not generally used in all the seven teaching hospitals (range 30.2% to 41.9%).

h. Knowledge of the potentials of ICTs by the Health Workers

Similarly to the advantages of Telemedicine, the health workers were also knowledgeable

about the potentials of ICTs in the health sector. However, on average, only about 50% of them believed that ICTs would increase unnecessary referrals (Table 4:20).

i. Obstacles to the use of ICTs

Nearly all the statements listed in Table 4.21 were cited as being obstacles to the use of ICTs in the health sector by all the health workers in the teaching hospitals. As observed at U.C.H., Ibadan, the most frequently cited were the inadequate supply of electricity in the urban and rural areas. Others were inadequate Telemedicine facilities in the health centres, and inadequate wireless networks in the country.

j. Knowledge of ICT Policy

It is apparent that the information on ICT Policy in Nigeria had not been widely circulated, as less than four out of every ten health workers were not familiar with nearly all the statements listed in Table 4.22.

Table 4.18: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by availability of Telemedicine Initiatives in Nigeria

Statements regarding Telemedicine Initiatives in Nigeria	Percentage knowledge of availability of Telemedicine Initiatives in Nigeria University Teaching Hospitals						
	UCH (n = 169) %)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
Telemedicine is generally available in Nigeria.	72.8	43.2	15.1	18.8	32.1	62.8	46.2
Telemedicine is available in In the health facility..	18.3	27.0	24.5	43.8	41.5	23.3	17.9
Health professionals do not generally trust ICTs or Telemedicine.	26.6	32.4	5.7	16.7	11.3	16.3	25.6
Health professionals generally do not care about using Telemedicine.	74.0	67.6	11.3	12.5	18.9	60.5	48.7
Health professionals generally accept Telemedicine if it is specialty- related.	55.0	51.4	62.3	72.9	71.7	60.5	35.9
Health professionals are usually hesitant to adopt							

new ICT or Telemedicine applications.	55.0	51.4	45.3	45.8	60.4`	60.5	35.9

Table 4.19: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by knowledge of advantages of Telemedicine

Advantages of Telemedicine	Percentage knowledge of advantages of Telemedicine University Teaching Hospitals						
	UCH (n = 169) (%)	**AKUTH (n = 37) (%)**	**JUTH (n = 53) (%)**	**OAUTH (n = 48) (%)**	**UCTH (n = 53) (%)**	**UMTH (n = 43) (%)**	**UNTH (n = 39) (%)**
Telemedicine will increase access to care.	92.3	81.1	94.3	93.8	86.8	93.0	84.6
Telemedicine will reduce waiting time in the clinic.	92.3	86.5	92.5	89.6	90.6	88.4	84.6
Telemedicine will result in more timely advice and interventions.	94.7	78.4	96.2	87.5	86.8	83.7	87.2
Telemedicine will improve follow-up care patients.	92.9	83.8	98.1	91.7	94.3	83.7	84.6
Telemedicine will decrease							

Unnecessary referrals to Tertiary health centres.	84.6	73.0	73.6	83.3	75.5	79.1	74.4
Telemedicine will improve collaboration health care professionals.	93.5	83.8	96.2	89.6	86.8	83.7	87.2
Telemedicine will save the costs to patients and health care providers.	81.1	67.6	62.3	72.9	71.7	60.5	69.2
Telemedicine will increase costs of care to patients.	42.6	51.4	30.2	43.8	39.6	51.2	38.5
Telemedicine will reduce revenues of the hospital.	43.8	35.1	30.2	35.4	56.6	37.2	38.5
Telemedicine will improve the knowledge and clinical acumen of health professionals.	91.1	73.0	86.8	85.4	79.2	81.4	71.8
Telemedicine will reduce the time and effort of health care professionals.	79.9	62.2	67.9	72.9	75.5	62.8	69.2
Use of the Telemedicine facility in the hospital	38.5	35.1	30.2	37.5	37.7	41.9	38.5

Table 4.20: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by knowledge of potentials of ICTs (all e-Health including m-Health and Telemedicine)

Potentials of ICTs	Percentage knowledge of potentials of ICTs University Teaching Hospitals						
	UCH (n = 169) (%)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
Improvement of practice through education and avoiding medical errors.	85.8	62.2	88.8	81.3	88.7	79.1	69.2
Improve practice through accessible and continuing education.	94.1	81.1	96.2	93.8	90.6	90.7	82.1
Reduce cost of treatment through informed decision-making leading to efficient use of medical and clinical resources.	89.9	67.6	88.7	91.7	81.1	76.7	79.5
Improve knowledge through education ,training and continuing professional development.	93.5	81.1	94.3	89.6	90.6	90.7	84.6
Save health workers' time and efforts.	91.1	89.2	96.2	93.8	90.6	83.7	82.1

Enhance the efficiency of a health professional.	89.3	75.7	92.5	93.8	79.2	81.4	87.2
Increase unnecessary referrals.	53.8	54.1	60.4	58.3	49.1	41.9	41.0

Table 4.21: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by their knowledge of the obstacles to the use of ICTs in the health sector

Obstacles to the Use of ICTs	Percentage knowledge of obstacles to the use ICTs University Teaching Hospitals						
	UCH (n = 169) (%)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
Inadequate number of ICT workers skilled in developing and maintaining infrastructure.	84.6	67.6	88.8	81.3	86.8	86.0	76.9
Inadequate telemedicine facilities in the health facilities.	90.5	75.7	88.7	91.7	92.5	86.0	79.5
Non-functional telemedicine facilities in the health facilities.	83.4	73.0	83.0	72.9	75.5	86.0	84.6
Inadequate number of Wireless networks, such as VSAT, satellite and microwave links.	84.0	81.1	83.0	83.3	83.0	86.0	84.6
Inadequate supply of electricity in the urban							

areas.	94.1	83.8	92.5	91.7	88.7	86.0	89.7
Inadequate supply of electricity in the rural areas.	91.7	81.1	94.3	91.7	83.0	90.7	92.3
Inadequate access to phone services.	60.4	67.6	66.0	58.3	52.8	65.1	59.0
Inadequate access to the Internet.	76.9	75.7	86.8	72.9	71.7	79.1	71.8
Unaffordable computer networks and Internet access.	82.8	70.3	77.4	66.7	69.8	79.1	69.2

Table 4.22: Distribution of Health workers in Seven Nigerian University Teaching Hospitals by knowledge of ICT Policy in Nigeria.

Statements on ICTs Policy in Nigeria	Health workers by knowledge of ICT Policy in Nigeria University Teaching Hospitals						
	UCH (n = 169) (%)	AKUTH (n = 37) (%)	JUTH (n = 53) (%)	OAUTH (n = 48) (%)	UCTH (n = 53) (%)	UMTH (n = 43) (%)	UNTH (n = 39) (%)
The Nigerian Government has an ICT Policy.	30.8	35.1	39.6	50.0	43.4	46.5	38.5
The Nigerian Government promotes the use of ICTs in the health sector	27.8	32.4	41.6	37.5	30.2	46.5	30.8
The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients.	21.9	35.1	32.1	31.3	26.4	41.9	25.6
The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector.	17.2	24.3	20.8	22.9	24.5	39.6	25.6
The government generally							

ensures standardization and availability of legal measures in ICT-related activities.	21.3	29.7	20.8	29.2	18.9	37.2	28.2

4.4.2 Findings from the survey of Medical Students in seven University Teaching Hospitals in Nigeria

a. Socio-demographic characteristics of the Medical Students

One hundred and two medical students were interviewed at the U.C.H., Ibadan, while the numbers ranged from 13 to 18 in the other six medical facilities. The lowest was at UNTH, Enugu. The proportions of males to females varied between 15:2 and 10:8 in the health facilities. The majority of the students were in the age bracket 21 to 30 years and were more or less evenly distributed between the 300 and 600 levels of their medical education in all the hospitals (Table 4.23).

b. Awareness and use of ICTs in the Medical Students' training programmes

The medical students had a reasonably good knowledge of the ICT applications shown in Figure 4.16, except at UNTH, Enugu, and UMTH, Maiduguri, where the awareness of PDAs and GRPS was fairly poor. However, the use of these applications was generally poor in all the hospitals, except for radios in U.C.H, AKUTH, JUTH and UCTH. Telephones, mobile and smart phones were widely used in all the hospitals, while Telemedicine, PDAs and GRPS had the lowest usage in all the hospitals.

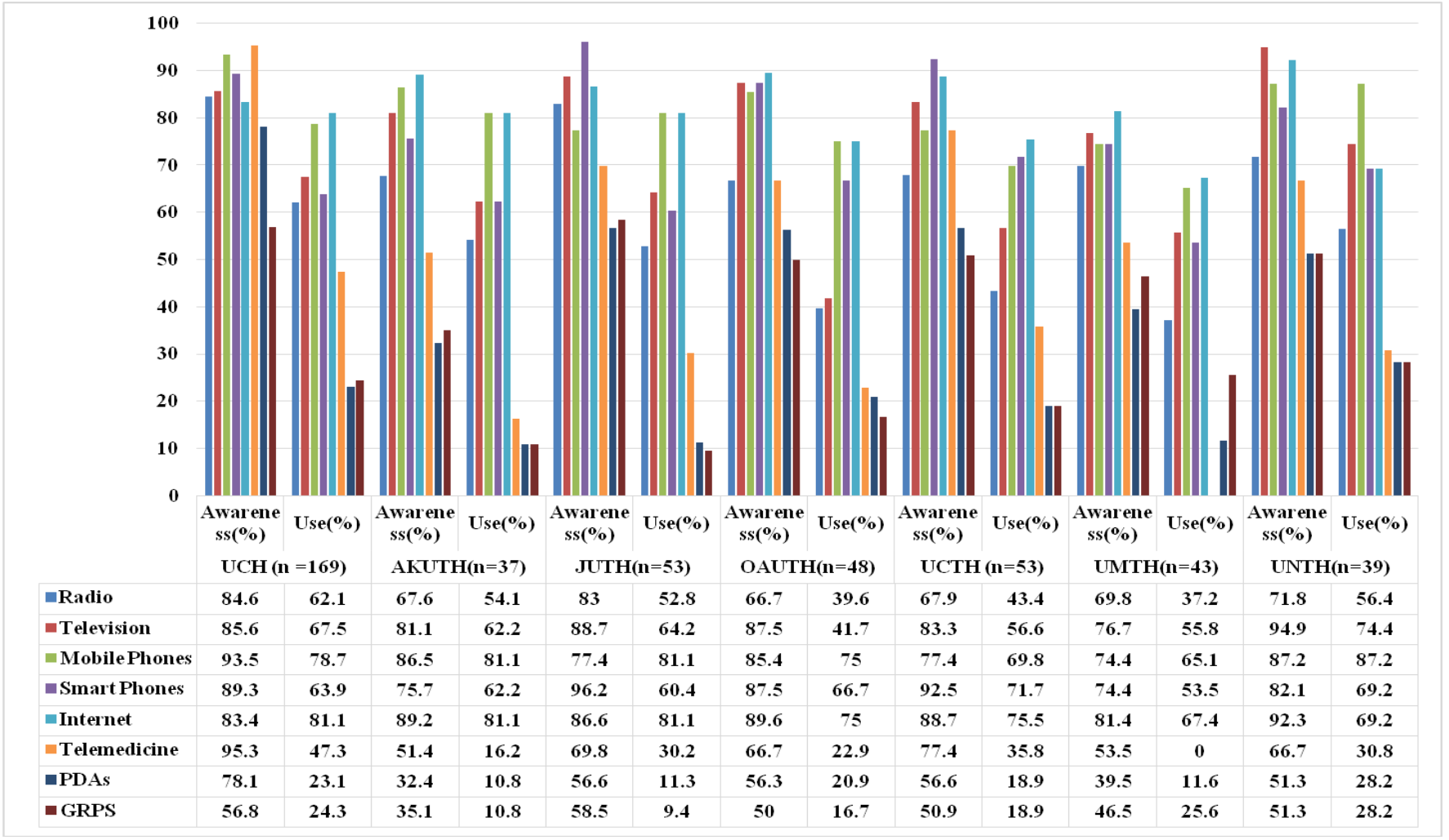
c. Knowledge of ICT Terminologies by the Medical Students

Again, as demonstrated at the U.C.H., the medical students in the other teaching hospitals were quite knowledgeable about the ICT terminologies, as depicted in Table 4.24.

Table 4.23: Socio-demographic Characteristics of Medical Students in selected Nigerian Teaching Hospitals

Characteristics	Socio-demographic Characteristics of Medical Students in Seven Nigerian Teaching Hospitals University Teaching Hospitals													
	UCH (n = 102)		**AKUTH (n = 17)**		**JUTH (n = 17)**		**OAUTH (n = 18)**		**UCTH (n = 18)**		**U NTH (n = 13)**		**UMTH (n =18)**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No**	**%**
Sex)														
Male	70.0	68.6	13	76.5	15	88.2	16	88.9	10	66.6	11	84.6	13	72.2
Female	32.0	31.4	4	23.5	2	11.8	2	11.1	8	44.4	2	15.4	5	27.8
Age														
Less than 20 years	4.0	3.9	-	-	1	5.9	-	-	-	-	1	7.7	-	-
21 – 30 years	90.0	88.2	17	100.0	29	94.1	1 6	88.9	17	94.4	10	76.9	17	94.4
31 – 40 years	1.0	1.0	-	-	-	-	2	10.1	-	-	-	-	-	-
Above 40 years	-	-	-	-	-	-	-	-	1	5.6	1	7.7	-	-
Not stated	7.0	6.9	-	-	-	-	-	-	-	-	1	7.7	1	5.6
Years spent in Medical School														
4 years (400 level)	31.0	30.4	5	29.4	8	47.1	1	5.6	6	33.3	3	23.1	6	33.3
5 years (500 level)	45.0	44.1	7	41.2	3	17.6	7	38.9	6	33.3	6	46.1	6	33.3
6 years (600 level)	25.0	25.5	5	29.4	6	35.3	10	55.6	6	33.3	4	30.8	6	33.3

Figure 4.16: Distribution of Medical Students in Seven Nigerian University Teaching Hospitals by Awareness and Use of ICTs in their training programmes



	UCH (n =169)		AKUTH(n=37)		JUTH(n=53)		OAUTH(n=48)		UCTH (n=53)		UMTH(n=43)		UNTH(n=39)	
	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)	Awareness(%)	Use(%)
Radio	84.6	62.1	67.6	54.1	83	52.8	66.7	39.6	67.9	43.4	69.8	37.2	71.8	56.4
Television	85.6	67.5	81.1	62.2	88.7	64.2	87.5	41.7	83.3	56.6	76.7	55.8	94.9	74.4
Mobile Phones	93.5	78.7	86.5	81.1	77.4	81.1	85.4	75	77.4	69.8	74.4	65.1	87.2	87.2
Smart Phones	89.3	63.9	75.7	62.2	96.2	60.4	87.5	66.7	92.5	71.7	74.4	53.5	82.1	69.2
Internet	83.4	81.1	89.2	81.1	86.6	81.1	89.6	75	88.7	75.5	81.4	67.4	92.3	69.2
Telemedicine	95.3	47.3	51.4	16.2	69.8	30.2	66.7	22.9	77.4	35.8	53.5	0	66.7	30.8
PDAs	78.1	23.1	32.4	10.8	56.6	11.3	56.3	20.9	56.6	18.9	39.5	11.6	51.3	28.2
GRPS	56.8	24.3	35.1	10.8	58.5	9.4	50	16.7	50.9	18.9	46.5	25.6	51.3	28.2

Table 4.24: Distribution of Medical Students in Seven Nigerian University Teaching Hospitals by knowledge of ICT terminologies

ICT Terminologies	Percentage knowledge of ICT Terminologies by Medical Students in selected Nigerian University Teaching Hospitals						
	UCH (n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UNTH (n = 13) (%)	UMTH (n =18) (%)
ICTs include all telephones, computers and network based technologies, e.g., Internet.	95.1	88.2	88.2	100.0	100.0	92.3	100.0
e-Health encompasses a range of services that involve health care and ICT, supported by processes and communication.	90.2	100.0	88.2	94.4	83.3	100.0	94.4
m-Health is the use of mobile technology to support the achieve-ment of health objectives.	77.5	76.5	64.7	83.3	94.4	76.9	61.1
Telemedicine is the use of medical information transferred from one site to another through electronic communication to improve patient's care, including diagnosis and treatment.	89.2	100.0	94.1	83.3	100.0	100.0	72.2
Telemedicine can be used for							

The education of the patient or healthcare provider for the purpose of improving patients' care.	87.3	100.0	88.2	100.0	77.8	84.6	83.3
m-Health is a component of e-Health.	70.6	70.6	47.1	88.9	83.3	61.5	55.6
Telemedicine is a component of e-Health.	83.3	100.0	76.5	88.9	83.3	100.0	77.8

However, about five out of every ten medical students at JUTH and UMTH could not affirm that m-Health is a component of e-Health.

d. Types of m-Health Initiatives being adopted in the health sector

Whereas the students exhibited a knowledge of ICT terminologies, as shown in Table 4.24, their knowledge of m-Health initiatives was poorer, as depicted in Table 4.25. The lowered percentages in the performance of the medical students spread across the seven teaching hospital, including U.C.H., Ibadan.

e. Knowledge of availability of m-Health initiatives in Nigeria

Regarding the knowledge of the availability of m-Health initiatives in Nigeria, the performances of the medical students were even poorer. It was particularly poor in AKUTH, Kano, and even worse at UMTH, Maiduguri (Table 4.26). However, all the students at UNTH and UMTH evaded the statement that "m-Health initiatives are used in the rural areas only."

f. Knowledge of the availability of Telemedicine Initiatives in Nigeria

It was the opinion of the medical students in the selected teaching hospitals that Telemedicine was not generally available in Nigeria. However, about half of the respondents at U.C.H., AKUTH and UMTH had a different opinion. The medical students, on average, thought that health professionals do not generally trust Telemedicine. In the seven teaching hospitals (except OAUTH and UCTH) more than five out of every ten medical students affirmed that the health professionals would generally accept Telemedicine if they were specialty-related (Table 4.27). However, at U.C.H., OAUTH, UCTH and UMTH, more than half of the respondents affirmed that the health professionals are usually hesitant in adopting new ICT or Telemedicine applications.

Table 4.25: Distribution of Medical Students t selected Nigerian University Teaching Hospitals by knowledge of the type of m-Health initiatives adopted in the health sector.

Type of m-Health Initiative	Percentage knowledge of type of m-Health initiatives adopted in the health sector in selected teaching hospitals University Teaching Hospitals UCH (%)	AKUTH (n = 102) (%)	JUTH (n = 17) (%)	OAUTH (n = 17) (%)	UCTH (n = 18) (%)	UNTH (n = 18) (%)	UMTH (n = 13) (%)	(n =18) (%)
Provision of health information to patients		75.5	52.9	64.7	83.3	55.6	100.0	66.7
Ascertaining treatment compliance for patients		61.8	35.3	58.8	72.2	50.0	69.2	55.6
Reminding patients of their appointments		52.0	35.3	58.8	55.6	50.0	69.2	33.3
Keeping patients' records		53.9	64.7	41.2	55.6	55.6	53.8	66.7
Following up the care of patients		53.9	47.1	52.9	61.1	44.4	61.5	55.6
Being used in emergency care		47.1	29.4	41.2	55.6	61.1	46.2	61.1
Provision of health information to colleagues		61.8	58.8	64.7	55.6	72.2	76.9	55.6
Building the capacity (training) of								

other health workers, including students	65.7	47.1	58.8	77.8	50.0	76.9	66.7
In community mobilization	55.9	47.1	41.2	66.7	50.0	61.5	50.0
Used in raising awareness of health issues	58.8	70.6	47.1	66.7	50.0	53.8	72.2
Used in conducting health surveys	55.9	47.1	41.2	55.6	33.3	53.8	66.7
Used in conducting disease surveillance	42.2	47.1	17.6	55.6	16.7	46.2	61.1
Used in tracking commodities	29.4	17.6	11.8	27.8	11.1	46.2	22.2
Performing social marketing interventions	26.5	11.8	11.8	22.2	16.7	38.5	16.7
In health financing – used smartcards or vouchers for mobile payments for health care	32.4	17.6	11.8	27.8	22.2	53.6	22.2

Table 4.26: Distribution of Medical Students in selected teaching hospitals by knowledge of the availability of m-Health Initiatives in Nigeria

Statements regarding m-Health Initiatives in Nigeria	Percentage knowledge of types of m-Health initiatives adopted in the health sector. University Teaching Hospitals						
	UCH (n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UNTH (n = 13) (%)	UMTH (n =18) (%)
m-Health initiatives are widely used in Nigeria.	25.5	8.9	23.5	16.7	16.7	46.2	5.6
m-Health initiatives are used by non-governmental organizations only. `	14.7	23.5	23.5	16.7	22.2	15.4	0.0
m-Health initiatives are used by the public health sector.	35.3	41.2	47.1	22.2	61.1	53.8	22.2
m-Health initiatives are used by the private health sector.	53.9	29.4	58.8	61.1	38.9	69.2	22.2
m-Health initiatives are used in the rural areas only.	23.5	17.6	23.5	50.0	33.3	0.0	0.0
m-Health initiatives are used by the urban areas.	51.0	76.5	70.0	50.0	38.9	53.8	5.6
m-Health initiatives are used in the PHCs only.	30.4	17.8	5.9	50.0	22.2	38.5	5.6

m-Health initiatives are used in the secondary health centres	33.3	29.4	35.3	27.8	55.6	46.2	27.8
m-Health initiatives are used in the tertiary health centres.	55.9	78.8	47.1	66.7	38.9	61.5	44.4

Table 4.27: Distribution of Medical Students in selected Nigerian Teaching Hospitals by knowledge of the availability of Telemedicine Initiatives in Nigeria

Statements regarding Telemedicine Initiatives in Nigeria	Percentage knowledge of ype of Telemedicine initiatives adopted in the health sector. University Teaching Hospitals						
	UCH n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UNTH (n = 13) (%)	UMTH (n =18) (%)
Telemedicine is generally available in Nigeria.	27.5	17.8	11.8	44.4	33.3	46.2	16.7
Telemedicine is available in the hospital	50.0	47.1	29.4	44.4	44.4	53.8	27.8
Health professionals do not generally trust ICTs or Telemedicine.	27.5	17.6	11.8	61.1	22.2	30.8	11.1
Health professionals generally do not care about using Telemedicine.	23.5	17.6	17.6	38.9	44.4	15.4	22.2
Health professionals generally accept Telemedicine if they are specialty-related.	59.8	70.6	58.8	38.9	44.4	69.2	50.0
Health professionals are usually hesitant to adopt new ICT or Telemedicine applications.	54.9	35.3	47.1	66.7	77.8	53.8	38.9

g. Knowledge of advantages of Telemedicine

Despite their poor knowledge of types of m-Health initiatives available in Nigeria, the medical students in all the seven hospitals demonstrated a good knowledge of the advantages of Telemedicine in the health sector. However, on average, less than four out of every ten students in all the hospitals affirmed that Telemedicine would increase the costs of care to patients or reduce revenues to the hospital. Apparently, Telemedicine was not generally used in four of the seven hospitals, namely, AKUTH, Kano, OAUTH, Ile-Ife, and UMTH, Maiduguri (Table 4.28).

h. Knowledge of potentials of ICTs by the Medical Students

Similarly, the medical students' knowledge of the potentials of ICTs in the health sector in all the teaching hospitals was quite good. Virtually, the majority of the medical students affirmed the statements listed in Table 4.30 regarding the potentials of ICTs, including all e-Health and Telemedicine. However, in three of the hospitals (AKUTH, UNTH and UMTH) less than four out of every ten medical students agreed that ICTs would increase unnecessary referrals.

i. Knowledge of the obstacles to the use of ICTs in the health sector

Similarly to the health workers, nearly all the statements listed in Table 4.30 were cited as obstacles to the use of ICTs in the health sector by the medical students in the seven teaching hospitals. The most frequently cited obstacles were the inadequate supply of electricity in the urban and rural areas; and inadequate and non-functional Telemedicine facilities in the medical centres.

Table 4.28: Distribution of Medical Students in selected Nigerian University Teaching Hospitals by knowledge of Advantages of Telemedicine

Advantages of Telemedicine	Percentage knowledge of type of Advantages of Telemedicine University Teaching Hospitals						
	UCH n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UMTH (n = 13) (%)	UNTH (n =18) (%)
Telemedicine will increase access to care.	73.5	88.2	94.1	55.6	100.0	92.3	88.9
Telemedicine will reduce waiting time in the clinic.	87.3	94.1	82.4	88.9	94.4	100.0	88.9
Telemedicine will result in more Timely advice and interventions.	88.2	88.2	94.1	88.9	83.3	100.0	83.3
Telemedicine will improve follow-up care for patients.	88.2	94.1	88.2	88.9	72.2	92.3	88.9
Telemedicine will decrease unnecessary referrals to tertiary health centres.	75.5	82.4	76.5	88.9	100.0	84.6	72.2
Telemedicine will improve collaboration among health care professionals.	92.2	100.0	94.1	100.0	72.2	100.0	88.9

Telemedicine will save the costs to patients and health care providers.	67.6	70.6	64.7	88.9	44.4	69.2	61.1
Telemedicine will increase costs of care to patients.	43.1	23.5	29.4	61.1	27.8	38.5	27.8
Telemedicine will reduce the revenues of the hospital.	39.2	29.4	23.5	27.8	61.1	38.5	27.8
Telemedicine will improve the knowledge and clinical acumen of health professionals.	72.5	94.1	82.4	50.0	72.2	84.6	61.1
Telemedicine will reduce the time and effort of health care professionals.	72.5	70.6	76.5	88.9	50.0	84.6	72.2
Use of the Telemedicine facility in the hospital	39.2	23.5	17.6	44.4	83.3	46.2	11.1

Table 4.29: Distribution of Medical Students in selected Nigerian Teaching Hospitals by knowledge of potentials of ICTs (all e-Health including m-Health and Telemedicine)

Potentials of ICT	Percentage knowledge of Potentials of ICTs in the health sector. University Teaching Hospitals						
	UCH (n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UNTH (n = 13) (%)	UMTH (n =18) (%)
Improve practice through reduction medical errors.	68.6	82.4	76.5	72.2	100.00	76.9	88.9
Improve practice through accessible and continuing education.	87.3	100.0	94.1	94.4	94.4	92.3	100.0
Reduce cost of treatment through informed decision-making leading to efficient use of medical and clinical resources.	78.4	88.2	76.5	88.9	72.2	84.6	68.7
Improve knowledge through education, training and contin-uing professional development	80.4	88.2	82.4	72.2	100.0	92.3	88.9
Save health workers' time and efforts.	86.3	94.1	94.1	83.3	83.3	92.3	94.4
Enhance the efficiency of a							

health professional.	83.3	94.1	88.2	88.9	66.7	92.3	94.4
Increase unnecessary referrals.	54.9	35.3	47.1	77.8	61.1	53.8	33.3

Table 4.30: Distribution of Medical Students in selected Nigerian Teaching Hospitals by knowledge of the obstacles to the use of ICTs in the health sector

Obstacles to the use if ICTs	**Percentage knowledge of Obstacles to ICTs in the health sector University Teaching Hospitals**						
	UCH n = 102) (%)	**AKUTH (n = 17) (%)**	**JUTH (n = 17) (%)**	**OAUTH (n = 18) (%)**	**UCTH (n = 18) (%)**	**UNTH (n = 13) (%)**	**UMTH (n =18) (%)**
Inadequate number of ICT workers skilled in developing and maintaining infrastructure.	72.5	88.2	76.5	61.1	100.0	76.9	94.4
Inadequate telemedicine facilities in the health facilities.	80.4	76.5	76.5	94.4	94.4	84.6	94.4
Non-functional telemedicine facilities in the health facilities.	81.4	76.5	88.2	88.9	94.4	92.3	83.3
Inadequate number of wireless networks, such as VSAT, satellite and microwave links.	79.4	88.2	76.5	88.9	100.0	92.3	94.4
Inadequate supply of electricity in							

the urban areas.	87.3	88.2	88.2	94.4	83.3	100.0	88.9
Inadequate supply of electricity in the rural areas.	83.3	82.4	94.1.	88.9	83.3	92.3	88.9
Inadequate access to phone services.	70.6	64.7	64.7	83.3	88.9	76.9	61.1
Inadequate access to the Internet.	74.5	88.2	70.6	77.8	94.4	76.9	94.4
Unaffordable computer networks and Internet access.	69.6	88.2	70.6	77.8	61.1	84.6	83.3

Table 4.31: Distribution of Medical Students in Seven Nigerian Teaching Hospitals by knowledge of ICT Policy in Nigeria

Statements regarding ICT Policy in Nigeria	Percentage knowledge of ICT Policy						
	UCH n = 102) (%)	AKUTH (n = 17) (%)	JUTH (n = 17) (%)	OAUTH (n = 18) (%)	UCTH (n = 18) (%)	UNTH (n = 13) (%)	UMTH (n =18) (%)
The Nigerian Government has an ICT Policy	39.2	29.4	35.3	44.4	61.1	38.5	61.1
The Nigerian Government promotes the use of ICTs in the health sector	34.3	35.3	41.2	50.0	50.0	15.4	38.9
The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients.	34.3	17.6	17.6	50.0	33.3	23.1	38.9
The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector.	30.4	17.6	17.6	50.0	27.7	23.1	33.3
The government generally ensures standardization and availability of legal measures in ICT-related activities.	30.4	11.8	17.6	33.3	11.1	30.8	16.7

j. Knowledge of types of ICT Policy in Nigeria

Again, similarly to what obtained in the case of health workers, the majority of the medical students were ignorant about issues related to the ICT policy in Nigeria. The highest knowledge of the ICT policy, and of other related issues, was found among the OAUTH medical students, while the poorest was noticed among the students from AKUTH and JUTH. These findings also confirmed that the information on the ICT Policy and other related issues had not been widely circulated in the country (Table 4.31).

4.5.0 Findings from the statistical analysis of the responses of Health Workers compared with those of the Medical Students and Users and Non-Users of health services at the University College Hospital (U.C.H.), Ibadan, Nigeria.

As stated in Chapter 3 (Materials and Methods), the appropriate and applicable statistical method that was conducted was the Z Test. A Z-test is a hypothesis test based on the Z-statistic, which follows the standard normal distribution under the null hypothesis. A Z test is usually used when your data is approximately normally distributed. and n the sample size is greater than 30; data points are independent from each other and are normally distributed. However, for large sample sizes (over 30) this doesn't always matter. The data should be randomly selected from a population, where each item has an equal chance of being selected.

The Z test was calculated for each comparison, using the software R with the command prop.test(), and is summarised in the Tables 4.32 and 4.33, below. The same command prop.test() is used for the comparison of three proportions.

Table 4.32: Statistical Analysis of the responses of Health Workers compared with those of the Medical Students.

Table 4.32.1: Distribution of UCH health workers and medical students according to their level (%) of awareness of ICTs components.

Types of ICTs	*Health Workers*	*Medical Students*	*Users/non users*	*P-value*	*Decision*	*Conclusion*
Radio	84.6	70.6	85.5	0.006	H_0 Rejected	*There is difference*
Television	85.6	76.5	83.0	0.145	H_0 accepted	No difference
Mobile Phones	93.5	88.2	81.1	0.007	H_0 Rejected	*There is difference*
Smart Phones	89.3	96.1	56.6	0.000	H_0 Rejected	*There is difference*
Internet	83.4	98	71.7	0.000	H_0 Rejected	*There is difference*
Telemedicine	95.3	89.2	52.8	0.000	H_0 Rejected	*There is difference*
PDAs	78.1	66.7	39.6	0.000	H_0 Rejected	*There is difference*
GPRS	56.8	75.5	34.0	0.000	H_0 Rejected	*There is difference*

4.32.2. Distribution of UCH's Health workers and medical students by use of ICTs

Types of ICTs	**Health Workers**	**Medical Students**	**Users/Non-Users**	**p-value**	**Decision**	**Conclusion**
Radio	62.1	41.2	67	0.000	H_0 rejected	*There is difference*
Television	67.5	61.8	68.9	0.508	H_0 accepted	No difference
Mobile Phones	78.7	81.8	71.7	0.220	H_0 accepted	No difference
Smart Phones	63.9	82.3	51.9	0.000	H_0 rejected	*There is difference*
Internet	81.1	67.7	61.3	0.001	H_0 rejected	*There is difference*
Telemedicine	47.3	32.4	50	0.019	H_0 rejected	*There is difference*
PDAs	23.1	34.3	17	0.012	H_0 rejected	*There is difference*
GPRS	24.3	25.5	29.2	0.650	H_0 accepted	No difference

Table 4.32.3: Distribution of Health workers and Medical students by their knowledge of ICT terminologies

Types of Terminologies	*Health Workers*	*Medical Students*	*p-value*	*Decision*	*Conclusion*
ICTs include all phones, computers and network based technologies, e.g., Internet	97	95.1	0.411	H_0 accepted	No difference
e-Health encompasses a range of services that involve health care and ICT supported by processes and communication	94.7	90.2	0.161	H_0 accepted	No difference
m-Health is the use of mobile technology to support the achievement of health objectives	89.3	77.5	0.008	H_0 rejected	*There is difference*
Telemedicine is the use of medical information transferred from one site to another through electronic communication to improve the patient's care, including diagnosis and treatment	88.8	89.2	0.907	H_0 accepted	No difference
Telemedicine used for education of the patient or health care provider for the purpose of improving patient's care	94.1	87.3	0.051	H_0 accepted	No difference
m-Health is a component of e-Health	81.7	70.6	0.034	H_0 rejected	*There is difference*
Telemedicine is a component of e-Health	89.9	83.3	0.112	H_0 accepted	No difference

4.32.4: Distribution of Health workers and medical students by type of m-Health adopted

Type of m-Health Initiative	Health Workers	Medical Students	p-value	Decision	Conclusion
Provision of health information to patients	89.3	75.5	0.002	H_0 rejected	*There is difference*
Ascertaining treatment compliance to patients	76.9	61.8	0.008	H_0 rejected	*There is difference*
Reminding patients of their appointment	78.1	52	0.000	H_0 rejected	*There is difference*
Keeping patients records	75.1	53.9	0.000	H_0 rejected	*There is difference*
Following up the care of patients	69.8	53.9	0.008	H_0 rejected	*There is difference*
Being used in emergency care	69.8	47.1	0.000	H_0 rejected	*There is difference*
Provision of health information to colleagues	83.4	61.8	0.000	H_0 rejected	*There is difference*
Building the capacity (training) of other health workers, including students	79.3	65.7	0.013	H_0 rejected	*There is difference*
In community mobilization	64.5	55.9	0.158	H_0 accepted	*There is difference*
Used in creating awareness over health issues	71.0	58.8	0.040	H_0 accepted	*There is difference*
In conducting health surveys	59.2	55.9	0.595	H_0 accepted	No difference
Used in conducting disease surveillance	51.5	42.2	0.137	H_0 accepted	No difference
Used in tracking commodities	36.1	29.4	0.259	H_0 accepted	No difference
Performing social marketing interventions	41.4	26.5	0.123	H_0 accepted	No difference

In health financing – used smartcards or vouchers for mobile payments for health care	47.3	32.4	0.015	H_0 rejected	*There is difference*

Table 4.32.5: Distribution of Health workers and medical students by knowledge of m-Health initiatives in Nigeria

Statements regarding m-Health Initiatives in Nigeria	Health Workers	Medical Students	p-value	Decision	Conclusion
m-Health initiatives are widely used in Nigeria	23.1	25.5	0.652	H_0 accepted	No difference
m-Health initiatives are used by non-governmental organizations only	49.7	14.7	0.000	H_0 rejected	*There is difference*
m-Health initiatives are used by the public health sector	53.3	35.3	0.004	H_0 rejected	*There is difference*
m-Health initiatives are used by the private health sector	21.9	53.9	0.000	H_0 rejected	*There is difference*
m-Health initiatives are used in the rural areas only	68.6	23.5	0.000	H_0 rejected	*There is difference*
m-Health initiatives are used in the urban areas	27.8	51.0	0.000	H_0 rejected	*There is difference*
m-Health initiatives are used in the PHCs only	49.1	30.4	0.002	H_0 rejected	*There is difference*
m-Health initiatives are used in the secondary health centres	58.6	33.3	0.000	H_0 rejected	*There is difference*
m-Health initiatives are used in the tertiary health centres	27.8	55.9	0.000	H_0 rejected	*There is difference*

Table 4.32.6: Distribution of Health workers and Medical students by knowledge of the availability of Telemedicine initiatives in Nigeria

Statement regarding Telemedicine Initiatives in Nigeria	Health Workers	Medical Students	p-value	Decision	Conclusion
Telemedicine is generally available in Nigeria	72.8	27.5	0.000	H_0 rejected	*There is difference*
Telemedicine is available in UCH	18.3	50	0.000	H_0 rejected	*There is difference*
Health professionals do not generally trust in ITCs or Telemedicine	26.6	27.5	0.882	H_0 accepted	No difference
Health professionals do not generally care about using Telemedicine	74	23.5	0.000	H_0 rejected	*There is difference*
Health professionals generally accept Telemedicine if they are specialty-related	55	59.8	0.442	H_0 accepted	No difference
Health professionals are usually hesitant to adopt new ICT or Telemedicine applications	55	54.9	0.984	H_0 accepted	No difference

Table 4.32.7: Distribution of Health workers and medical students by knowledge of the advantages of Telemedicine

Advantages of Telemedicine	Health Workers	Medical Students	p-value	Decision	Conclusion
Telemedicine will increase access to care	92.3	73.5	0.000	H_0 rejected	*There is difference*
Telemedicine will reduce waiting time in the clinic	92.3	87.3	0.171	H_0 accepted	No difference

Telemedicine will result in more timely advice and interventions	94.7	88.2	0.055	H_0 accepted	No difference
Telemedicine will improve follow-up care for patients	92.9	88.2	0.190	H_0 accepted	No difference
Telemedicine will decrease unnecessary referrals to tertiary health care centres	84.6	75.5	0.063	H_0 accepted	No difference
Telemedicine will improve collaboration between health care professionals	93.5	92.2	0.677	H_0 accepted	No difference
Telemedicine will save the costs to patients and health care providers	81.1	67.6	0.012	H_0 rejected	*There is difference*
Telemedicine increases the costs of care to patients	42.6	43.1	0.931	H_a accepted	No difference
Telemedicine will reduce revenues of the hospital	43.8	39.2	0.460	H_0 accepted	No difference
Telemedicine will improve the knowledge and clinical acumen of the health professionals	91.1	72.5	0.000	H_0 rejected	*There is difference*
Telemedicine will reduce the time and effort of health care professionals	49.9	72.5	0.000	H_0 accepted	*There is difference*
Use of the Telemedicine facility in UCH	38.5	39.2	0.902	H_0 accepted	No difference

Table 4.32.8: Distribution of Health workers and medical students by their knowledge of the potentials of ICTs

Potentials of ICTs	***Health Workers***	***Medical Students***	***p-value***	***Decision***	***Conclusion***
Improvement of practice through reduction of medical errors	85.8	68.6	0.001	H_0 rejected	*There is difference*

Improve practice through accessible and continuing education	94.1	87.3	0.051	H_0 accepted	No difference
Reduce cost of treatment through informed decision-making leading to efficient use of medical and clinical resources	89.9	78.4	0.010	H_0 rejected	*There is difference*
Improve knowledge through education, training and continuing professional development	93.5	80.4	0.001	H_0 rejected	*There is difference*
Save health workers' time and efforts	91.1	86.3	0.211	H_0 accepted	No difference
Enhance the efficiency of a health professional	89.3	83.3	0.152	H_0 accepted	No difference
Increase unnecessary referrals	53.8	54.9	0.866	H_0 accepted	No difference

Table 4.32.9: Distribution of Health workers and medical students by knowledge of the obstacles to the use of ICTs in the health sector

Obstacles of Telemedicine	Health Workers	Medical Students	Users/non users	p-value	Decision	Conclusion
Inadequate number of ICT workers skilled in developing and maintaining infrastructure	84.6	72.5	49.1	0.000	H_0 rejected	*There is difference*
Inadequate telemedicine facilities in the health facilities	90.5	80.4	54.7	0.000	H_0 rejected	*There is difference*
Non-functional telemedicine facilities in the Health facilities	83.4	81.4	45.3	0.000	H_0 rejected	*There is difference*
Inadequate number of wireless networks, such as VSAT, satellite and microwave links	84	79.4	39.6	0.000	H_0 rejected	*There is difference*

Inadequate supply of electricity in the urban areas	94.1	87.3	62.3	0.000	H_0rejected	*There is difference*
Inadequate supply of electricity in the rural areas	91.7	83.3	64.2	0.000	H_0 rejected	*There is difference*
Inadequate access to phone services	60.4	70.6	45.3	0.001	H_0 rejected	*There is difference*
Inadequate access to the Internet	46.9	74.5	50.9	0.000	H_0 rejected	*There is difference*
Unaffordable computer networks and Internet access	82.8	69.6	49.1	0.000	H_0 rejected	*There is difference*

Table 4.32.10: Distribution of health workers and medical students by their knowledge of the use of ICTs in the health sector

Statement	Health Workers	Medical Students	p-value	Decision	Conclusion
The Nigerian Government has an ITC Policy	30.8	39.2	0.155	H_0 accepted	*There is difference*
The Nigerian Government promotes the uses of ICTs in the Health sector	27.8	34.3	0.259	H_0 accepted	No difference
The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients	21.9	34.3	0.025	H_0 rejected	*There is difference*
The government generally actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector	17.2	30.4	0.011	H_0 rejected	*There is difference*
The government generally ensures standardization and availability of legal measures in ICT-related activities	21.3	30.4	0.093	H_0 accepted	No difference

Table 4.33: Statistical Analysis of the responses of Health Workers and Medical Students compared with those of Users and Non-Users of Medical Services

Table 4.33.1: Comparison of UCH Health Workers with users and non-users by their Awareness of ICTs

Type Of ICTs	Health Workers %	Users/Non users %	p-value	Decision	Conclusion
Radio	84.6	85.5	*0.779*	H_0 accepted	No difference between Health workers and users/non-users by awareness of Radio as ICTs
Television	85.6	83.0	*0.532*	H_0 accepted	No difference between Health workers and users/non-users by awareness of Television as ICTs
Mobile Phones	93.5	81.1	*0.002*	*H_0 rejected*	Percentage of awareness of Mobile phones as ICTs among Health workers is statistically greater than users/non-users
Smart Phones	89.3	56.6	*0.000*	*H_0 rejected*	Percentage of awareness of Smart phones as ICTs among Health workers is statistically greater than users/non-users
Internet	83.4	71.7	*0.020*	*H_0 rejected*	Percentage of awareness of Mobile Internet as ICTs among Health workers is statistically greater than users/non-users
Telemedicine	95.3	52.8	*0.000*	*H_0 rejected*	Percentage of awareness of Telemedicine as ICTs among Health workers is statistically greater than users/non-users
PDAs	78.1	39.6	*0.000*	*H_0 rejected*	Percentage of awareness of PDAs as ICTs among Health workers is statistically greater than users/non-users
GRPS	56.8	34.0	*0.000*	*H_0 rejected*	Percentage of awareness of GRPS as ICTs among Health workers is statistically greater than users/non-users

Table 4.33.2: Comparison of UCH Health Workers with users and non-users by use of ICTs

Type Of ICTs	Health Workers %	Users/Non users %	p-value	Decision	Conclusion
Radio	62.1	67.0	*0.415*	H_0 accepted	No difference between Health workers and users/non-users by use of Radio
Television	67.5	68.9	*0.807*	H_0 accepted	No difference between Health workers and users/non-users by use of Television
Mobile Phones	78.7	71.7	*0.186*	H_0 accepted	No difference between Health workers and users/non-users by use of Mobile Phones
Smart Phones	63.9	51.9	*0.048*	*H_0 rejected*	Percentage of use of Smart Phones by Health workers is statistically greater than user/non users
Internet	81.1	61.3	*0.000*	*H_0 rejected*	Percentage of use of Internet by Health workers is statistically greater than user/non users
Telemedicine	47.3	50.0	*0.667*	H_0 accepted	No difference between Health workers and users/non-users by use of Telemedicine
PDAs	23.1	17.0	*0.225*	H_0 accepted	No difference between Health workers and users/non-users by use of PDAs
GRPS	24.3	29.2	*0.360*	H_0 accepted	No difference between Health workers and users/non-users by use of GRPS

Table 4.33.3: Comparing percentage knowledge of obstacles to the use ICTs in the health sector between Health Workers and Users/non-users

Obstacles of the use of ICTs	Health Workers%	Users/non-users %	p-value	Decision	Conclusion
Inadequate number of ICT workers skilled in developing and maintaining infrastructure.	84.6	49.1	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate telemedicine facilities in the health facilities.	90.5	54.7	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Non-functional telemedicine facilities in the health facilities.	83.4	45.3	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate number of wireless networks, such as VSAT, satellite and microwave links.	84	39.6	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate supply of electricity in the urban areas.	94.1	62.3	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate supply of electricity in the rural areas.	91.7	64.2	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate access to phone services phone services.	60.4	45.3	0.014	H_0 rejected	There is statistically significant difference between the 2 proportions
Inadequate access to the Internet.	76.9	50.9	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions
Unaffordable computer networks and Internet access.	82.8	49.1	0.000	H_0 rejected	There is statistically significant difference between the 2 proportions

Table 4.33.4: Comparison of Medical Students with users and non-users by Awareness of ICTs

Type Of ICTs	Medical Students %	Users/Non users %	p-value	Decision	Conclusion
Radio	76.5	85.5	*0.083*	H_0 accepted	No difference between medical students and users/non-users by awareness of Radio
Television	88.2	83.0	*0.284*	H_0 accepted	No difference between medical students and users/non-users by awareness of Television
Mobile Phones	96.1	81.1	*0.001*	*H_0 rejected*	Percentage of awareness of Mobile Phones among medical students is statistically greater than that of Users/non-users
Smart Phones	98.0	56.6	*0.000*	*H_0 rejected*	Percentage of awareness of Smart Phones among medical students is statistically greater than that one of Users/non-users
Internet	89.2	71.7	*0.001*	*H_0 rejected*	Percentage of awareness of Internet among medical students is statistically greater than that one of Users/non-users
Telemedicine	66.7	52.8	*0.284*	H_0 accepted	No difference between medical students and users/non-users by awareness of Telemedicine
PDAs	75.5	39.6	*0.000*	*H_0 rejected*	Percentage of awareness of PDAs among medical students is statistically greater than that of Users/non-users
GRPS	52.9	34.0	*0.006*	*H_0 rejected*	Percentage of awareness of GRPS among medical students is statistically greater than that of Users/non-users

Table 4.33.5: Comparison of Medical Students with users and non-users by use of ICTs

Type Of ICTs	Medical Students %	Users/Non users %	p-value	Decision	Conclusion
Radio	41.2	67.0	*0.000*	*H_0 rejected*	Percentage of use of Radio is statistically greater among users/non-users than Medical students
Television	61.8	68.9	*0.282*	H_0 accepted	No difference in term of Television use among Medical students and users/non-users
Mobile Phones	81.4	71.7	*0.100*	*H_0 rejected*	No difference in term of Mobile phones use among Medical students and users/non-users
Smart Phones	82.3	51.9	*0.000*	*H_0 rejected*	Percentage of use of Smart Phones is statistically greater among Medical students than users/non-users
Internet	67.5	61.3	*0.341*	H_0 accepted	No difference in term of Internet use among Medical students and users/non-users
Telemedicine	32.4	50.0	*0.009*	*H_0 rejected*	Percentage of use of Telemedicine is statistically greater among users/non-users than Medical students
PDAs	34.3	17.0	*0.004*	*H_0 rejected*	Percentage of use of PDAs is statistically greater among Medical students than users/non-users
GRPS	25.5	29.2	*0.543*	H_0 accepted	No difference in term of GRPS use among Medical students and users/non-users

Table 4.33.6: Comparing percentage knowledge of obstacles to the use of ICTs in the health sector between Medical students (UCH) and Users/non-users

Obstacles of use of ICTs	Medical students %	Users/non-users %	p-value	Decision	Conclusion
Inadequate number of ICT workers Skilled in developing and maintaining infrastructure.	72.5	49.1	0.001	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate telemedicine facilities in the health facilities.	80.4	54.7	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Non-functional telemedicine facilities in the health facilities.	81.4	45.3	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate number of wireless networks, such as VSAT, satellite and microwave links.	79.4	39.6	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate supply of electricity in the urban areas.	87.3	62.3	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate supply of electricity in the rural areas.	83.3	64.2	0.002	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate access to phone services.	70.6	45.3	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Inadequate access to the Internet.	74.5	50.9	0.000	H_0 rejected	There is statistical difference between the 2 proportions
Unaffordable computer networks and Internet access.	69.6	49.1	0.003	H_0 rejected	There is statistical difference between the 2 proportions

4.5 Conclusion

The findings from the IDIs and the questionnaire survey revealed that some ICT applications are in use in the College of Medicine and its hospital, the University Hospital, Ibadan, Nigeria. There is no definite hospital policy or plan as to how the use of these can be maximised to facilitate communication in the health sector. In addition, apart from the Telemedicine facility and a few desktops, most of the ICT equipment mentioned by the respondents is personal. This made it difficult for the respondents to accurately determine the level of effectiveness of ICTs in improving communication in the institutions. However, it appears that ICTs have been well embraced by some professionals, because they have enhanced their communications among their colleagues and the clients/patients.

The major obstacles militating against the use of ICTs in the institutions are the funding and the power supply. Some workers also perceived the introduction of ICTs in their units as a threat to their positions, and they are reluctant to embrace the applications. On the side of the clients/patients, the health professionals are of the opinion that the major challenges are confidentiality and an abuse of their rights to privacy. Notwithstanding these obstacles and challenges, the IDI respondents believe that when the potentials of ICTs; applications are fully maximized for communications in the health sector, the gains will certainly outweigh the pains.

The IDI respondents recommended that there should be the creation of a greater awareness among the health workers, advocacy for an improved and efficient power supply, the purposeful implementation of the ICT Policy, increased funding for the health sector, and training health professionals to use the available ICT applications for communications in the health sector.

The FGDs among the health workers, medical students, users of hospital services (patients) and the professionals who were conversant with the use of ICTs for

communicating within their professions (bankers and journalists), were more revealing than the IDIs, with the principal officers of the two institutions. The major ICT applications reported by the discussants were similar in all the groups, except for the bankers, who also use the ATM and POS. Compared to a few universities in the nation, the medical students would wish to have more, and free, access to the Internet. The patients also expressed the same concerns with regard to the use of the mobile phone and the Internet for communicating with the health workers. The use of the social media networks was more prevalent among the medical students. Surprisingly, unlike the qualified professionals, the medical students did not mention Telemedicine until much later in their discussion.

There were divergent opinions in all the groups regarding the effectiveness of ICTs for communicating in the health sector, but the challenges being encountered or envisaged were similar in all the groups, including the non-medical professionals. However, virtually all the discussants in the five groups affirmed the benefits that the use of these applications would bring to health care practice and delivery in the country if adopted and efficiently utilized by all stakeholders. More importantly, the students were of the opinion that effective use of ICTs in the health sector will improve the interactions between them and their trainers. The strategies adopted by the banking sector to get the Nigerian public to take on the use of ICT applications appear to be applicable and appropriate in the health sector. Similarly, the health sector will certainly benefit from the lessons learnt by those in the banking sector. There were divergent opinions on the effect of some selected factors relating to the adoption of ICTs for communicating in the health sector. Unlike the qualified professionals who considered the mind-set to be a major factor that would influence the adoption of these applications, the medical students had a totally different opinion. This, in addition to their flare for the use of the social media networks for communicating amongst themselves when compared to other discussants, may be a reflection of a generational gap. On the other hand, all the discussants agreed that availability, affordability and awareness are important factors that would certainly have a profound effect on the adoption and use of ICTs for communicating in the health sector.

Several suggestions were offered by all the groups of discussants for accelerating the adoption and use of ICT applications for all of the stake holders to communicate in the health sector. These, together with the lessons learnt in the banking sector while implementing the 'Cashless Policy' of the Central Bank of Nigeria (CBN, will be useful catalysts for the adoption of ICTs by all the stakeholders. It is not without significance to note that the health workers, including the medical students, were of the opinion that a major factor that may hinder the adoption of ICT applications for communicating in the health sector by the patients is the fear of a lack of privacy and confidentiality, which are major components of 'Client/Patient Rights.' In contrast, the discussants from the group of patients expressed absolute trust in regard to the confidentiality of their health records, if and when ICTs are adopted by the sector.

CHAPTER FIVE

Discussion

5.0 Introduction

Information and Communication Technologies (ICTs) have spread to nearly every industry in modern societies, and healthcare systems around the world are increasingly making use of these innovations. The aim is to streamline and coordinate healthcare activities, to enhance cost effectiveness and to improve the quality and quantity of services (Hartford et al., 2010). It is assumed that translating bodies into digital data that can be distributed across the sites and activities of medical and care practices is one way to optimize the use of resources.

Integration and the assimilation of ICT applications into the everyday life of health care workers is becoming a reality in some developing countries in Africa. ICTs enable online communication about medical issues and the diagnosis of complicated diseases by linking medical practitioners who are separated geographically. They have the potential to change the delivery of health care services and patient care, as well as the management of health-care systems (Ruxwana et al., 2010). ICTs are widely perceived to have the capability, if used effectively, to bridge social and economic gaps that divide rural and urban communities (Gurstein, 2000, 2005), improving access and providing a wider range of health services to enhance the well-being of underprivileged people (and those living in hard-to-reach areas) (Ruxwana et al., 2010).

5.1 Tests of Hypotheses

The adoption of ICTs by an organization and/or in a society, can be driven by many factors. My study has attempted to better understand the influence that ICT applications have had on health care services in Nigeria, and how they are being used to improve the

health system in selected teaching hospitals in Nigeria, including both the challenges and prospects. My theoretical model is a hybrid of the Diffusion of Innovation Model of Rogers (1995) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Both theories can provide important insights into the factors influencing technology transfer in developing countries. The main research questions were to investigate how ICTs are being used in the health sector and also to determine what factors were perceived to influence the effective use of ICT applications as e-Health solutions. Diffusion and adoption patterns of an innovation are the functions of several elements, including the characteristics of the innovation itself, the channel of communication, the nature of the social system, and time (Rogers, 1983).The Unified Theory of Acceptance and Use of Technology (the UTAUT model) aims to explain user intentions to use an information system and their subsequent usage behaviour. However, technology adoption consists of consecutive stages that ultimately lead to either its use or its rejection. . The hybrid theory stipulates that four key constructs impact on usage intention, behaviour and use behaviour. These constructs are performance expectancy, effort expectancy, social influence and facilitating conditions. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behaviour. Both theories can provide important insights into the factors influencing technology transfer in developing countries. All the consecutive stages of the Diffusion of Innovation Theory and the core determinants of intention and usage of the UTAUT have been incorporated into the research model that was adopted earlier. From the theoretical model discussed in Chapter 2, I thus hypothesized that:

H_1: Greater awareness of recent advances in the use of ICTs in the health sector is positively related to the adoption of the applications.

H_2: Organizational structures that promote the development of ICTs are positively related to the acceptance of ICT applications by the health workers.

H_3: Investments in the provision of ICT applications by organizations are positively related to its acceptance by health workers

H_4: Health workers' individual characteristics are positively related to the adoption of ICT applications in the health sector.

H_5: Health workers' adoption of the use of ICT applications are positively related to their acceptance by the clients/patients.

H_6: Policies that favour the development of ICTs in general, especially with a specific focus on health care, will facilitate the adoption of ICT capabilities in the health sector.

My first hypothesis (H_1) was that "*greater awareness of recent advances in the use of ICTs in the health sector is positively related to the adoption of the applications".* A good number of the workers, medical students, users and non-users of health services, claimed to be aware of the use of ICTs in the health sector, although there was a statistically significant difference between the health workers/medical students and the users/non-users, in terms of awareness of the radio, mobile phones, Internet, Telemedicine, PDAs and GPRS. The only ICT component in which there was no difference was the television. Similarly, the users and non-users of health services had a wide ranging awareness of ICT types. However, despite these, there was poor use of these ICTs among the three groups surveyed. Greater awareness of recent advances in the use of ICTs in the health sector is therefore not entirely related to the adoption of the application. Among the health professionals, the Internet was the most widely used ICT, while the smart phones and mobile phones were more popular with the medical students and with the users and non-users of health services. Similarly, Ajuwon (2003), in a study on computer and Internet use by first year clinical and nursing students in a Nigerian teaching hospital, found that the students had not fully utilized the opportunity that the use of the computer and the Internet offer for medical education. As previously noted, the success of

information and communication technology applications in health is dependent on the level of computer use by the health professionals, especially doctors (Asangasi et al., 2008: 1-5). Bello et al. (2004) investigated the use of ICTs to transform modern health systems in the areas of communication, teaching, the storage and retrieval of medical information, among health care professionals and students in a teaching hospital at Ile-Ife, Nigeria. The authors concluded that medicine is an ever evolving and information-based discipline, and, as such, the provision of structured computer and IT training for all members of the health team would equip them with the skills to practice up-to-date and evidenced based medicine, which are essential to improving the quality of medical care.

The maturity of Internet use in daily life is an indicator of how far digitalization of the health care sector should have come (Kairos Future, 2012). Internet diffusion in Africa has been hampered by factors such as poverty, low computer penetration and illiteracy, lack of trained personnel, disinterest, and a failure to understand the benefits of Internet access (CITI, 2000). Along with the exponential growth in the number of Internet users worldwide, newer means to access the Internet keep appearing. In particular, Internet access by mobile and broadband technologies has been experiencing a rapid growth worldwide. According to the ITU, currently, cellular phone subscribers in the world have outnumbered fixed line subscribers, and more e-commerce is taking place over handsets.

My second hypothesis (H_2) is that *"organizational structures that promote the development of ICTs are positively related to the acceptance of ICT applications by the health workers".* This is a true reflection of what obtains in the Nigerian health sector presently. It was the opinion of nearly all the stakeholders interviewed that the management of the hospital and the medical school have not invested much in e-Health. According to the World Health Organization (WHO), (WHO, 2005, Lindberg et al., 2015), e-Health is used in healthcare for the transmission of digital data, including data stored and retrieved electronically to support healthcare, both at the local site and at a distance. e-Health also includes the interaction between patients and health service providers, or peer-to-peer communication between patients, and/or health professionals.

One major application that the medical students at U.C.H., Ibadan, seemed to have found useful was the Power Point presentations by their lecturers. The College Management has, over the years, promoted the use of these for the students' lectures. During their focus group discussion, they also applauded the provision of an Internet service by the College of Medicine to both staff and students, albeit, with its many challenges. According to them:

> "Aside from getting resources, we can also learn; we can get information from the 'skype', we can store information on the computers."

The existence of organizational structures in the system is therefore certainly positively related to the acceptance of ICT applications. Nearly all the respondents at the focus group discussions affirmed that availability and affordability were major factors affecting the adoption of ICT applications in the health sector in Nigeria. Another issue is the lack of a maintenance culture in the system. Interventions are doomed when basic conditions that could make it possible for people to adopt new attitudes and behaviours are missing. As noted previously by Olatokun and Adeboyejo (2009), the production of quality health-care delivery in a country is guided by the level of ICT infrastructure that is possessed and used by that country

The third hypothesis (H_3) is that *"Investments in the provision of ICT applications by organizations are positively related to their acceptance by health workers".* Rather unfortunately, as much as one would expect this to be quite logical, this does not hold water in the situation at the U.C.H., Ibadan. A typical example is the case of the Telemedicine facility at the hospital. Telemedicine is normally used within the clinics and wards of health institutions and it is about communication/information sharing by electronic means between health professionals. Initially, Telemedicine drew interest from health political circles as a way to reach out with hospital-based expertise from metropolitan locations to medically underserved rural, or hard-to-reach, areas. Today, however, many industrialised nations see it as a possible way to provide health-care more cost-efficiently (Gheradt, 2010: 509-510). As an example, a general practitioner at a primary care centre could transmit a digital x-ray to a medical expert elsewhere, who

could then decide whether the patient can stay at the care centre or should be transferred to the hospital. Used in this way, Telemedicine should help streamline the service and prevent unnecessarily moving patients to more costly hospital care (Peterson, 2011).

Surprisingly, despite the existence of the Telemedicine facility in the hospital, the health workers and students at U.C.H. were not taking advantage of it. Neither the health workers nor the medical students have embraced it. In fact, the health workers and the medical students had divergent opinions on the availability of Telemedicine in Nigeria. While there were statistically significant differences with regard to their views that:

- "Telemedicine is generally available in Nigeria"
- "Telemedicine is available at U.C.H.," and that
- "Health professionals do not generally care about the use of Telemedicine",

There were no statistically significant differences with regard to the "trust in ICTs or Telemedicine", a general acceptance of Telemedicine if they are specialty-related" and their "hesitancy to adopt new ICT or Telemedicine applications". On the use of the Telemedicine facility at the hospital, there was no statistical significance between the health workers and medical students' view that it was not generally used in the hospital. Investments in the provision of ICT applications alone are not positively related to their acceptance by health workers, other factors are certainly responsible for their acceptance, even when an organization invests in it.

The fourth hypothesis (H_4) is that *"health workers individual characteristics are positively related to the adoption of ICT applications in the health sector."* This seems to be the most valid of all the hypotheses as reflected in the opinions expressed by the respondents at the focus group discussions and during the in-depth interviews with the principal officers. Most discussants thought that the mind-set is a major factor influencing the use of ICT applications in the health sector. The discussants, especially those from the banking sector, felt that the mind-set was a major factor that influenced

the introduction of the electronic banking system in Nigeria and this is not likely to be different in the health sector. As one of the discussants stated:

> "When the ATM was introduced a lot of bankers were scared, especially the operation staff. The ATM would be doing most of the work of tellers, meaning automatically, the bank would downsize. I don't know much about the health sector, but someone at the records office will be scared that once everything is put into the computer, I will lose my job. Such a person will be averse to change and will want whatever you are planning to fail."

However, a few opined that:

> "It is more of not knowing what to do due to lack of training than the mindset."

In fact, one of the medical students remarked that:

> "Usually when an innovation is introduced, you cannot expect 100% acceptance, but over time, people's myths about it will be debunked. They will realise that the new invention has more advantages than disadvantages and will readily accept it."

In the evolving ICT environment, IT elements such as email and group support facilities improve the organizational communication, which ultimately leads to effective decision-making (Rockart and Short, 1989). Furthermore, ICTs are very useful for the collection and dissemination of information. The success of an ICT application is not possible in the organizations where the human element is not given importance and where a lack of participation by end users exists in Information System (IS) development proceedings, as asserted by Macleod (2007), design and implementation of the hardware/software have greater success rates in organizations in which users and IT-staff/professionals jointly develop an information system. This is the human element, which is related to the adoption and success of new technologies (Qureshi et al., 2014). Similarly, Certo (2001: 37-38) argues that organizational success can be enhanced by building appropriate relationships with the people.

My fifth hypothesis H_5 is that *"health workers' adoption of the use of ICT applications are positively related to their acceptance by the clients/patients."* Fish et al., (2008) have suggested that the widespread assumption that tele-healthcare will revolutionize the

delivery of healthcare calls for critical approaches to various kinds of systems and their use, including how they express the relationships between professionals and target groups, will result in different forms of health care. In this study, the health workers were more knowledgeable about the benefits and advantages of ICTs in the health sector than the users and non-users. It is not without significance to assume that the acceptance of ICTs in the health sector will motivate the clients/patients. As one of the discussants from the Bankers' group said: "all stakeholders must be open-minded, and the health workers must be the first to use them":

> "Keep using them as if you don't have alternatives. When they see them, they will know what you are selling. And the fact you are using it will encourage and give confidence to others."

However, other factors, such as the high level of illiteracy, poor infrastructural development in the urban and rural areas, affordability and availability, will certainly affect the adoption of the new innovations by both the users and non-users of the health services. As Rogers (1983) had previously affirmed, the adoption patterns of an innovation are the functions of several elements, including the characteristics of the innovation itself, the channel of communication, the nature of the social system, and time.

Information is at the heart of health care. Health professionals collect information from the patients about their background, presenting symptoms, general health status and recommend course of action including drugs prescribed and referrals for laboratory tests or to other services. They are also expected to keep up-to-date knowledge of trends and developments in medical practice, pharmacy and research (Gauld, 2005). Clearly, health services require a variety of different forms of information management systems (Berg, 2004; Smith 2000). ICTs offer additional promises to health care. Information can be easily collated, complete and reliable. Medical errors can be reduced. Electronic prescribing and data entry at point of service, for instance, has been shown to lessen errors in the process of communicating via, and deciphering, hand written notes (Bates et al., 2000). This potential to reduce inaccuracy is important as international studies have

found medical errors – often the result of miscommunications – to be responsible for significant number of hospital readmissions and deaths (Gauld, 2005; Daniel et al., 2002; Institute of Medicine, 2000; Wilson et al, 1995). Telemedicine allows for video consultations and patient examinations and transfer of information between remote sites. Advancing technology is allowing patients to deliver their own results to clinicians; electrocardiogram tests and a variety of diagnostics can be done via video and telecommunications; emails and the Internet are facilitating remote consultations and increasing level of information and service available to patients (Kedar et al., 2003). When appropriately implemented, ICTs can and have been shown to enable improvements in people's lives wherever they live (Qureshi, 2015).

There are many barriers to the implementation of e-health solutions in Nigeria that cause delays or hinder their use. The Nigerian health sector is compromised by lack of infrastructure, services and expertise, limited resources, low literacy levels and professional association. Several studies have reported similar findings (Olugbara et al., 2006; Uys, 2006). In addition to these inherent problems, shortcomings in the knowledge and skills of patients and health professionals to use ICT solutions present other challenges. Some of these obstacles pertain to ICT itself and with time will be alleviated; others relate to the challenges ICT poses for health care organizations. Even when implemented, the benefits of ICTs and applications cannot be realised if people are unable to use them. One challenge is to train people in the use of ICT solutions so that they can improve on their health or quality of service (Ruxwana et al, 2010). David Gauntlett's book, "Making is Connecting" (Gauntlett, 2013) = is a key source of literary text in helping to understand the impact of technology if well embraced. In some areas, it discussed the relationship surrounding deeper levels of the challenges surrounding creativity and sharing (Hay and Couldry, 2011) and this is extremely relevant to the fears and challenges unravelled in my findings such as lack of literacy and unreliability of infrastructure and cultural values, therefore forcing the health care workers to adopt 'old school' methods in order to satisfy the patients' needs. This is as a major drawback. Hope is assured when ICTs in the African health sector are in line with the cultural values of

the people and thus further integrated in to the design and implementation of these technologies. ICTs should not be seen merely as the solution for eradicating the problems within Sub-Saharan Africa, but rather as a means of infinite development (Ojo, 2006).

The sixth and the last hypothesis H_6 is that *"policies that favour the development of ICTs in general, especially with a specific focus on health care will facilitate the adoption of ICT capabilities in the health sector."* Whereas, there is a national policy on ICTs, this has not been widely circulated nor properly implemented which made it difficult for me to test this hypothesis. In the ICT Policy for Nigeria, the government has acknowledged its role as a major employer and user of ICTs. However, the awareness of most of the respondents within and outside U.C.H. was very poor. From the surveys, IDIs and FGDs, there is no doubt the respondents believed that a greater involvement of the government in institutionalising ICTs in the health sector will produce a significant development in the delivery of health services via these applications. Currently, efforts to institutionalise ICTs in the health sector have been fragmented and the government has to be on the driving seat to facilitate the adoption of ICT capabilities in the health sector. Policies have to be developed around collection and access to, protection of personal information, and privacy which were some of the concerns of the users and non-users as reflected in the FGDs. To guard against third parties accessing networks, a high-level of data security will be required. This may require acceptance and enforcement of an organization-wide security policy. Once developed, such policies need to be widely disseminated and strictly observed to bolster trust in ICT systems and information sharing (Berg, 2004; Smith, 2000). The literature generally states that ICT policies regulate demand and supply of ICTs as well as sectoral ICT diffusion such as e-Health, e-education and e-government (Kifle, 2006, Kraemer et al., 2002;; Raman and Yap, 1996). Kilfe (2006), in his study entitled "A Theoretical Model for Telemedicine: Social and Value Outcomes in Sub-Saharan Africa," found that general ICT policies have significant influence on telemedicine capabilities.

5.2 Acceptance of ICT Applications in the Health Sector and Theories of Diffusion and Adoption of Innovations

A deeper and richer understanding of the multifaceted and complex processes of the diffusion and adoption of ICTs requires the integration of theories from diverse perspectives, such as political science and international relations, communications, information systems, sociology, marketing, and geography (Dholakia et al., 2003). Past research has found that the 'country-level efforts' or the 'societal effects' (Kshetri and Dholakia, 2002; Zaheer and Zaheer, 1997) have a strong influence on technology adoption and the behaviour of forms and individuals in a country. Similarly, technology –society compatibility (Gatignon and Robertson, 1985; Rogers, 1983) theories could help explain why a particular technology is more compatible in certain societies than in others.

Since the 1950s, a diversity of theoretical and empirical traditions has converged in the field of development communication. Such convergence has produced a rich analytical vocabulary, but also a conceptual confusion. The field has not experienced a unilinear evolution in which new approaches have superseded and replaced previous ones. Instead, different theories and practices that originated in different disciplines have existed and have been used simultaneously (Waisboard, 2001). The early generation of development communication studies was dominated by modernization theory, which suggested that a cultural and information deficit lie beneath developmental problems and that difficulties in developing countries were partially related to the existence of a traditional culture that inhibited development. Culture was viewed as the "bottle-neck" that prevented the adoption of modern attitudes and behaviours (Hagen, 1962; McClelland, 1961). The goal was, therefore, to instil modern values and information through the transfer of modern technology and the adoption of innovations and culture that had originated in the developed world. The current aim of development communication is to remove constraints to a more equal and participatory capacity (Waisboard, 2001).

The Diffusion of Innovation theory that was elaborated by Everett Rogers (1983, 1960) became one of the most influential modernization theories. It has been said that Rogers' model has ruled development communication for decades, and it became the blueprint for communication activities in development. Rogers' intention was to understand the adoption of new behaviours. The premise was that innovations diffuse over time according to an individual's stages. Lerner and Schramm introduced another idea in diffusion researchL what motivates change is not economics, but communication and culture (Schramm, 1964; Lerner, 1958).

Economic factors, such as income level, the availability and price structures of ICT products and services, and bandwidth and supporting infrastructures, which were noted as major obstacles to the acceptance of ICT applications in the health sector in Nigeria in this study, were noted by Kishetri (2001) to affect the diffusion of the Internet. For instance, income can be expected to be positively associated with the demand for modern ICT products (Gatignon and Robertson 1985; Rogers, 1985, 1965). Economic factors influence the means used to access the Internet. Bandwidth availability is a determinant of Internet adoption and diffusion. In general, bandwidth is very low in developing countries, such as Nigeria. Lower bandwidth results in a longer time being needed to transfer data, and hence a low relative advantage for Internet use. Another component of the value system is related to the skills required to use the Internet and other ICT applications. Literacy and computer skills are almost the prerequisites for Internet use. A large proportion of the population in developing countries, including Nigeria – the site of this study, is illiterate, and a still higher proportion lacks computer skills. As noted in this study, innovations are adopted by those individuals from the higher socioeconomic strata, rather than the lower ones.

The adoption of ICTs in an organization and/or in a society can be driven by many factors, as noted in this research study. Since the diffusion of innovation requires an understanding of "people, hardware, software, communication networks and data resources that collect, transform and disseminate information" (O'Brien, 1996), theories from information systems have been suggested as being well suited to explain such aspects of the diffusion and

adoption phenomena. As stated in Chapter 2, technology adoption consists of consecutive stages that ultimately lead to its use or rejection. My theoretical model is a hybrid of Rogers' (1995) Diffusion of Innovation Model and Venkatash et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT). Both theories can provide important insights into the factors influencing technology transfer in developing countries, which have been demonstrated by the findings of this research study. UTAUT is a technology acceptance model that is formulated by leading technology researchers and it was published in the September, 2003, edition of MIS Quarterly (Schapel and Pervan 2004 736, Vinkatesh et al. 2003: 425 – 478). The model aims to explain user intentions to use an information system and the subsequent usage behaviour. The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems' usage behaviour. The findings of this study have demonstrated that the factors that influence the use of ICTs in the Nigerian health sector are dependent on several variables, which include the extent to which a person believes that using a particular technology will meet that person's need or enhance their job performance; the perceived benefits of using the technology,: availability of useful information by using the ICT application; the extent to which the person believes that using a particular technology will be free of effort, and "that the performance benefit of usage are outweighed by the effort involved" (Wahlberg, 2006; Davis et al., 1989). Others factors are variables relating to the levels of ICT access, access to supporting communication infrastructure and the Internet, and ICT-related skills (Ruxwana et al., 2010).

5.3 Conclusion

The world has continued to change considerably since the inception of development institutions, theories and their policy interventions (Qureshi, 2015). It has been suggested that development theories, policies, and interventions from western institutions may not be suited to the conditions of the countries that they are intending to improve (May et al., 2014; Escobar, 2011; Willis, 2011; Easterly and Easterly, 2006). The United Nations (UN) Millennium Development Goals (MDGs), established in 2000 with the signing of the

Millennium Declaration by the UN's member states, were seen as being key in establishing desirable development interventions. However, since the deadline in 2015, these have been replaced by the UN Sustainable Development Goals (SDGs), or Global Goals, which are a comprehensive, far-reaching and people-oriented set of universal and transformative goals and targets that build upon the achievements of the MDGs. The SDGs are set to guide development policy and funding until 2030, beginning with a pledge to end poverty. The SDGs offer major improvements on the MDGs, and their framework addresses key systematic barriers to sustainable development, such as inequality, unsustainable consumption patterns, weak institutional capacity, and environmental degradation, which the MDGs neglected (ICSU, ISSC, 2015).

CHAPTER 6

Conclusions and the Way Forward

This study has contributed new knowledge-based evidence on how ICTs and their applications can enhance the quality of health care and services. Although ICTs and their applications are being increasingly used in healthcare training, research and services across African countries, the reports of the effort of using ICTs and their applications for communicating in the health sector have been fragmented, particularly with regard to awareness, use, the knowledge of terminologies, the benefits, potentials and challenges, as compiled in the findings of this study. The study has provided an overview of the diffusion and adoption of ICTs and their applications in the Nigerian health sector and has examined factors that have shaped and/or are shaping the diffusion dynamics of innovations. The diffusion pattern of innovations, such as ICTs, is a function of economic, political, cultural and geographical factors. Low levels of income, illiteracy, poor infrastructure, socio-cultural environments, fear for the confidentiality of health records and of health workers being laid off from their jobs, the lack of a strong political will, and other barriers, have hampered the rapid diffusion of ICTs in the Nigerian health sector. The study also revealed the inherent fears being harboured by the potential users (health workers), including the risks of losing their coveted positions, as well as the fears of the clients/patients, who are rather sceptical about accepting such new technologies, citing possible health risks and lack of confidentiality. Already, most of the patients being served by the hospital are rural dwellers who tend to be rooted in traditional ways. The majority of the prospective clients are also likely to be rural dwellers, who would prefer face-to-face contact with their doctors. This may reflect their resistance to social change or to the adoption of new technologies.

The use of ICT applications in the health sector in Nigeria is an expanding research area. The results of this study have revealed that, at the moment, ICTs in the health sector in Nigeria are mostly used as a tool for communication between health professionals (including those in training), with limited use by the users and non-users of the health services. The presented data found evidence that health professionals were highly aware of on-going trends towards the

adoption of ICTs and their applications for use in communication in the health sector. They were also willing to optimize the benefits of the technical innovations. However, the users of health services were cautious that ICT applications must be used as adjuncts, and not as replacements, for standard care, otherwise, the potentials may be lost. Some patients would prefer being involved and participating in decision-making regarding the care they receive, as has previously been noted by Lindberg et al. (2012).

The findings of this study have revealed that the adoption of ICT applications in Nigeria's health sector in still in its infancy. The presented data demonstrated evidence that health professionals were highly aware of on-going trends towards the adoption of ICTs and their applications for use in communication in the health sector, but the potential benefits of ICTs in the health sector have not been fully exploited by the selected Nigerian teaching hospitals that were studied. The study also found that there are many barriers to the implementation of e-Health solutions in Nigeria and that this causes delays or hinders their use. The Nigerian health sector is compromised by a lack of infrastructure, services and expertise, limited resources, low literacy levels and professional associations. In addition to these inherent problems, shortcomings in the knowledge and skills of the patients and health professionals to enable them to use ICT solutions present other challenges. Individuals perform or reproduce behaviours that are themselves a product of relationships between people, their environment, and the technology that surrounds them (Morris et al. 2012).

The first hypothesis was that a greater awareness of recent advances in the use of ICTs is positively related to the adoption of the applications. Even though health workers, medical students, users and non-users of health services had a wide range of awareness of ICTs and their applications, there was poor use of them among the three groups. There is still a shortage of the necessary equipment and infrastructure for ICT development and growth in Nigerian society, as this study has revealed. My second hypothesis is that "organizational structures that promote the development of ICTs are positively related to the acceptance of ICT applications by the health workers". This is a true reflection of what obtains in the Nigerian health sector presently. It was the opinion of nearly all of the stakeholders interviewed that the management of the hospital and

the medical school have not invested much in e-Health. The existence of organizational structures in the system is therefore certainly positively related to the acceptance of ICT applications. The third hypothesis is that "Investments in the provision of ICT applications by organizations are positively related to their acceptance by health workers". Rather unfortunately, as much as one would expect this to be quite logical, it does not hold water in the situation that pertains at the U.C.H., Ibadan. A typical example is the case of the Telemedicine facility at the hospital. Surprisingly, despite the existence of the Telemedicine facility in the hospital, the health workers and students at U.C.H. were not taking advantage of it. Neither the health workers nor the medical students have embraced it. The fourth hypothesis is that "health workers' individual characteristics are positively related to the adoption of ICT applications in the health sector." This seems to be the most valid of all the hypotheses, as is reflected in the opinions expressed by the respondents at the focus group discussions and during the in-depth interviews with principal officers. Most discussants were of the opinion that the mind-set is a major factor in influencing the use of ICT applications in the health sector. My fifth hypothesis is that "health workers' adoption of the use of ICT applications is positively related to their acceptance by the clients/patients." In this study, the health workers were more knowledgeable about the benefits and advantages of ICTs in the health sector than were the users and non-users. It is not without significance to assume that the acceptance of ICTs in the health sector will motivate the clients/patients. However, other factors, such as the high level of illiteracy, poor infrastructural development in both urban and rural areas, affordability and availability, will certainly affect the adoption of the new innovations by both users and non-users of the health services. The sixth, and last, hypothesis is that "policies that favour the development of ICTs in general, especially with a specific focus on health care, will facilitate the adoption of ICT capabilities in the health sector." Whereas, there is a national policy on ICTs, this has neither been widely circulated nor properly implemented, which made it difficult for me to test this hypothesis.

The theory of planned behaviour (TPB) is one of the most cited and applied behaviour theories. The TPB (Ajzen 1985, 1991; Ajzen and Madden 1986) evolved from the theory of resolved action (Fishbein and Ajzen 1975), which posited an intention to act as the best predictor of

behaviour. However, Morris et al. (2012) have remarked that intention is itself an outcome of a combination of attitudes towards behaviour. Both Leener (1958) and Schramm (1964) believed that the mass media would bring development to developing countries if people in these countries were exposed to the modernized world and the culture of the west; and, in turn, learn new lifestyles, behaviour and cultures of the west (Ojo, 2004). Modernization theory presumed that the transfer of capital goods, technologies, industries and Western norms to developing countries would bring rapid economic productivity and social development to them. Yet, despite an obviously important link between ICTs and economic growth, many research workers have questioned the actual role of ICTs in social and economic development. Indeed, the sector has gradually become the economic engine, as well as an enabler of social, educational and medical progress (ITU, 2002; Ojo, 2004)). However, these efforts have not resulted in development initiatives in Africa, as revealed by this study, which was conducted in Nigeria. Schramm (1964), one of the key architects of the modernization paradigm, once criticized his own work and modernization approach. Schramm (1979) argued that the future of the development initiatives in the developing countries was due to the total applicability of the western-model of development in them. He suggested a revision of the design and implementation of development projects so as to integrate cultural and community needs.

On the other hand, the Diffusion of Innovation Theory (DoI) places its emphasis on innovation as an agent of behavioural change, with innovation as "an idea, practice, or object perceived as new" (Rogers, 2003). Consequently, Rogers (2003) was of the opinion that it is the perceived attributes of an innovation that determine its rate of adoption to a greater extent than the characteristics of the adopters. Certainly, the diffusion of an innovation will require time. Among the various efforts to understand the process of the user acceptance of ICTs, the Technology Acceptance Model (TAM), which was introduced by Davis (1986), is one of the most researched theoretical frameworks (Oni, 2013). The model aims not only to explain key factors in the user acceptance of ICTs, but also to predict the relative importance of such factors (Davis et al. 1989). TAM is linked with the Unified Theory of Acceptance and Use of Technology (UTAUT), part of the hybrid model adopted in this study), which recognizes demo-psychographic indices, such as gender, age, experience, and voluntariness of use as moderating variables in the process of ICT

acceptance and use (Ojo, 2013). Although TAM is a well-documented model in explaining users' technology acceptance, two weaknesses exist in the model. The first is its lack of the explicit inclusion of antecedent variables that influence the perceived ease of use and perceived usefulness (Dishan and Strong, 1999). The second weakness is that it assumes ICTs are a given and it focuses on factors that affect technology acceptance and use, yet it lacks an explanation of why people are accepting and using specific ICTs (Ojo, 2013). The Uses and Gratification Theory (Palmgreen, 1985) which has been widely used for decades in the area of media effects, tried to overcome TAM''s limitations.

African countries have continued to institutionalize programmes and projects that are aimed at improving the lives of their citizens. Among these is the introduction of ICT applications in the health sector. Sadly, most of these programmes and projects have turned out to be short-lived, and some have been truncated by a lack of proper planning and implementation. ICTs are new technologies that cannot be ignored by African countries, especially for development. This is because ICT applications are one of the main driving forces that stimulate development and change in the digital age (Olise, 2010). Recognizing that ICTs are significant tools for sustainable development, they have now occupied a key position in government policies and programmes. ICTs have helped, and are still helping, to improve the fields of healthcare and health delivery all over the world.

Certainly, several factors militate against the effective utilization of ICTs for sustainable development in Nigeria. Some that are already alluded to in the findings of this study include poor funding, management problems, illiteracy and a lack of technical know-how, a low level of technological penetration non-viable ICT policies, and a weak economy. These studies were also observed by Olise (2010) in a study on ICTs and MDGs in Nigeria. He observed that the acquisition and maintenance of ICTs require adequate funding and, unfortunately, many countries in Africa, including Nigeria, have not been able to earmark enough funds for ICTs. In addition, bad leadership and corruption were other factors militating against the effective utilization of ICTs for sustainable development in Africa. A major limitation of this study is a limited coverage of the country, particularly for in-depth interviews and the users' perspectives.

To get more coverage of the health workers' and medical students' perspectives, questionnaires had to be dispatched to six teaching hospitals (each representing a geopolitical zone) of the country. The prevailing political situation in the country deterred plans to personally visit the zones, due to the Boko Haram terrorists bombing across the country.

This study is premised on a theoretical model which is a hybrid of Rogers (1995) Diffusion of Innovation Model and UTAUT. They both aim to achieve development through the positive use of the media and ICTs and they have provided important insights into the factors influencing technology transfer in developing countries. The development media theory seeks to explain the normative behaviour of the media/ICTs in developing countries (Folarin, 2005). It supports the use of media/ICTs for sustainable development. On the other hand, the technological determinism theory is the belief that technologies (ICTs) have the power to hasten actions that result in development (Lievrouw and Livingstone, 2006; Olise 2010). Several communication theories exist in the literature. Their acceptance as theories, particularly as they affect developing countries, does not exempt them from continuous scrutiny.

New information and communication technologies are the basis of the knowledge society. ICT-based solutions offer a modern measure to meet both the current and future challenges of the exploding health expenditures of developing countries. ICT has helped to bridge the gap between the provider and the seeker, through Telemedicine and remote consultations, enabled health knowledge engagement by institutions and agencies, and has facilitated the creation of networks between providers for the exchange of information and experiences (Qureshi et al., 2014). The results of this study have shown that the potential benefits of ICTs in the health sector have not been fully exploited by the selected Nigerian teaching hospitals. It also showed that the Digital Divide is becoming wider, due to the rapid advances and proliferation of the use of ICTs in the health sector and the lack of the political and financial support from the governments of developing countries. For these innovations to become essential health care tools in communications in the health sector in the near future, the concerted efforts and unalloyed support of the developed countries will certainly be required to bridge this gap. This calls on different stakeholders to fully implement and mainstream ICT applications in the health sector in

order to make them a reality, and not a myth, in promoting access to, and the quality of, health services. Without doubt, ICT advancements are propelling a transformation in health care organization and delivery. ICTs and their applications offer a foundation for information sharing and exchange. In Nigeria, the journey is likely to be a lengthy one, with numerous obstacles, many of them unique to health care settings, to be surmounted. The areas for further research include ICTs and health care access by patients, the aged and the poor, youths and rural dwellers; cooperative research between countries within West Africa and in greater Africa, and more specific studies through multilateral approaches by international organizations, such as the United Nations (UN), the ITU, the World Bank and the World Trade Organization.

Suggestions for the Way Forward for enlacing usage and access to ICTs in the health sector

These suggestions are directed at addressing the weaknesses identified in the study and staff concerns/inhibitions so as to progress the institutions in their enhancement of the use of ICTs and their applications in the health sector.

1. National institutions should be mandated by the Federal Government of Nigeria to institutionalize the use of ICTs and their applications in the health sector. In addition, clear policies must be established to monitor progress in the adoption of ICTs in the sector.

2. The managements of the College of Medicine and the University College Hospital (U.C.H.), Ibadan should be aligned to drive forward the initiative and establish a delivery platform for institutionalising ICTs in their training, research and services.

3. The University of Ibadan, under which the College of Medicine is, should implement a university management policy with the institution's strategy on learning, teaching and assessment, consistently filtering down through faculties, schools, departments and programmes.

4. There should be training and re-training to support the use of ICT applications that are on-going and flexible. The training and support must be multi-faceted to cater for the specific needs of each group and department.

5. The government and international agencies should help to reduce the gap between skills required for ICT use and existing use by health workers and students.

6. Individual departments should be encouraged to advise management on resource allocations for institutionalising ICTs, particularly what is achievable in the initial stages.

7. The management should be alert to the challenges of the institutionalizing of ICTs in the health sector by staff, students, users and non-users of the health services.

8. ICT infrastructure and support systems across the country need to be improved in order to facilitate the transfer of information. Special attention should be given to improving basic infrastructure, such as a regular supply of electricity, hardware, appropriate software and telecommunications, in general.

9. Policies for technology maintenance and support should be introduced/upgraded, widely disseminated and enforced.

10. To guard against third parties accessing networks, the hospital management should establish a high level of data security. This may require the acceptance and enforcement of an organization-wide security policy.

11. As earlier recommended by Berg (2004) and Smith (2000), policies need to be developed around collection, access to, and protection of personal information to provide protection of personal information and privacy. Once developed, such policies need to be widely

disseminated and strictly observed so as to bolster trust in ICT systems and information sharing.

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APPENDICES

Appendix 1: Approval of the UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

Appendix 2: In-Depth Questionnaire Guidelines

Appendix 3: Focus Group Guidelines (Health Workers)

Appendix 4: Questionnaire for Health Care Providers

Appendix 5: Questionnaire for Medical Students

Appendix 6: Questionnaire for Users and Non-users of Health Services

Appendix 1

Approval of the UI/UCH Ethics Committee Number: UI/EC/14/0076.

INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IAMRAT)
COLLEGE OF MEDICINE, UNIVERSITY OF IBADAN. IBADAN, NIGERIA.
Director: **Prof. A. Ogunniyi,** B.Sc(Hons), MBChB, FMCP, FWACP, FRCP (Edin), FRCP (Lond)
Tel: **08023038583, 08033094173**
E-mail: **aogunniyi@comui.edu.ng**

UI/UCH EC Registration Number: **NHREC/05/01/2008a**

NOTICE OF EXPEDITED REVIEW AND APPROVAL

Re: Development Communications: How Information and Communication Technologies (ICTs) Have Influenced Access to Health Care in Nigeria

UI/UCH Ethics Committee assigned number: UI/EC/14/0076

Name of Principal Investigator: **Yewande Adekunle**

Address of Principal Investigator: Communication and Media Research Institute (CAMRI)
University of Westminster
Harrow Road, London, UK

Date of receipt of valid application: 06/03/2014

Date of meeting when final determination on ethical approval was made: **N/A**

This is to inform you that the research described in the submitted protocol, the consent forms, and other participant information materials have been reviewed and *given expedited approval by the UI/UCH Ethics Committee.*

This approval dates from 26/03/2014 to 25/03/2015. If there is delay in starting the research, please inform the UI/UCH Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the* UI/UCH EC *assigned number and duration of* UI/UCH EC *approval of the study.* It is expected that you submit your annual report as well as an annual request for the project renewal to the UI/UCH EC early in order to obtain renewal of your approval to avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UI/UCH EC. *No changes are permitted in the research without prior approval by the* UI/UCH EC *except in circumstances outlined in the Code. The* UI/UCH EC *reserves the right to conduct compliance visit to your research site without previous notification.*

UI/UCH EC
2 6 MAR 2014
APPROVED

Professor A. Ogunniyi
Director, IAMRAT
Chairman, UI/UCH Ethics Committee
E-mail: uiuchirc@yahoo.com

Appendix 2

IN-DEPTH QUESTIONNAIRE GUIDELINES

A. Introduction:

I am Miss Yewande Adekunle, a postgraduate Student in Development Communications from the Communications and Media Research Institute (CAMRI), University of Westminster, Harrow Road, London, UK.

I am conducting a study entitled "Development Communications: How Information and Communication Technology (ICT) Applications Have Influenced Access to Health Care in Nigeria." It includes a case study on the University College Hospital, Ibadan.

I have been given approval by the UI/UCH Ethics Committee. I also have approval from the Hospital management.

B. Gratitude:

I thank you for giving me audience despite]your busy schedule.

C. Brief introduction of the aim and objectives of the research study:

The aims of my research study are to:

- investigate the influence and usage of ICTs in the provision of health services in this hospital and generally in Nigeria.
- review and determine the level of involvement of all stakeholders in the usage of ICTs in the provision of health services in Nigeria.
- review and determine the level of implementation of the ICT policies of the Nigerian government

D. Obtaining Informed Consent to tape-record the interview:

Please, assist me in transcribing the proceedings of the interview, kindly permit me to record this session on my iopad. Please be assured that your name will not be mentioned or used in the write-up.

E. QUESTIONS

1. Please, what types of Information Communication Technologies (ICTs) are being used by health professionals or health workers in this hospital?
2. Apart from those you mentioned, what other types of ICTs are you aware of that should be available for use by health professionals/and health workers in this hospital? *(Probe by mentioning various types of m-Health and e-Health applications if necessary).*
3. Of these, which types are you in charge of, managing or are in control of?

4. Now, please let us concentrate on those you are currently managing, or in control of or using personally:

   (a) How long has it been in existence in the hospital?

   (b) How effective has been its use in this hospital?

   (c) Is it widely accepted by the health professionals/health workers for the practice of their professions? *Please probe.*

   (d) Which health professionals or health workers are making use of the ICT application?

   (e) Is it always available for them?

   (f) What obstacles have they encountered in the use of the ICT application?

5. How do you think the effective use of ICT applications can improve the practice of the health professionals or health workers?

6. What are the benefits of ICT applications for both health professionals or health workers and their patients/clients?

7. What will you consider to be the disadvantages of ICT applications for both health professionals or health workers and their patients/clients?

8. In general, what obstacles does the hospital or the government have regarding the use of ICT applications?

9. What can be done by the hospital or the government to overcome these obstacles to the use of ICTs by the health professionals or health workers?

10. Please, do you think that the use of these ICT applications is affected by:

    (a) Awareness (b) Availability
    (c) Affordability (d) Mindset
    (e) Are there other factors affecting their use?

11. Please, what suggestions do you have that can make health professionals or health workers employ the use of ICT applications in their profession?

12. Please, what are your comments about the ICT Policy of Nigeria?

13. Please, do you have any information that can be of further assistance to me in this research study?

F. Thank the Officer for sparing his/her time.

Appendix 3

FOCUS GROUP GUIDELINES (HEALTH WORKERS)

A. Introduction:

This study is entitled "Development Communications: How Information and Communication Technology (ICT) Applications Have Influenced Access to Health Care in Nigeria."

We have conducted 5 FGDs among health workers, medical students and clients/patients of this hospital. This is the sixth FGD and is being conducted for those who have been using ICTs in their profession.

It is increasingly evident that Information Communication Technologies (ICTs) can also transform a health system. ICTs are increasingly important for communication. They include a conundrum of equipment, services and devices that enable transmission, processing and use of information and knowledge. The emergence of the use of ICTs in the health sector appears to be an ideal vehicle for the dissemination of informational content.

I have been given approval by the UI/UCH Ethics Committee. I also have approval from the Hospital management.

B. Gratitude:

Thank them for agreeing to participate despite their busy schedule.

C. Brief introduction to the aim and objectives of the research study:

The aims of this FGD session are to:

- determine how the usage of ICTs has been built into your profession.
- review and determine the level of involvement of all stakeholders in the usage of ICTs in your profession
- review and determine the level of implementation of the ICT policies of the Nigerian government
- obtain your suggestions as to how ICTs can be employed in the health sector, based on the experience garnered in your profession.

D. Obtain Informed Consent to tape-record the interview:

Please, assist me in transcribing the proceedings of the interview, kindly permit me to record this session. Please be assured that your name will not be mentioned or used in the write-up.

E. QUESTIONS

1. Please, what types of Information Communication Technologies (ICTs) are being used in your profession?

2. Please, what types of Information Communication Technologies (ICTs) do your think can be applied in the health sector?

3. Apart from those you mentioned, what other types of ICTs are you aware of that should be available for use by health professionals/health workers in this hospital? *(Probe by mentioning various types of m-Health and e-Health applications if necessary).*

4. Now, please let us concentrate on how you have been using ICTs in your profession.

   (a) What ICTs do you use in your profession?

   (b) How long have been using them?

   (c) How effective have been their use in your profession?

5. Are they widely accepted by the stakeholders? (*Please probe).*

6. What obstacles have you or the stakeholders encountered in the use of the ICT applications?

7. How do you think the effective use of ICT applications can improve the practice of the health professionals or health workers.

8. What will you consider the benefits of ICT applications for both health professionals or health workers and their patients/clients?

9. What will you consider the disadvantages of ICT applications in your profession?

10. How are you overcoming these obstacles in your profession?

11. What will you consider as the disadvantages of ICT applications for both health professionals or health workers and their patients/clients?

12. What can be done by the hospital or the government to overcome these obstacles to the use of ICTs by health professionals or health workers?

13. Please do you think that the use of these ICT applications is affected by:

    (b) Awareness
    (c) Availability
    (d) Affordability
    (e) Mindset
    (f) Are there other factors affecting their use?

14. Please, what suggestions do you have that can make health professionals or health workers employ the use of ICT applications in their profession?

15. Please, what are your comments about the ICT Policy of Nigeria?

16. Please, do you have any information that can be of further assistance to me in this research study?

Thank the FGD participants for sparing their time.

Appendix 4

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER HARROW ROAD LONDON UK

Development Communications: How Information and Communication Technology (ICT) Applications Have Influenced Access to Health Care in Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

INFORMED CONSENT FORM FOR RESPONDENTS (HEALTH WORKERS)

I am Miss Yewande Adekunle, a Postgraduate Student in Development Communications from the Communications and Media Research Institute (CAMRI), University of Westminster, Harrow Road, London, UK. I am conducting a study on Development Communications: How Information and Communication Technologies (ICTs) Have Influenced Access to Health Care in Nigeria, including a case study on the University College Hospital, Ibadan.

There are constant changes in health care delivery which have led to increased need for communication among and between health care providers, as well as the public. Nigeria is a country in need of rapid communication solutions, especially in the health sector. It is increasingly evident that Information Communication Technologies (ICTs) can also transform a health system. ICTs are increasingly important for communication. They include a conundrum of equipment, services and devices that enable transmission, processing and use of information and knowledge. The emergence of the use of ICTs in the health sector appears to be an ideal vehicle for the dissemination of informational content.

The goal of this research is to review and determine the level of implementation not only of the ICT policies of the Nigerian government and the involvement of other stakeholders, but also to investigate the influence and usage of ICTs in the provision of health services in Nigeria. It is envisaged that this study will contribute new knowledge on the policies and usage of Information Communication Technologies (ICTs) in health communications in a developing country. It will examine the findings in the context of theories about the dimensions of the Digital Divide, Social Shaping and Development Communication.

If you decide to participate in the study, you will be asked some questions concerning your perceptions of the significance of ICTs in your practice and in the day-to-day running of the hospital, and the use of ICTs in enhancing the efficiency of your profession.

There may be benefits to the country and the hospital from your participation in this study. The results may be used by the policy makers and the Hospital Management to improve access to e-Health initiatives, especially through education, training and professional development. By

participating, you may also contribute to an improvement in the quality of communication strategies available for your education, practice and the care of your patients.

Any information you provide will be kept confidential and will not be used against you. Your name will not appear on the questionnaire. Your responses will not in any way affect you.

You are free to choose whether or not you wish to participate. You are also free to discontinue responding to the questions at any time.

I hope that you will participate and thank you if you do.

Do you have any questions about the study?

Should you have further questions or any concerns about this study, please contact:

Miss Yewande Adekunle
Communications and Media Research Institute (CAMRI),
University of Westminster,
Harrow Road, London, UK.
Tel: 08033445484

OR Chairman, UI/UCH Ethics Committee,
Biode Building, 2nd Floor, Room T10, IMRAT
College of Medicine, University of Ibadan, Nigeria.
Email: uichirc@yahoo.com

Respondent/Participant Statement

The study has been well explained to me and I fully understand the content of the research. I have read an explanation of the planned research study. I understand that my participation in this study is voluntary. I will be willing to participate.

Name of Participant .....

Signature of Participant/Date.....

Investigator/Interviewer who conducted the Informed Consent Discussion:

I confirm that I have personally explained the nature and extent of this research study and the confidentially of information given by respondent.

Name of person obtaining consent:.....

Signature of Interviewer/Date.....

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER LONDON UK

Development Communications: Information and Communication Technology (ICT) Applications in the Health Sector in Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

HEALTH CARE PROVIDERS' QUESTIONNAIRE

1. Sex of respondent Male ☐ Female ☐

2. Age of Respondent ☐☐ years

3. Occupation

Medical Practitioner	☐	Nurse Practitioner	☐
Pharmacist	☐	Physiotherapist	☐
Radiographer	☐	Laboratory Scientist	☐
Social Worker	☐	Others (Please specify)	☐
		……	

4. How long have you been practicing your profession? ☐☐

5. Which of the following do you regard as Information Communication Technologies (ICTs)? (Tick as many as you are aware please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

6. Which of the following Information Communication Technologies (ICTs) have you employed or are being used in your practice? (Tick as many as apply please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

Others (Please specify) ……

ICT Terminologies

7. To what extent do you consider these statements TRUE or FALSE regarding the terms being used in ICT?

	TRUE	FALSE	DON'T KNOW
a. ICTs or Information Technologies include all telephones, computers and network-based technologies: wireless, fixed, satellites and the Internet.	☐	☐	☐
b. e-Health encompasses a range of services that involve health care and information technology supported by electronic processes and communication.	☐	☐	☐
c. m-Health is the use of mobile technology to support the achievement of health objectives.	☐	☐	☐
d. Telemedicine involves the use of medical information transferred from one site to another through electronic communication to improve patient's care including diagnosis and treatment.	☐	☐	☐
e. Telemedicine can be used for education of the patient or the health care provider for the purpose of improving patients' care.	☐	☐	☐
f. m-Health is a component of e-Health.	☐	☐	☐
g. Telemedicine is a component of e-Health	☐	☐	☐

m-Health Initiatives

8. Which of the following m-Health initiatives have you adopted in your practice?

	YES	NO
a. Providing health information to your patients	☐	☐
b. Ascertaining the treatment compliance of your patients	☐	☐
	☐	☐

c. As appointment reminders to your patients

d. Keeping your patients' records ☐ ☐

e. Follow-up care for your patients ☐ ☐

f. Use in emergency care, as in an Emergency Response system ☐ ☐

g. Providing health information to your colleagues ☐ ☐

h. Building the capacity (training) of other health workers, including students ☐ ☐

i. Community mobilization ☐ ☐

j. Awareness raising over health issues ☐ ☐

k. Conducting health surveys ☐ ☐

l. Conducting disease surveillance ☐ ☐

m. Tracking commodities ☐ ☐

n. Performing social marketing interventions ☐ ☐

o. In Health financing – use of smartcards or vouchers, making use of mobile payments for health care ☐ ☐

Availability of m-Health Initiatives in Nigeria

9. To what extent do you consider these statements TRUE or FALSE?

	TRUE	FALSE	DON'T KNOW
a. m-Health initiatives are widely used in Nigeria	☐	☐	☐
b. In Nigeria, m-Health Initiatives are used by the non-Governmental organizations only	☐	☐	☐
c. In Nigeria, m-Health Initiatives are used by the public sector	☐	☐	☐

d. In Nigeria, m-Health Initiatives are used by the private health sector ☐ ☐ ☐

e. In Nigeria, m-Health Initiatives are used in the rural areas only ☐ ☐ ☐

f. In Nigeria, m-Health Initiatives are used in the urban areas ☐ ☐ ☐

g. In Nigeria, m-Health Initiatives are used in the Primary Health Centres (PHC) only ☐ ☐ ☐

h. In Nigeria, m-Health Initiatives are used in the secondary health centres ☐ ☐ ☐

i. In Nigeria, m-Health Initiatives are used in the tertiary health centres ☐ ☐ ☐

Telemedicine Initiatives in Nigeria

10. To what extent do you consider these statements true of Telemedicine in Nigeria?

	TRUE	FALSE	DON'T KNOW
a. Telemedicine is generally available in Nigeria.	☐	☐	☐
b. Telemedicine is available at UCH Ibadan.	☐	☐	☐
c. Health professionals generally do not trust ICTs or Telemedicine	☐	☐	☐
d. Health professionals generally do not care about using Telemedicine	☐	☐	☐
e. Health professionals generally accept telemedicine if they are speciality-related	☐	☐	☐
f. Health professionals are usually hesitant to adopt new ICT or telemedicine applications	☐	☐	☐

Advantages of Telemedicine

11. Which of the following do you consider as an advantage of Telemedicine

	YES	NO	DON'T KNOW
a. Telemedicine will increase patient access to care	☐	☐	☐

b. Telemedicine will reduce waiting time in the clinic	☐	☐	☐
c. Telemedicine will result in more timely advice and interventions	☐	☐	☐
d. Telemedicine will improve the follow-up care of patients	☐	☐	☐
e. Telemedicine will decrease unnecessary referrals to tertiary care	☐	☐	☐
f. Telemedicine will improve collaboration among health care professionals	☐	☐	☐
g. Telemedicine service will save costs to patients and health care providers	☐	☐	☐
h. Telemedicine will increase costs of care to the patient	☐	☐	☐
i. Telemedicine service will reduce the revenues of the hospital	☐	☐	☐
j. Telemedicine will improve the knowledge and clinical acumen of health professionals	☐	☐	☐
k. Telemedicine will reduce the time and effort of health care professionals	☐	☐	☐
l. Have you ever used the telemedicine facility in UCH?	☐	☐	

Potentials of ICTs (all e-Health including m-Health and telemedicine)

12. Please indicate which of the following you consider as Potentials of ICTs application in your hospital/practice.

	YES	NO	DON'T KNOW
a. They can improve my practice by reducing medical errors	☐	☐	☐
b. They can improve my practice through accessible and continuing education	☐	☐	☐

c. They can reduce cost of treatment from informed decision-making leading to more efficient use of medical and clinical resources.	☐	☐	☐
d. They can improve knowledge through education, training and continuing professional development.	☐	☐	☐
e. They will save health workers' time and efforts	☐	☐	☐
f. They will enhance the efficiency of a health professional	☐	☐	☐
g. They will increase unnecessary referrals.	☐	☐	☐

Obstacles to the use of ICTs in the health sector

13. Which of the following do you consider as obstacles to the use of ICTs in the health sector in Nigeria:	YES	NO	DON'T KNOW
a. Inadequate number of ICT workers skilled in developing and maintaining infrastructures	☐	☐	☐
b. Inadequate telemedicine facilities in the health facilities	☐	☐	☐
c. Non-functional telemedicine facilities in the health facilities.	☐	☐	☐
d. Inadequate number of wireless networks, such as VSAT, Satellite and microwave links	☐	☐	☐
e. Inadequate supply of electricity in the urban areas	☐	☐	☐
f. Inadequate supply of electricity in the rural areas	☐	☐	☐
g. Inadequate access to phone services	☐	☐	☐
h. Inadequate access to the Internet	☐	☐	☐
i. Unaffordable computer networks and Internet access.	☐	☐	☐

Knowledge of ICTs Policy in Nigeria

14. To what extent do you consider these statements TRUE or FALSE regarding ICT Policy in Nigeria?

	TRUE	FALSE	DON'T KNOW
a. The Nigerian Government has an ICT Policy	☐	☐	☐
b. The Nigerian Government promotes the use of ICTs in the health sector.	☐	☐	☐
c. The government generally creates awareness of the concept and benefits of e-Health to the service providers and patients	☐	☐	☐
d. The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector	☐	☐	☐
e. The government generally ensures standardization and availability of legal measures in linked ICT-related activities.	☐	☐	☐

15. Please, what suggestions do you have for improving the use of ICT Applications in the health sector? (Suggestions for health workers, health institutions and the government).

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THANK YOU.

Appendix 5

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER HARROW ROAD LONDON UK

Development Communications: How Information and Communication Technology (ICT) Applications Have Influenced Access to Health Care in Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

INFORMED CONSENT FORM FOR RESPONDENTS (MEDICAL STUDENTS)

I am Miss Yewande Adekunle, a Postgraduate Student in Development Communications from the Communications and Media Research Institute (CAMRI), University of Westminster, Harrow Road, London, UK. I am conducting a study on Development Communications: How Information and Communication Technologies (ICTs) Have Influenced Access to Health Care in Nigeria including a case study on the University College Hospital, Ibadan.

There are constant changes in health care delivery which have led to increased need for communication among and between health care providers as well as the public. Nigeria is a country in need of rapid communication solutions, especially in the health sector. It is increasingly evident that Information Communication Technologies (ICTs) can also transform health system. ICTs are increasingly important for communication. They include a conundrum of equipment, services and devices that enable transmission, processing and use of information and knowledge. The emergence of the use of ICTs in the health sector appears to be an ideal vehicle for the dissemination of informational content.

The goal of this research is to review and determine the level of implementation of not only the ICT policies of the Nigerian government and the involvement of other stakeholders, but also to investigate the influence and usage of ICTs in the provision of health services in Nigeria. It is envisaged that this study will contribute new knowledge on the policies and usage of Information Communication Technologies (ICTs) in health communications in a developing country. It will examine the findings in the context of theories about the dimensions of the Digital Divide, Social Shaping and Development Communication.

If you decide to participate in the study, you will be asked some questions concerning your perceptions of the significance of ICTs in medical practice/training, and in the day-to-day running of the hospital, and the use of ICTs in enhancing the efficiency of the medical profession.

There may be benefits to the country and the hospital by your participation in this study. The results may be used by the policy makers and the Hospital Management to improve access to e-

Health initiatives, especially through education, training and professional development. By participating, you may also contribute to improvement in the quality of communication strategies available for your education, practice and care of your patients.

Any information you provide will be kept confidential and will not be used against you. Your name will not appear on the questionnaire. Your responses will not in any way affect you.

You are free to choose whether or not you wish to participate. You are also free to discontinue responding to the questions at any time.

I hope that you will participate and thank you if you do.

Do you have any questions about the study?

Should you have further questions or any concerns about this study, please contact:

Miss Yewande Adekunle
Communications and Media Research Institute (CAMRI),
University of Westminster,
Harrow Road, London, UK.
Tel: 08033445484

OR Chairman, UI/UCH Ethics Committee,
Biode Building, 2nd Floor, Room T10, IMRAT
College of Medicine, University of Ibadan, Nigeria.
Email: uichirc@yahoo.com

Respondent/Participant Statement

The study has been well explained to me and I fully understand the content of the research. I have read an explanation of the planned research study. I understand that my participation in this study is voluntary. I will be willing to participate.

Name of Participant .....

Signature of Participant/Date.....

Investigator/Interviewer who conducted the Informed Consent Discussion:

I confirm that I have personally explained the nature and extent of this research study and the confidentially of information given by respondent.

Name of person obtaining consent:.....

Signature of Interviewer/Date.....

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER LONDON UK

Development Communications: Information and Communication Technology (ICT) Applications in the Health Sector in Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

QUESTIONNAIRE FOR MEDICAL STUDENTS

1. Sex of respondent Male ☐ Female ☐

2. Age of Respondent ☐☐ years

3. What level are you in your medical education? (e.g., 300 level) ☐☐☐

4. Which of the following do you regard as Information Communication Technologies (ICTs)? (Tick as many as you are aware please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

5. Which of the following Information Communication Technologies (ICTs) have you used or are being used in your medical training programme? (Tick as many as apply please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

Others (Please specify) ……

ICT Terminologies

6. To what extent do you consider these statements TRUE or FALSE regarding the terms being used in ICT?

	TRUE	FALSE	DON'T KNOW
a. ICTs or Information Technologies include all telephones, computers and network-based technologies: wireless, fixed, satellites and the Internet.	☐	☐	☐
b. e-Health encompasses a range of services that involve health care and information technology supported by electronic processes and communication.	☐	☐	☐
c. m-Health is the use of mobile technology to support the achievement of health objectives.	☐	☐	☐
d. Telemedicine involves the use of medical information transferred from one site to another through electronic communication to improve patient's care including diagnosis and treatment.	☐	☐	☐
e. Telemedicine can be used for education of the patient or the health care provider for the purpose of improving patients' care.	☐	☐	☐
f. m-Health is a component of e-Health.	☐	☐	☐
g. Telemedicine is a component of e-Health	☐	☐	☐

m-Health Initiatives

7. Which of the following m-Health initiatives are being used in your hospital?

	YES	NO
a. Providing health information to the patients	☐	☐
b. Ascertaining treatment compliance of the patients	☐	☐
c. As appointment reminders to the patients	☐	☐
d. Keeping the patients' records	☐	☐
e. Follow-up care for the patients	☐	☐
f. Use in emergency care as in Emergency Response System	☐	☐

g. Providing health information to medical students and staff ☐ ☐

h. Building the capacity (training) of medical students and other health workers. ☐ ☐

i. Being used in mobilizing the surrounding communities ☐ ☐

j. Creating awareness raising over health issues in your hospital ☐ ☐

k. Conducting health surveys ☐ ☐

l. Conducting disease surveillance ☐ ☐

m. Tracking commodities ☐ ☐

n. Performing social marketing interventions ☐ ☐

o. Being used In Health financing – use of smartcards or vouchers (making use of mobile payments for health care) ☐ ☐

Availability of m-Health Initiatives in Nigeria

8. To what extent do you consider these statements TRUE or FALSE?

	TRUE	FALSE	DON'T KNOW
a. m-Health initiatives are widely used in Nigeria	☐	☐	☐
b. In Nigeria, m-Health Initiatives are used by the non-Governmental organizations only	☐	☐	☐
c. In Nigeria, m-Health Initiatives are used by the public sector	☐	☐	☐
d. In Nigeria, m-Health Initiatives are used by the private health sector	☐	☐	☐
e. In Nigeria, m-Health Initiatives are used in the rural areas only	☐	☐	☐
f. In Nigeria, m-Health Initiatives are used in the urban areas	☐	☐	☐

g. In Nigeria, m-Health Initiatives are used in the Primary Health Centres (PHC) only ☐ ☐ ☐

h. In Nigeria, m-Health Initiatives are used in the secondary health centres ☐ ☐ ☐

i. In Nigeria, m-Health Initiatives are used in the tertiary health centres ☐ ☐ ☐

Telemedicine Initiatives in Nigeria

9. To what extent do you consider these statements true of Telemedicine in Nigeria?

	TRUE	FALSE	DON'T KNOW
a. Telemedicine is generally available in Nigeria.	☐	☐	☐
b. Telemedicine is available in my Teaching Hospital.	☐	☐	☐
c. Health professionals generally do not trust ICTs or Telemedicine	☐	☐	☐
d. Health professionals generally do not care about using Telemedicine	☐	☐	☐
e. Health professionals generally accept telemedicine if they are speciality-related	☐	☐	☐
f. Health professionals are usually hesitant to adopt new ICT or telemedicine applications	☐	☐	☐

Advantages of Telemedicine

10. Which of the following do you consider as advantages of Telemedicine?

	TRUE	FALSE	DON'T KNOW
a. Telemedicine will increase the patient's access to care	☐	☐	☐
b. Telemedicine will reduce waiting time in the clinic	☐	☐	☐
c. Telemedicine will result in more timely advice and interventions	☐	☐	☐

d. Telemedicine will improve follow-up care of patients	☐	☐	☐
e. Telemedicine will decrease unnecessary referrals to tertiary care centres	☐	☐	☐
f. Telemedicine will improve collaboration among health care professionals	☐	☐	☐
g. Telemedicine service will save costs for patients and health care providers	☐	☐	☐
h. Telemedicine will increase costs of care to the patient	☐	☐	☐
i. Telemedicine service will reduce revenues of the hospital	☐	☐	☐
j. Telemedicine will improve the knowledge and clinical acumen of health professionals	☐	☐	☐
k. Telemedicine will reduce the time and effort of health care professionals	☐	☐	☐
l. Have you ever used the telemedicine facility in your Teaching Hospital?	☐	☐	

Potentials of ICTs (all e-Health including m-Health and telemedicine)

11. Please indicate which of the following you consider as potentials of ICTs application in your Teaching Hospital

	YES	NO	DON'T KNOW
a. They can improve medical practice by reducing medical errors	☐	☐	☐
b. They can improve medical practice through accessible and continuing education	☐	☐	☐
c. They can reduce cost of treatment from informed decision-making leading to more efficient use of medical and clinical resources.	☐	☐	☐

d. They can improve knowledge through education, training and continuing professional development.	☐	☐	☐
e. They will save health workers' time and efforts	☐	☐	☐
f. They will enhance the efficiency of a health professional	☐	☐	☐
g. They will increase unnecessary referrals.	☐	☐	☐

Obstacles to the use of ICTs in the health sector

12. Which of the following do you consider as obstacles to the use of ICTs in the health sector in Nigeria:

	YES	NO	DON'T KNOW
a. Inadequate number of ICT workers skilled in developing and maintaining infrastructures	☐	☐	☐
b. Inadequate telemedicine facilities in the health facilities	☐	☐	☐
c. Non-functional telemedicine facilities in the health facilities.	☐	☐	☐
d. Inadequate number of wireless networks, such as VSAT, Satellite and microwave links	☐	☐	☐
e. Inadequate supply of electricity in the urban areas	☐	☐	☐
f. Inadequate supply of electricity in the rural areas	☐	☐	☐
g. Inadequate access to phone services	☐	☐	☐
h. Inadequate access to the Internet	☐	☐	☐
i. Unaffordable computer networks and Internet access.	☐	☐	☐

Knowledge of ICTs Policy in Nigeria

13. To what extent do you consider these statements TRUE or FALSE regarding ICT Policy in Nigeria?

	TRUE	FALSE	DON'T KNOW
a. The Nigerian Government has an ICT Policy	☐	☐	☐
b. The Nigerian Government promotes the use of ICTs in the health sector.	☐	☐	☐
c. The government generally creates awareness of the concept and benefits of e-Health to the service health providers and patients	☐	☐	☐
d. The government actively supports ICT-related projects (equipment, training) and capital expenditure in the health sector	☐	☐	☐
e. The government generally ensures standardization and availability of legal measures in related ICT-related activities.	☐	☐	☐

14. Please what suggestions do you have for improving the use of ICT Applications in the health sector? (Suggestions for students, health workers, health institutions and the government).

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THANK YOU.

Appendix 6

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER HARROW ROAD LONDON UK

Development Communications: How Information and Communication Technology (ICT) Applications Have Influenced Access to Health Care in Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

INFORMED CONSENT FORM FOR RESPONDENTS (USERS AND NON-USERS OF HEALTH SERVICES)

I am Miss Yewande Adekunle, a Postgraduate Student in Development Communications from the Communications and Media Research Institute (CAMRI), University of Westminster, Harrow Road, London, UK. I am conducting a study on Development Communications: How Information and Communication Technologies (ICTs) Have Influenced Access to Health Care in Nigeria including a case study on the University College Hospital, Ibadan.

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The goal of this research is to review and determine the level of implementation of not only the ICT policies of the Nigerian government and the involvement of other stakeholders, but also to investigate the influence and usage of ICTs in the provision of health services in Nigeria. It is envisaged that this study will contribute new knowledge on the policies and usage of Information Communication Technologies (ICTs) in health communications in a developing country. It will examine the findings in the context of theories about the dimensions of the Digital Divide, Social Shaping and Development Communication. If you decide to participate in the study, you will be asked some questions concerning your perceptions of the significance of ICTs in medical practice, the day-to-day running of the hospital, and the use of ICTs in enhancing health care delivery.

There may be benefits to you, the country and the hospital by your participation in this study. The results may be used by the policy makers and the Hospital Management to improve access to e-Health initiatives, especially through education, training and professional development. By

participating, you may also contribute to improvement in the quality of communication strategies available for your education, practice and care of your patients.

Any information you provide will be kept confidential and will not be used against you. Your name will not appear on the questionnaire. Your responses will not in any way affect you.

You are free to choose whether or not you wish to participate. You are also free to discontinue responding to the questions at any time.

I hope that you will participate and thank you if you do.

Do you have any questions about the study?

Should you have further questions or any concerns about this study, please contact:

Miss Yewande Adekunle

Communications and Media Research Institute (CAMRI),
University of Westminster,
Harrow Road, London, UK.
Tel: 08033445484

OR Chairman, UI/UCH Ethics Committee,
Biode Building, 2nd Floor, Room T10, IMRAT
College of Medicine, University of Ibadan, Nigeria.
Email: uichirc@yahoo.com

Respondent/Participant Statement

The study has been well explained to me and I fully understand the content of the research. I have read an explanation of the planned research study. I understand that my participation in this study is voluntary. I will be willing to participate.

Name of Participant .....

Signature of Participant/Date.....

Investigator/Interviewer who conducted the Informed Consent Discussion:

I confirm that I have personally explained the nature and extent of this research study and the confidentially of information given by respondent.

Name of person obtaining consent:.....

Signature of Interviewer/Date.....

COMMUNICATIONS AND MEDIA RESEARCH INSTITUTE (CAMRI)
UNIVERSITY OF WESTMINSTER LONDON

Development Communication: Information and Communication Technology (ICT) Applications in the Health Sector In Nigeria

UI/UCH Ethics Committee Number: UI/EC/14/0076. Effective 26/03/2014 to 25/03/2015

QUESTIONNAIRE FOR USERS AND NON-USERS OF HEALTH SERVICES

1. Sex of respondent Male ☐ Female ☐

2. Age of Respondent ☐☐ years

3. Occupation (Please specify) ……

4. Highest Educational Level Attained:

	YES	NO
None	☐	☐
Completed Primary School Education	☐	☐
Completed Secondary School Education	☐	☐
Completed Tertiary level of Education	☐	☐

5. Which of the following do you regard as Information Communication Technologies (ICTs)? (Tick as many as you are aware please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

6. Which of the following Information Communication Technologies (ICTs) do you employ to obtain health information? (Tick as many as apply please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

Others (Please specify) ……

7. Which of the following Information Communication Technologies (ICTs) do you FREQUENTLY use to obtain health information? (Tick only TWO please)

Radio	☐	Internet	☐
Television	☐	Telemedicine	☐
Mobile Phone	☐	Personal Digital Assistants (PDAs)	☐
Smart Phone	☐	General Packet Radio Service (GPRS)	☐

Others (Please specify) …….....

8. What type of health information do you usually obtain from the use of the ICTs you selected in Question 7?

	YES	NO
p. Health information from your health provider (e.g. doctors/nurses)	☐	☐
q. Obtaining treatment guidelines from your health provider	☐	☐
r. Obtaining appointment date/time from your health provider	☐	☐
s. Confirming appointment dates with your health provider	☐	☐
t. Obtaining follow-up care from your health provider	☐	☐
u. Obtaining emergency care from a health provider	☐	☐

9. Which of the following health services can be provided using ICT Applications?

	YES	NO	DON'T KNOW
a. Providing health information to the community	☐	☐	☐
b. Providing appointment reminders to patients and clients	☐	☐	☐
c. Providing follow-up care to patients	☐	☐	☐
d. Obtaining health information from health providers	☐	☐	☐
e. Obtaining treatment guidelines from health providers	☐	☐	☐
f. Obtaining appointment date/time from your health provider	☐	☐	☐

g. Confirming appointment dates with your health provider	☐	☐	☐
h. Obtaining follow-up care from your health provider	☐	☐	☐
i. Obtaining emergency care from a health provider	☐	☐	☐
j. Providing emergency care as in Emergency Response System	☐	☐	☐
k. Training of other health workers	☐	☐	☐
l. Community mobilization	☐	☐	☐
m. Awareness raising over health issues	☐	☐	☐
n. Conducting health surveys	☐	☐	☐
o. Conducting disease surveillance	☐	☐	☐
p. In Health financing – use of smartcards or vouchers making use of mobile payments for health care	☐	☐	☐

10. To what extent do you consider the following statements TRUE or FALSE

	TRUE	FALSE	DON'T KNOW
a. ICTs are widely used for providing health services in Nigeria	☐	☐	☐
b. Health professionals use ICTs for health services in Nigeria	☐	☐	☐
c. Telemedicine is available in U.C.H., Ibadan	☐	☐	☐
d. Telemedicine is generally available in Nigeria	☐	☐	☐
e. Health professionals in Nigeria are hesitant to adopt new ICT or telemedicine applications	☐	☐	☐
f. Use of ICTs will increase patient access to care	☐	☐	☐
g. Use of ICTs will reduce waiting time in the clinic	☐	☐	☐
h. Use of ICTs will result in more timely advice and	☐	☐	☐

interventions

i. Use of ICTs will improve follow-up care of patients	☐	☐	☐
j. Use of ICTs will improve collaboration among health care professionals	☐	☐	☐
k. Use of ICTs will save costs for patients and health care providers	☐	☐	☐
l. Use of ICTs will increase costs of care to the patient	☐	☐	☐
m. Use of ICTs will reduce revenues of the hospital	☐	☐	☐
n. Use of ICTs will reduce the time and effort of health care professionals	☐	☐	☐
o. Use of ICTs will enhance the efficiency of health workers	☐	☐	☐

11. Which of the following do you consider as obstacles to the use of ICTs in the health sector in Nigeria:

	TRUE	FALSE	DON'T KNOW
a. Inadequate number of ICT workers skilled in developing and maintaining infrastructures	☐	☐	☐
b. Inadequate ICT facilities in the health facilities	☐	☐	☐
c. Non-functional ICT facilities in the health facilities.	☐	☐	☐
d. Inadequate number of wireless networks, such as VSAT, Satellite and microwave links	☐	☐	☐
e. Inadequate supply of electricity in the urban areas	☐	☐	☐
f. Inadequate supply of electricity in the rural areas	☐	☐	☐
g. Inadequate access to phone services	☐	☐	☐
h. Inadequate access to the Internet	☐	☐	☐

i. Unaffordable computer networks and Internet access.	☐	☐	☐
j. Lack of an ICT Policy by the Government	☐	☐	☐
k. The Nigerian Government does promote the use of ICTs in the health sector	☐	☐	☐
l. The government does not generally create awareness on the concept and benefits of ICTS in the health sector to the service providers and patients	☐	☐	☐
m. The government does not actively support ICT-related projects (equipment, training) and capital expenditure in the health sector	☐	☐	☐

12. Please what suggestions do you have for improving the use of ICT Applications in the health sector? (Suggestions for health workers, health institutions and the government).

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THANK YOU.