ASSESSMENT OF THE USE OF MOBILE APPS FOR HEALTH COMMUNICATION IN UNIVERSITY OF BENIN TEACHING HOSPITAL

BY

EHIMIAGHE JOY AIMALOHI
ART2100913

DEPARTMENT OF MASS COMMUNICATION,
FACULTY OF ARTS,
UNIVERSITY OF BENIN,
BENIN CITY, NIGERIA.

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF MASS COMMUNICATION, FACULTY OF ART, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE. INPARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF ART (B.A) DEGREE IN MASS COMMUNICATION

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DECLARATION

This Project work is based on a study undertaken by me, in the department of Mass Communication, Faculty of Arts, university of Benin, under the supervision of Prof. E. S. Asemah. All findings and analysis in the study are product of my personal research where the views of others have been used and expressed, they have been duly acknowledged.

EHIMIAGHE JOY AIMALOHI
ART2100913

CERTIFICATION

This is to certify that this research work was duly carried out by Ehimiaghe Joy Aimalohiin the department of Mass Communication, Faculty of Art, University of Benin, in partial fulfillment of the requirements for the award of Bachelor of Art degree in Mass Communication.

_____ _____

Prof. Ezekiel S. Asemah **Date**
Project Supervisor

_____ _____

Dr. Daniel O. Ekhareafo **Date**
Head of Department

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DEDICATION

This research work is dedicated to GOD Almighty for His never-ending grace, mercies blessings upon my life during the period of this study.

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ABSTRACT

This study was carried out to assess the use of mobile apps for health communication in the University of Benin Teaching Hospital. Questionnaire was used to gather data from 100 healthcare professionals and patients at UBTH. The study which adopted the survey research method was anchored on the Diffusion of Innovation Theory and the Health Belief Model (HBM). Findings of the study revealed that the level at which healthcare professionals and patients of UBTH are exposed to mHealth applications is

high. The findings also indicated that mHealth apps enhance communication between patients and healthcare providers, although respondents revealed that they rarely use these apps. This was indicated to be so because respondents prefer to communicate directly over using mHealth apps due to concerns about data security and cultural preferences for in-person consultation. Based on the findings, the researcher concluded that mHealth applications have not been successfully put to regular use in the hospital. The researcher therefore recommended among other things that the government should establish and execute policies at the health policy stage that would make the use of mobile applications a key aspect of healthcare delivery in the nation's healthcare system. The researcher also recommended that developers of mHealth apps need to implement robust security data measures.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Since the beginning of the 21st century, technological input and advancement have been constant as the technological era kept evolving. The products of these advancements are seen in new media technologies and their attendant capacities (Asemah & Uye, 2012; Jumbo, Asemah, Anyanwu, Onyebuhi, Etumnu&Anyi, 2023). Particularly, contemporary information technologies, such as computers and mobile phones, touch human life in many different ways and have changed how individuals access and consume information, communicate with others, learn, exchange knowledge, and provide services (Ozdalga& Ahuja, 2014; Salami, 2015).

A new age in mobile technology began in 2007 with the introduction of the first advanced touchscreen mobile phone on the globe. These days, mobile phones have evolved into more than just a convenient means of making phone calls. Users can now actively participate in the creation of media materials thanks to smartphones, which combines the functions of a computer, phone, camera, and video camera. These devices are becoming tools necessary to complete such tasks as managing a schedule,

checking and responding to urgent work emails, and even keeping track of physical activities.

Without a doubt, medicine is one of the disciplines that has been significantly impacted by the availability of mobile devices. This is evident in many surveys that have revealed a high ownership rate of these tools, employed in both clinical practice and education. Smartphones and tablets have even supplanted desktop computers as the preferred computing devices for quick access to information at the point of care.

The integration of mobile technology into healthcare delivery has revolutionised modern medicine, driving the transformation in health communication globally. The shift brought about by this new culture is what Smith (2008) described as a move from “industrial age medicine” to “information age health care”, wherein health providers and health service consumers are exposed to, and increasingly utilise or deploy, information tools in dispensing and receiving services (Salami, 2015).

Among the innovations attendant on this culture of ICT-based health services are mobile health applications, a type of computer software that provides health-related services when installed on mobile devices like smartphones and tablets (Rouse, 2018). While some of these applications are for consumers, others are for health service

providers. Mobile health applications offer a verity of services to users, and in the context of individual consumers, the services range from supply of health information to the facilitation of consultation with healthcare providers (Rana, 2017; Rouse, 2018).

Mobile health applicators has proven to be a convenient tool for patients to manage their health, bridging the gap between patients and medical professionals. They have become an integral part of enhancing patients engagement, medical decision making and overall health outcomes. These apps, designed for use on smartphones and other mobile devices, provide users with access to a wide range of health-related information, resources, and services (Iribarren, Akande, Kamp, Barry, Kader, & Surlier, 2021; Nguyen, Frensham, Baysari, Carland, & Day, 2019; Wei, Zheng, Deng, Wang, Li, & Fu, 2020) They are especially useful to patients, allowing them to upload medical information, check test results, track medical metrics, manage appointments with health professionals, receive medication reminders, book remote consultations with doctors, etc.

MyFitnessPal is a well-known app that helps users in monitoring their diet, exercise, and weight loss goals. It provides personalised recommendations based on users' health objectives and allows them to track their progress over time. Mango Health is

an app that assists users in managing their medications by providing reminders to take their medications, tracking their medication adherence, and providing information about possible drug interactions (Bracken & Waite, 2020; Gordon, Althoff & Leskovec, 2019). Fitbit is a wearable device and app that tracks users' physical activity, sleep patterns, and heart rate. It offers users with personalised insights and recommendations to help them enhance their general health and well-being. Ada is an AI-powered app that assists users in evaluating their symptoms and provides personalised health advice. It allows users to track their symptoms over time and share this information with their healthcare providers. These are all popular mHealth apps that have resonated with a lot of people.

For many years, the mass media was hailed as an important ally in any public health situation; they serve the role of being a source of correct information, as well as, an advocate for correct health behaviours. Asemah (2017) stated that awareness campaigns have been used extensively in print media, including magazines and newspapers, as well as media platforms like radio, television, and billboards. According to Allara, Ferri, Bo, Gasparrini, and Faggiano (2015), as cited by Asemah (2012), in the area of health communication, the media may have an impact on health behaviour patterns, preventable strategies, and mediators like awareness, knowledge,

and attitudes regarding a disease, bacteria infection or virus. However, this profound concept became a blurry view since the inception of and domination of mobile devices globally.

Mobile health, or mHealth is rapidly turning into the new normal of the medical industry. Agile technological adoptions of mobile health have produced a plethora of mobile applications for remote caregiving and speedier service. A cheaper and faster diagnosis is the biggest advantage of mobile health, but there are several others. mHealth apps have greatly improved the quality and approach toward healthcare services. The market for mHealth apps is fast evolving offering medical professionals and patients a wide range of possibilities. Their adoption has grown rapidly, particularly in developed countries, where they are employed to enhance patient-centered care and improve health system efficiency (Krick, Hunter, Seibert, Donhoff& Wolf-Ostermann, 2019).

In 2012, 31% of mobile phone owners were reported using their phone to search for medical or health information on the Internet, and 19% of mobile phone owners reported using mobile health apps to track and manage their health. In a descriptive analysis of “health and wellness” apps available on the Apple iTunes Store in 2014, the most popular mobile health apps were those that encouraged self-monitoring of

exercise, diet, and weight management. This suggests that developers see a market in individuals interested in taking a more proactive role in their health management.

The World Health Organization (WHO) has also recognized the potential of mobile health (mHealth) applications to enhance healthcare delivery and outcomes across the globe noting that "a powerful combination of factors is driving this change. These include rapid advances in mobile technology and applications, the emergence of new opportunities to incorporate mHealth into existing eHealth services, and the ongoing growth in coverage of mobile cellular networks". In its 2011 report, "mHealth: New Horizons for Health through Mobile Technologies," WHO highlighted the role of mobile devices in supporting health interventions, particularly in resource-limited settings.

There are currently a number of locally available mHealth applications in Nigeria. Okoruwa (2018) identified some of such apps that are popular among local users to include *Omomi, 25Doctors, Find-A-Med, Hudibia and Kangpe.* These consumer-oriented apps offer services such as health information , health status checks, expert search, consultation, and drug authentication among others. Okoruwa (2018) argues that availability of health mobile apps will contribute significantly in

improving health service dispensation and consumption in the country especially in the light of the multifarious obstacles confronting quality healthcare in Nigeria.

However, such widespread use will more likely be realized when there is adequate awareness and positive attitude among the populace. It is therefore against this background that this study is founded as it seeks to assess the use of mobile apps for health communication in university of Benin Teaching Hospital, Benin City, Nigeria.

1.2 Statement of the Problem

E-health communication is relatively new in Nigeria, implying that it is a practice that is yet to be fully embraced (Abodunrin&Akande, 2009; Abubakar, 2015). Given this novelty, there may be a reason to be concerned about the extent to which the country has realised awareness of and use of mobile health applications. This is especially worth considering given that there doesn't seem to be much, if any, awareness-raising going on in the country about this health resource. Okoruwa (2018) observes that eHealth is yet to be satisfactorily integrated into Nigeria’s health system and so is yet to be given a space in the state-sponsored health campaigns.

Furthermore, Nigeria is still burdened by the problem of poor ICT infrastructure. This infrastructural challenge extends to the mobile telephone and Internet sectors, which

has hampered the realisation of ICT objectives, including those related to the health sector in the country (Idowu, Cornford&Bastin, 2008; Akadiri, Olusanya&Omitola, 2009; Adebayo &Ofoegbu, 2014; Abubakar, 2015; Allen &Ejiofor, 2020). This situation again constitutes a cause for concern regarding the realisability of mobile health (mHealth) culture in the country, especially as it concerns mobile health applications.

Given this, the aim of this study is to ascertain the extent to which mobile apps are used in the University of Benin Teaching Hospital for health communication.

1.3 Objectives of the Study

The objectives of this study were to:

1. Ascertain the extent to which healthcare professionals and patients are aware of mobile applications for health communication.
2. Examine the attitude of healthcare professionals and patients of UBTH towards mobile health applications.
3. Assess the effectiveness of mobile apps in improving health communication between patients and healthcare providers.

4. Identify barriers hindering the optimal use of mHealth applications within the hospital setting.

1.4 Research Questions

This study aims to answer the following research questions:

1. What is the extent to which healthcare professionals and patients are aware of mobile applications for health communication?
2. What is the attitude of healthcare professionals and patients of UBTH towards mobile health applications?
3. How effective are these mobile apps in improving health communication between patients and healthcare providers?
4. What barriers exist that impede the optimal utilization of mHealth apps in UBTH?

1.5 Significance of the Study

The study will be of benefit to developers of mobile health applications in their effort to meet the demands of consumers. By understanding how users accept their products, their taste and expectations in relation to such apps, they may be in a better position to achieve better user satisfaction.

The study will also help in creating awareness among smartphone users and the public in general about the relevance and effectiveness of mobile health applications for people's health and well-being. Such awareness raising could contribute to bringing about utilisation of mobile health applications among more members of the public.

Insights from this study can guide hospital administrators in developing frameworks for integrating mobile technologies into healthcare settings. This includes addressing infrastructure needs, enhancing digital literacy among healthcare workers and patients, and ensuring that mHealth solutions are user-friendly and culturally appropriate.

Additionally, this research will also contribute to health communication scholarship, specifically in the area of mobile health (mHealth) in general and the use of mobile health applications in particular. By focusing on UBTH, the research provides context-specific findings that can be compared with studies from other regions, enriching the global understanding of mHealth applications. It will provide empirical data about the awareness and patterns of utilisation of such applications among the studied population. It will equally offer insight into the extent to which pertinent theories, such as diffusion of innovation and the Health Belief Model (HBM), may serve in explaining people's attitude to health-related ICT innovations like mobile health applications.

1.6 Scope of the Study

The study is confined to the University of Benin Teaching Hospital and focuses on both healthcare providers and patients utilizing mHealth applications for health communication. The study encompasses mobile health applications utilised for various communication purposes, including those for appointment scheduling, medical consultations, health information access, and patient monitoring.

The investigation will be limited to mobile applications that are either in use or recently implemented at UBTH. The study will examine patterns of adoption and usage trends among medical professionals working in different departments of the hospital, including doctors, nurses, pharmacists and laboratory technicians.

Additionally, the study will assess the perspectives of patients who have interacted with these mobile health communication platforms. However, the study will not extend to evaluating the technical specifications or software development aspects of these applications; it will instead focus on their practical implementation and impact on healthcare delivery.

1.7 Operational Definition of Terms

For the purposes of this study, the following definitions are provided for the terms as they are meant to be understood.

Assessment: This involves carefully evaluating or examining something in order to determine its quality, value, or importance. In this study, it acts as the process of gathering information, analysing information and drawing conclusions on based on the findings.

Health Communication: It refers to the process of disseminating information and messages about health-related topics to individuals, communities, or larger populations using various communication strategies, channels, and media to promote health, raise awareness, and influence behaviours related to health and well-being.

Mobile health (mHealth): A medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices.

mHealth Applications: Software applications designed to run on mobile devices for various health-related services and information, such as telemedicine, appointment scheduling, and patient monitoring.

University of Benin Teaching Hospital: A public research university teaching hospital located in Benin City, Edo State, Nigeria.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This part of the study contains a review of important literature related to mobile apps for health communication and it uses. It synthesizes the findings of existing studies to identify key themes, trends, and gaps in the current research.

2.1 Historical Review

2.1.1. Evolution of Mobile Health Applications

The concept of mobile applications began taking shape during the end of the twentieth century, though by today's standards, these early versions were remarkably basic. Calendars, calculators, ringtone editors, small arcade games, etc. were among the first built-in applications available on mobile phones. These were the first instances of phones that went beyond basic communication devices, but they weren't downloadable or customisable.

The evolution of mobile content and applications happened at the beginning of the new millennium. There was rapid development of new and updated operating systems (like Android, Mac iOS, Windows Mobile, etc.) and other mobile phone software. The mobile phones nowadays are very different from the first-generation mobile phones, not only in look but also in features. With time, the demand for these features grew and is increasing day by day, as mobile phone users desire better technology.

The first mobile device that incorporated both communication and computing features was the Blackberry, which was introduced in 2002 by Mike Lazaridis and Doug Fregin in Waterloo, Ontario. The devices introduced more advanced applications for business users, including email and basic productivity tools. However, these early smartphone applications had limited relevance to healthcare settings. A notable development during this period was the emergence of SMS-based health services, which, while not full mobile applications, represented early efforts to leverage mobile technology for health communication. These services provided health information, appointment reminders, and public health messages through text messaging.

The introduction of the BlackBerry was followed by the introduction of other handheld mobile devices. Perhaps most notably, Apple launched the first-generation

iPhone in January 2007. Then, in October 2008, smartphones that run the Google Android operating system were released.

Due to the advanced features and capabilities of the iPhone and Android smartphones, as well as their user-friendly touch-screen interfaces, the number of mobile device owners rose quickly. Apple's iPad tablet, which debuted in April 2010, was another groundbreaking computing gadget notable for its portability, user-friendliness, and relatively large screen. With the release of tablets running the Google Android operating system later that year (such as the Samsung Galaxy), the use of these mobile devices became even more common. According to McNaughton and Light (2013), iPads and other new mobile technologies give an impactful advancement to the communication process.

The introduction of the Apple iTunes App Store further revolutionised app accessibility by enabling iPad, iPhone, and iPod Touch (iTouch) users to browse and download apps from an online marketplace. As of January 2014, Apple reported that there were an astounding 1 million apps available through the iTunes App Store, according to a study published on PubMed Central (Ventola 2014). In 2011, Apple created the “Apps for Healthcare Professionals” section within the medical category of the iTunes App Store, a unique feature among mobile app marketplaces. In 2013,

this section was further divided into subcategories including reference, medical education, EMR and patient monitoring, nursing, imaging, patient education, and personal care. Google similarly launched a “Google Play” shop that provides a wide variety of apps.

The first generation of purpose-built health applications emerged worldwide between 2008 and 2012. Wellness, fitness tracking, food tracking, exercise tracking, sleep tracking, and other basic health data were the main focus of these early health apps. Medical reference applications also became popular among healthcare professionals, providing portable access to drug information, medical calculators, and clinical guidelines.

The mid-2010s saw the integration of mobile health apps with wearable technology and sensors, such as fitness trackers and smartwatches. This integration allowed for more comprehensive health monitoring and provided users with real-time feedback on their health metrics. Applications created especially for hospital settings were also developed at this time, including patient management systems, electronic health records (EHRs) accessible via mobile devices, and secure communication platforms for healthcare teams.

The use of mobile health apps for managing chronic illness gained popularity in the latter part of the 2010s. Apps that offer personalised care plans and monitoring features were developed to help users manage conditions like diabetes, hypertension, and asthma.

The COVID-19 pandemic dramatically accelerated mobile health application adoption globally and in Nigeria. The necessity for remote care delivery and reduced physical contact created unprecedented demand for digital health solutions. Telemedicine applications, in particular, saw exponential growth, allowing for virtual consultations when in-person visits were restricted. Apps like Teladoc, Doxy.me, and Doctor on Demand enables secure video consultations, prescription services, and follow-up care, making healthcare more accessible and convenient.

Today, mobile health apps are incorporating artificial intelligence (AI) and machine learning (ML) algorithms to provide more personalised and accurate health recommendations (Azizan, Ahmed &Razak, 2023; Blaszka & Rascon, 2023; Waalen, 2023). These applications are able to recognise early indicators of health issues and offer personalised advice based on user data analysis. Apps like Ada Health for instance, utilises AI to analyze symptoms and suggest possible diagnoses, while

others like MyFitnessPal leverage machine learning to provide tailored fitness and nutrition plans.

Overall, the history of mobile health applications shows a steady shift towards increasingly complex and effective tools for enhancing patient engagement and health outcomes. As technology continues to advance, mobile health apps are poised to play an even greater role in shaping the future of healthcare delivery.

More sophisticated predictive analytics will probably be incorporated into mHealth apps in the future. These applications can anticipate possible health problems before they arise by evaluating big databases, enabling early intervention and prevention. Predictive model, for instance, may use health data to identify individuals who are at risk of developing chronic diseases and offer tailored advice to mitigate those risks.

2.2 Conceptual Review

2.2.1 Definition and Scope of Health Communication

The World Health Organisation defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and this definition has not been amended since it was adopted by the International Health Conference in 1948 (WHO, 2003).

In explaining the concept of health, Nwabueze (2015) defines health as the harmony and balance of the physical, mental, emotional, social, and spiritual dimensions of an individual. It is a state of optimal functioning and thriving rather than mere absence of illness. It includes the ability to adapt, cope with life's challenges, and maintain a high quality of life. Asemah (2017) defines health as the proactive maintenance and prevention of illness through healthy lifestyle choices, regular screenings, and early interventions. It is the positive mental and emotional well-being that allows individuals to experience happiness, fulfilment, and positive relationships.

It is clear from the definitions provided thus far by the different authors that each person's idea of health is subjective and differs according to their own requirements, objectives, and circumstances. It takes into account personal preferences, values, and aspirations in defining what it means to be healthy. This underscores the pertinence of health communication, which contributed to various aspects of disease prevention, health promotion and health education (Nwabueze, 2015).

Healthy People (2007) defines health communication as the adoption of communication strategies to enlighten the public on health-related matters and influence individuals, government or community decisions that positively impact health. It is relevant in disease prevention and health promotion in the following ways:

health professional-patient relations; an individual's exposure to, search for and use of health information; individual adherence to clinical recommendations and regimens; the construction of public health messages and campaigns; the dissemination of individual and population health risk information; the education of consumers about how to gain access to the public health and health care systems; and the creation of telehealth applications. The pertinence of health communication is captured in the above-stated contributions.

Similarly, Akinfeleye (2007) avers that health communication is the study and use of strategies to inform and influence individual and community decisions that enhance health. The Office of Disease Prevention and Health Promotion of the U.S. Department of Health and Human Services asserts that health communication is the study and practice of communicating promotional health information, such as in public health campaigns, health education, and between doctor and patient (Atkin, 2011). Hence, it will be right to assert that health communication is the dissemination of health information in order to influence people's health choices and improve their health literacy for sustainable health development.

Health communication is the study of communication strategies that are used to inform as well as influence individual decisions that can enhance the health status of a

person (Francis, Pirkis, Dunt, Blood & Davis, 2012). Flynn, Worden and Bunn (2009) define health communication as a valid tool that facilitates health messages (which include but are not limited to prevention and awareness) for educational purposes with an aim of avoiding ill health.

In health promotion, communication has a pivotal role to ensure that people live healthy lives. However, this only comes to fruition when people start adhering to the advice of health professionals (Bauman, 2010). It I s crucial to communicate in order to encourage and maintain healthy behavior. Health communication serves as the medium that is used to create awareness in the individual group and communities on health related issues. Health promotion provides knowledge, skills and capacity to assist individuals, groups and communities in identifying health needs, obtaining information and resources and mobilising them to achieve change. However, the World Health Organisation (WHO) (2013, p.32) defined health communication as "the process of enabling people to increase control over and to improve their health."

Communication is part of human nature, as it plays an integral role in relaying information, as it signifies symbolic capability. In addition to this, it also fulfils a ritualistic function, the one that reflects so much of the humans as members of a social grouping, among others. In this context, communication can be defined as the

symbolic exchange of shared meaning (Asemah, 2011; Noar, 2016; Rogers &Storey, 1987).

As a concept, health communication plays a crucial role in health literacy as it advises people what to do in times of some signs and symptoms in their bodies. Health communication is, therefore, crucial in countries where there are not enough health personnel. Limited health literacy often results in less participation in health activities. This can lead to the lack of disease identification, habits that risk health such as heavy smoking, and more work accidents as a result of failure to adhere to precautionary measures. In addition to this, it can also lead to the lack of proper management of chronic diseases such as diabetes, HIV infection, asthma, among others (Rychetnik, Frommer, Hawe&Shiell, 2012; WHO, 2013).

2.2.2. Understanding Health Informatics

Health informatics refers to "the scientific discipline concerned with the systematic processing of data, information and knowledge in medicine and health care" (Chinaka, 2008, p. 13). Often known as healthcare informatics, medical informatics or biomedical informatics, health informatics is information engineering used in the

healthcare industry, essentially the management and use of patient healthcare information (Warner, Sorenson &Bouhaddou, 1997).

Warner, Sorenson and Bouhaddou (1997) define health informatics as the science that deals with the use of computers and communication technology to acquire, store, analyse, communicate, and display medical/health information and knowledge to promote understanding and improve the accuracy, timeliness, and reliability of decision-making. Before now, “medical informatics” was the accepted standard term until it was changed to “health informatics” or “healthcare informatics” when some health officers felt that the term “medical informatics” was related to physicians alone (Shortliffe& Blois, 2001). Thus, the term health informatics captures the application of information systems that allow collection, updating, storing, analysis and management of health-related data to assist health care delivery.

Health informatics is diverse, encompassing a range of disciplines and fields of study relevant to healthcare. The Association of State and Territorial Health Officials, ASTHO (2004), explains this further. Computer science, social science, behavioural science, management science, information science, and other fields are among the disciplines that are involved.

The World Health Organisation (2019) defines health informatics as “the interdisciplinary study of the design, development, adoption and application of IT-based innovations in healthcare services delivery, management and planning”. It addresses the tools, resources, and techniques needed to maximise the collection, archiving, retrieval, and application of data in biomedicine and health. Computers, clinical guidelines, formal medical terminology, information and communication systems, and more are examples of health informatics technologies.

2.2.3 Concept of Mobile Health (mHealth)

Mobile health (mHealth) is part of the wider “eHealth” movement, which is using technology such as computers, mobile phones, mobile health apps and patient monitors for health services and information. Mobile health as defined by the World Health Organisation (2011) is a “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices”. According to this definition, mHealth is seen as the health-related use of mobile telecommunications and multimedia technologies within health service delivery and public health systems.

Mobile health (mHealth) involves “the use of mobile phones or portable devices such as personal digital assistants (PDAs) for healthcare service delivery. Typically, these interventions are in the form of direct phone calls, short message service (SMS) messages, voice calls or mobile applications” (Ilozumba, Abejirinde, Dieleman, Bardají, Broerse& Belle, 2018). In a similar vein, Chowdhury and Jahan (2014) explained mHealth to mean the use of mobile and wireless technologies, such as mobile phones, patient monitoring devices, personal digital assistants, as well as mobile software programmes to support the achievement of health objectives.

Mobile health can be applied for a wide variety of purposes, including health promotion and disease prevention, health care delivery, training and supervision, electronic payments and information systems (Eze&Okojie, 2016). Experts have identified mHealth as one of the key trends reshaping the future of health care. It is a broad supportive system within healthcare sectors around the world and has been seen as having the potential to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilised by healthcare organisations, practitioners, and patients in developing countries (Chowdhury & Jahan, 2014; Eze & Okojie, 2016).

At the basic level, mHealth involves leveraging mobile technology platforms to provide information and learning to the patient. However, at more advanced levels, it

involves “more complicated platforms of communication between healthcare provider and patient, support for decision-making through platforms with analytics, and even support of remote diagnostics and treatment” (Ilozumba et al., 2018, p. 2). Mobile health (involving the application of mobile phone cum Internet-based systems) has been used continuously with success for healthcare in the developed world. Commenting on the proven efficiency of mHealth, Ilozumba et al. (2018) note. mHealth is a potential game changer in the delivery of healthcare, as there is the potential for applications which could enhance the value proposition for all players in the mobile technology ecosystem. Furthermore, the use of mobile communication technologies in health services can reduce gaps in health-related needs that exist between people. Such needs could include functional quality of health information, availability of services, affordable cost options, communication infrastructure between client and healthcare providers; and easy-to-use information can play a predominant function in enhancing user perception of the health care system.

2.3 Opinion Review

2.3.1 Categories of Mobile Health Applications

According to Rouse (2018), mobile health applications (or mobile apps for short) are computer software that offers health-related services when installed on mobile devices

like smartphones and tablets. There were previously other computer programmes that provided health services; however, the advantage of mobility was added when such programmes were designed for mobile phones, thus developing what is known today as mobile health apps (Rana, 2017). Use thanks to advancements in processing speed, memory capacity, battery size, and open-source operating systems that are incredibly efficient. There are medical Given that mobile health applications are "accessible to patients both at home and on the go, health apps are a part of the movement towards mobile health (mHealth) programmes in health care" (Rouse, 2018, p. 1). There are now a plethora of medical mobile apps available for both personal and professional applications for a variety of uses, including ones for electronic prescribing, diagnosis and treatment, practice management, coding and billing, and CME or e-learning.

Rouse (2018) gave the following as the different classes of mobile applications used by patients and healthcare providers for health communication:

1. **Mobile health apps for providers**

These are programmes used by healthcare providers to support clinical decisions around the time of a patient's visit. Providers, for instance, can use mobile health apps to access clinical reference materials such as Epocrates and perform searches. This class of mobile health apps also assists providers with patient monitoring and

follow-up. For example, several mobile health apps use GPS (global positioning system) technology to track a patient's movement for a specified period, generate questions about the patient's well-being, and include regular reminders to report or measure symptoms (Rouse, 2018).

2. **Mobile health apps for consumers**

This class of mobile health apps is used by consumers to manage their health through accessing of information and other health services, including consultation. There has been explosive growth in the number of mobile health apps for consumers. ICT giants such as Apple, Google and Microsoft have all developed and are marketing new consumer health apps. However, there have been concerns about the accuracy and unregulated status of mobile health apps for consumers (Rouse, 2018).

3. **Patient portals**

These mHealth apps are designed to facilitate communication between healthcare providers, staff and patients. From their mobile devices, patients are allowed to check test results, refill prescriptions, review their medical records, browse educational materials and even schedule appointments. Some apps even allow patients to use their mobile devices to interact with their healthcare providers through their patient portals. These features streamline administrative tasks such as registration, scheduling

appointments, and patient reminders and empower patients to securely and conveniently connect with their healthcare providers while on the go (Rouse, 2018).

4. **Secure text messaging (STM)**

This category of mHealth applications helps providers to securely exchange text and image messages between mobile devices and office workstations. STM ensures that the information shared is confidential and protected. Messages (text and pictures) that are sent and received via STM are encrypted during transmission to and from a device or workstation (Rouse, 2018).

5. **Patient monitoring devices**

This class of mobile health apps enables the use of wearable devices or sensors like smartwatches and fitness bands to track health metrics and to improve a patient's compliance with treatment recommendations. Many companies are developing products that measure biological factors (such as blood pressure, weight, sleeping patterns and glucose) and behaviours (such as mobility and taking medication), then store that information in a secure place where they are accessible to healthcare providers.

This can help providers keep track of patients, particularly those with chronic illness who are at risk of serious health incidents. For example, a device could pick up

elevated blood pressure or glucose and alert the provider before the patient has to be sent to a hospital (Rouse, 2018). Applications such as MySugr for diabetes management and Propeller Health for asthma management are designed to empower patients to take control of their health and adhere to their treatment plans more effectively. Also, apps like Fitbit and Nike+ FuelBand integrate seamlessly with wearables, providing a holistic view of their health under a central source.

6. **Telemedicine**

Patients and their healthcare providers may communicate remotely in real time thanks to these mobile health apps. With cloud-based health information technology (HIT) and other technologies such as two-way video, providers can review lab results, see patients, and prescribe medicine or treatment in real time. Telemedicine offers important benefits, such as better access to health care for remote populations, better preventive care and lower healthcare costs. (Rouse, 2018). Telemedicine is one of the most significant trends in mHealth. This trend was accelerated by the COVID-19 pandemic, which necessitated remote healthcare solutions. Apps like Teladoc and Amwell provide video consultations, prescription services, and follow-up care, making healthcare more accessible and convenient.

2.3.2 Mobile Health Apps in Nigeria

Mobile health technology has been identified as a means to help achieve universal health coverage, especially in resource-limited settings. Governments are now expressing interest in mHealth as a complementary strategy for strengthening health systems and achieving the health-related Millennium Development Goals (MDGs) in low-and middle-income countries. This interest has led to a number of mHealth deployments worldwide that are offering preliminary proof of the possibilities of mobile and wireless technologies. mHealth 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 (TB).

Sotunde (2014) identifies 10 mobile apps that are popularly utilised on the African continent. These include Hello Doctor, which provides free essential healthcare information (including in local languages); mPedigree, an anti-counterfeit ICT software application which allows pharmaceutical retailers and users to verify the authenticity of a drug; MomConnect, an application that provides information and advice for pregnant women in South Africa; Matibabu, an app that helps to diagnose malaria without a blood sample; and MedAfrica, which helps people in rural areas diagnose and monitor symptoms of diseases. Others include mRamadan, an app that

helps diabetic patients manage their health while fasting; Smart Health apps which provides accurate, baseline information resources on HIV/AIDS, TB and malaria; Sehatuk (meaning "Your Health" in Arabic), which provides a huge data-base of drugs available in Morocco, along with their prices and dosages; and DrBridge, used mostly in Egypt to make appointments with a doctor online.

In Nigeria, mobile health applications have also become freely available. Okoruwa (2018) provides a list of what he terms the five leading mobile health applications in Nigeria. The list is as follows:

1. **momi:** Omomi, which translates to "My Child" in Yoruba, is a health platform that enables parents to monitor their children's health with the help of a smartphone. The app was designed with the child's health in mind and has all the essential features that cover all of WHO's childhood survival strategies. It ensures that a woman's health is protected right from pregnancy to childbirth and beyond. It is also a platform for child health information on key themes such as breastfeeding, child growth and nutrition, dietary supplementation, and management of diarrhoea. Apparently, Omomi serves as a reminder for immunisation appointments and also has a GPS (global positioning system) locator of the closest hospitals to help with emergency health care.

2. **Hudibia:** This app was introduced in 2016 with the goal of bringing the gap between patient and doctors by offering medical care without the initial problems that come with directly visiting the hospital. Hudibia was founded by AhjokuAmadi-Obi, a Nigerian medical doctor, and researcher of telemedicine. He founded the app with the goal of enabling anyone search for a doctor anywhere in the world, book medical appointments, and have live consultations. Hudibia is designed to reach a broad audience as it has translator icons for Yoruba, Hausa, and Igbo. Hudibia was designed to make "contacting the doctor" a less herculean task.

3. **Find-A-Med:** This app was created by Emeka Onyenwe in 2014. Like Hudibia, Find-A-Med boasts more than 5,000 registered medical centres, giving users access to a host of medical facilities and service, including hospitals, pharmacies, doctors and laboratories. As the name implies, Find-A-Med serves as a directory for users to locate hospitals and medical centres with ease. In addition, the catalogue of reviewed medical centres on the app ensures that individuals make informed decisions when choosing a medical platform.

4. **25Doctors:** This app was designed by Charles Davies Omiete, a medical doctor. Through this app, Charles, together with a team of online doctors, delivers vital information to the public on health and medical facts. This is to enable individuals to

learn very basic things about their body in a fun and easy manner. 25Doctors provides users with information on human anatomy, diet and weight loss, lifestyle, life hacks and more. Users can also get familiar with the medical jargon and play interactive quizzes which are answered once submitted. With these services and many more, 25Doctors is rapidly growing to become a globally recognised mobile health application providing the public with health-related knowledge.

5. **Kangpe:** Three friends, Femi Kuti, Ope Olumekan, and Matthew Mayaki, invented this app in 2015. People get on Kangpe through their smartphones, enter their medical questions and have them answered by medical professionals for a small fee within 10 minutes or less. Furthermore, the app provides referrals for patients to consult doctors and also serves as a platform for advice on all matters pertaining to health. Kangpe operates in Ghana and Kenya as well and has over 100 thousand downloads on the Google Play Store. The Kangpe founders plan to provide Africans with the best medical care possible at reasonable prices.

2.3.3 Benefits of Mobile Health Apps

As you see it today, a mobile health app has gone through substantial development. The use of healthcare mobile apps has gained significant momentum over the years in

the healthcare sector. Given the consistently increasing number of people using mobile devices, a mobile health app is nothing short of a necessity. mHealth is becoming popular with more and more healthcare institutions integrating it for improved patient satisfaction. There is no doubt that a healthcare mobile solution offers several benefits, like:

a. Improved Patient Engagement and Self-Management: One of the most significant advantages of mobile apps in healthcare is the ability to improve patient engagement and self-management. Patients can now use smartphone apps to track their own health metrics, such as heart rate, blood pressure, blood sugar, and more. Many apps also provide personalised reminders for medication, follow-up appointments, and lifestyle changes, encouraging patients to take an active role in their own care.

Furthermore, healthcare apps often feature educational resources, wellness tips, and motivational support, helping patients better understand their conditions and treatment plans. This heightened level of engagement not only leads to better health outcomes but also improves patient satisfaction as they feel more involved and empowered in their care.

b. There is a Healthcare app for various care needs: Several mHealth app developers are emerging to meet the growing demand among the population. You can find different mHealth apps for various care needs, from fitness tracker apps to yoga, nutrition, mental wellness, and so on. Some reports indicate that over 300,000 mobile health apps are available today, offering flexibility and choice to the users.

c. 24/7 Access to Healthcare Services: Mobile healthcare apps enable patients to access medical advice and services at any time, regardless of location. This is especially important for people in remote areas or those who have limited access to healthcare facilities. With telemedicine features integrated into many mobile apps, patients can schedule virtual consultations with doctors, receive prescriptions, and even obtain second opinions without needing to leave their homes.

d. Efficient Healthcare Delivery and Cost Savings: Mobile apps can streamline the healthcare delivery process, resulting in more efficient care and reduced costs. For healthcare providers, apps can facilitate smoother appointment scheduling, reduce no-show rates, and automate administrative tasks such as billing and patient records management. By reducing the burden of administrative work, healthcare staff can devote more time to direct patient care, improving overall productivity.

Additionally, mobile apps help in reducing unnecessary hospital visits or emergency room admissions. For instance, patients can track their symptoms, communicate with healthcare providers remotely, and receive guidance on when to seek in-person care. This can lead to fewer non-emergency visits, which can save both the patient and the healthcare system money.

e. Enhanced Data Collection and Analytics: Mobile health apps are powerful tools for data collection and analysis. By tracking a wide range of health metrics over time, these apps provide healthcare providers with valuable data to make informed decisions. This real-time data collection can help in the early detection of health issues, identifying trends, and improving diagnosis accuracy.

f. Better Communication and Collaboration: Mobile apps also enhance communication and collaboration between patients and healthcare teams. Through secure messaging systems and direct communication channels, patients can easily reach their doctors, ask questions, or share updates about their condition. This two-way communication fosters stronger patient-provider relationships and ensures that patients receive timely advice and support.

For healthcare teams, mobile apps facilitate collaboration between specialists, allowing for quick consultations and information sharing. This is particularly beneficial for patients with complex conditions who require multidisciplinary care. By breaking down communication barriers, mobile apps help improve coordination, reduce errors, and enhance the quality of care.

2.3.4 Challenges and Limitations of Mobile Health Applications

Despite the global increase in mHealth applications to support universal health coverage, several challenges and limitations are affecting the adoption of such interventions by healthcare stakeholders. Barriers and challenges related to the implementation of mHealth applications include:

1. Data Privacy and Security Concerns: A major concern surrounding mobile health apps has been the risk to data privacy for people inputting their personal health data into an app, particularly when there is no link between the app and the patient's physician or hospital. The possibility that one's data may be sold or used for any other reason not made clear to the user is one that exists across all types of apps. Studies have revealed that many mHealth apps lack robust data protection measures, leading to potential misuse of personal information. However, these days, a lot of

apps provide data transparency and ask users to consent to being contacted and share clearly how their data will be used.

2. Regulatory Compliance Issues: One of the biggest challenges facing mHealth app developers is navigating the complex landscape of healthcare regulations. Compliance with standards like the Health Insurance Portability and Accountability Act (HIPAA) in the U.S. or the General Data Protection Regulation (GDPR) in Europe is crucial but often complicated. Non-compliance can result in legal repercussions and diminish user trust.

3. Integration with Existing Healthcare Systems: Seamless integration of mHealth apps with established healthcare infrastructures, including electronic health records (EHRs), is often hindered by interoperability issues which can result in fragmented healthcare and insufficient clinical workflows.

4. Usability and Accessibility Challenges: Design flaws, complex user interfaces, and technical performance issues can impede the usability of mHealth apps. In additionally, although a benefit of a mobile app is that you can have it in your pocket at all times, this is assuming that all individuals have the means to obtain a mobile phone. This is a bigger problem in developing countries where mobile health apps

have surged to reach regions of the world that struggle to receive care; however, without access to smartphones, some individuals won't be able to access mobile health apps that could potentially improve their quality of life.

5. Accuracy and Reliability of Information: Some mHealth apps provide inaccurate or unverified health information, which can mislead users and potentially result in adverse health outcomes. For instance, apps that claim to measure vital signs using smartphone sensors have been found to deliver inconsistent results.

6. Limited Clinical Evidence: The clinical effectiveness of many mHealth applications remains under-researched, with a scarcity of rigorous studies to validate their benefits. This lack of evidence can hinder their acceptance among healthcare professionals and limit their integration into standard care practices.

7. User Engagement and Adherence: Sustaining user engagement with mHealth apps over time is difficult. Factors such as lack of personalisation, technical issues, and the absence of human interaction can lead to decreased adherence and app abandonment.

2.4 Empirical Review of Related Studies

Ogundaini, Harpe, and McLean (2021) studied the integration of mHealth information and communication technologies into the clinical setting of hospitals in sub-Saharan Africa. The primary objective of the study was to investigate opportunities for integrating mHealth ICTs into the work activities of medical professionals at points of care in clinical settings of hospitals in Sub-Saharan Africa. Hence, the research question is, "How can mHealth ICTs be integrated into the work activities of medical professionals at points of care in hospital settings?" A qualitative approach was used to arrive at the findings. Tertiary hospitals and participants for this study were selected from Nigeria and South Africa. A total of 19 participants, including physicians, nurses, and hospital managers, were engaged in the study. The study identified potential points of integration of mHealth ICTs with activities such as patient consultations, remote communications, referrals, and report writing. It was also inferred that mHealth ICTs can cause negative disruptions, and some participants perceived the use of mobile devices while engaging with patients as unprofessional.

Fan, Ezekieldoka and Qalati (2024) examined the factors that influence the rigid opposition to e-health services by integrating two theoretical models: the Stimulus-Organism-Response theory and the Theory of Planned Behaviour. Results from a survey of 543 respondents over 18 years old indicated that concerns about data

security, lack of trust in technology, and cultural preferences for in-person consultations contribute to resistance. Addressing these issues through culturally sensitive interventions and robust data protection policies is crucial for successful mHealth implementation.

Adum and Mozie (2020) carried out a study to ascertain the awareness and utilisation of mobile health applications among teaching and non-teaching staff at NnamdiAzikiwe University in Awka, Anambra State, Nigeria. The study's quantitative research design that involved structured questionnaire collected data from 360 respondents. The study was conducted in the framework of the Diffusion of Innovation theory and the Health Belief Model. From the data analysis, the study found that there is a low level of awareness of mobile health applications among staff of UNIZIK due to such factors as high cost of Internet subscription and limited awareness of m-health applications. The study recommended that the Nigerian government should establish and execute policies at the health policy stage that would make the use of mobile health applications a key aspect of healthcare delivery in the nation's healthcare system. Additionally, relevant government and non-governmental health organisations should collaborate with both domestic and foreign software

developers to create mobile health applications that would cater to each person's unique health needs and preferences.

2.5 Theoretical Framework

A theory is a set of assumptions, propositions or accepted facts that attempt to provide a plausible or rational explanation of cause-and-effect relationships among a group of observed phenomenon", (Asemah, Gujbawu, Ekhareafo & Okpanachi, 2012). Contributing to the numerous definitions of theories, McQuail (1987) says that "theories are a set of ideas of varied status and origin, which may explain or interpret some phenomena," a definition that Asemah et al. (2017) cited. Thus, it is possible to state that theories form the basis of all research and investigation. As such, one needs to be guided by some guidelines derived from theories prior to starting any investigation.

Having stated that, the Diffusion of Innovation theory and Health Belief Model (HBM) are considered apt for situating this study in a proper theoretical framework. A collection of ideas and theories that offer a framework for comprehending a particular occurrence is known as a theoretical framework. It serves as a guide for carrying out

research and aids in determining the connections between the variables under investigation.

2.5.1 Diffusion of Innovation Theory

The theory was proposed by P. Lazarsfeld, B. Berelson and H. Gaudet in 1944. This theory traces the process by which a new idea or practice is communicated over time among members of a social system through certain channels. The model describes the factors that influence people's thoughts and actions and the process of adopting a new technology or idea (Asemah, Nwammuo, & Nkwam-Uwaoma, 2017). The "newness" of an innovation is subjective, determined by the potential adopter. Thus, diffusion of innovation theory attempts to explain how an innovation is spread and why it is adopted at both the micro and macro levels of analysis (Asemah et al. 2017).

The theory of Diffusion of Innovation recognises that new ideas, such as mobile health applications, do not just become adopted at the same time by everyone in society; rather, the process of adoption is gradual, moving from one layer of society to the other, i.e., from innovators down to laggards (Rogers, 1964; Lewis, 2009). Hence, the theory will help to explain how and why a particular smartphone user may accept such innovation at a particular point in time and why a person may accept it faster or

slower than the other. It will also be useful for explaining factors that motivate adoption of a technology like health mobile apps. These factors, according to the theory, include relative advantage – the degree to which mobile health apps are seen as better than the ideas; programme, or product they replace; compatibility – how consistent the apps are with the values, experiences, and needs of the potential adopters; complexity – how difficult the apps are to understand and/or use; triability – the extent to which the apps can be tested or experimented with before a commitment to adopt is made; and observability – the extent to which the apps provide tangible results.

2.5.2 Health Belief Model (HBM)

This theory was first propounded by some psychologists in the 1950s who wanted to use this model to explain why people don't use health services such as x-rays, tuberculosis, and smallpox immunisation. It was later developed in 1966 for the first time by Rosen Stock and was expanded byBeeker. The first and possibly most popular model for figuring out what influences someone's medical and health behaviors, as well as how they manage their symptoms, is the health belief model. According to the health belief model, a person's health- related behaviours determine how much value he places on his health, which in turn influences his beliefs about

illness and its consequences. If an individual's beliefs and attitudes which are seen as problems are identified, the health education that should be provided or the treatment strategies that should be used will be determined to be more appropriate for that person. If someone is highly sensitive to the possibility that a health issue can gravely hurt them, they believe that the risk will lessen.

They think that if something isn't done, the repercussions could be worse than the inconvenience (money, time, effort) of dealing with things like getting tested, going through screenings, and controlling one's food. To give a more specific example, someone who is susceptible to cancer would rather have health checks than suffer the negative effects of the disease. They would accomplish this by overcoming challenges including time constraints, financial constraints, and physical barriers that prevent them from seeing a doctor or medical facility.

Hence, the Health Belief Model (HBM) helps to view smartphone users as people who would adopt mobile health apps based on their belief that such practice would fetch specific health benefits to them. In other words, if they perceive use of such applications as a helpful health action, then they are likely to adopt them. Such perception is constitutive of the following: perceived susceptibility – the extent an individual perceives themselves as facing the likelihood of an adverse health;

perceived severity – an individual's belief concerning the effects a given disease or condition would have on their state of affairs; perceived benefits of taking action – the extent an individual believes that taking action, i.e., use of mobile health apps will help deal with the perceived health risk; perceived barriers to taking action – the extent an individual sees hurdles in adopting mobile health apps; cues to action – the extent an individual is spurred to action either by internal or external cues; and self-efficacy – the extent to which an individual is confident in their ability to take action, i.e., use mobile health applications.

Therefore, the Diffusion of Innovation theory and Health Belief Model (HBM) both help to understand how a health resource like mobile health applications becomes understood, accepted and utilised among a population. While the diffusion of innovation provides a sociological insight into how such innovation spreads among a given social unit, the HBM gives a psychological explanation as to why an individual may be motivated to utilise such a health resource.

2.6 Summary of Review

The history and development of mobile health applications, a conceptual review to comprehend the perspectives of researchers who have studied this subject, categories of mHealth apps, mobile health apps in Nigeria, their benefits and challenges, a

review of empirical studies, and a theoretical framework by grounding the study in a relevant theory were all covered in this chapter.

CHAPTER THREE

METHODOLOGY

This chapter presents the methodology adopted in conducting this research. The chapter is presented under the following headings:

3.1 Research Design

3.2 Population of the study

3.3 Sample Size

3.4 Sampling techniques

3.5 Research Instrument

3.6 Validity of the instrument

3.7 Reliability of instrument

3.8 Method of data collection

3.9 Method of data analysis

3.1 Research Design

This study is executed using the survey research method. A survey is an empirical study that uses questionnaire to discover descriptive characteristics of a phenomenon (Asemah, Gujbawu, Ekhareafo and Okpanachi, 2012). Survey research approach is aimed at developing generalized prepositions about human behaviors from what is observed in a sampled population (Asemah et al, 2012). In addition, the descriptive survey describes the population being studied (Berger, 2000) as cited in Asemah et al (2012). This descriptive research design would help this study to have a sound basis for efficiency and accuracy in collecting and describing data on the use of mobile apps for health communication in UBTH.

3.2 Population of the Study

In research methodology, the population of study refers to the entire group of individuals or elements that the researcher is interested in studying and drawing conclusions about (Nwaoboli, 2022). The population of this study comprises of healthcare professionals including doctors, nurses and pharmacists and patients with focus on the outpatients; individuals who attend a hospital for diagnosis, treatment or

regular checkup without being admitted. From the clinic's available records, UBTH has about 1,800 medical professionals and an average of 3,000 outpatient attended to each day. The population of the study therefore amount to 4,800.

3.3 Sample of the Study

Sample size refers to the number of individuals or elements included in a sample, which is a subset of a larger population (Nwaoboli & Asemah, 2023). It is a crucial consideration in research and statistical analysis as it plays a significant role in determining the reliability and generalizability of research findings (Nwaoboli & Asemah, 2021).

The sample size of this study was drawn using Taro Yamani's formula which is

n = N/(1+N(e)2)

Where, n = sample size

N = Population size

e = level of significance

1= Constant

Therefore:

N = 4,800

e = 0.10

1 = Constant

n = 4,800/1 + 4,800 (0.10) ^ 2

n = 4,800/1 + 4,800 * 0.01

n = 4,800/49

n = 97.95

n = 98

For a more comprehensive work, 100 will be use as the sample size

3.4 Sampling Technique

Simple random sampling and purposeful procedures were the sampling methods used to acquire the data. The researcher used the straightforward random procedure to offer each responder in the target population an equal and independent probability of being chosen for the sample.

The researcher purposefully chose a group of individuals they felt to be trustworthy for the study, employing the purposive sampling technique in the process. The term "purposeful sampling" implies that the sample was chosen on purpose and that the researcher thinks it is typical and representative of the group.

3.5 Research Instrument

The instrument for collecting data in this study is the questionnaire. A questionnaire is a list of inquiries created with a certain topic in mind (Asemah, Nwaoboli & Beli, 2022; Asemah, Nwaoboli & Nwoko, 2022). The questionnaire instrument has two sections: the demographic and psychographic section. The demographic section is used to elicit information about the bio-data of the respondents while the psychographic section focused on the research questions.

3.6 Validity of Instrument

The research instrument (questionnaire) will be subjected to face validity testing to guarantee that pertinent items were included. After being careful and thoroughly constructed, a copy of the questionnaire was given to the research supervisor for a close examination and double-checking of the tool to make sure the questions are relevant to the objectives of the study. Before creating the final version of the questionnaire, all recommendations and changes were made.

3.7 Reliability of Instrument

According to Asika (2006, P.73), reliability is "the consistency between independent measurements of the same phenomenon, it is the accuracy or precision of a measuring instrument." The questionnaire which is an instrument in this study was deemed

reliable because it helped in providing answers for the research questions. The instrument was first subjected to a Pilot study by the researcher in which 30 questionnaire were distributed to respondents.

3.8 Method of data Collection

For the study, the researcher used both primary and secondary sources. Regarding the principal source of information, copies of the questionnaire were distributed electronically to the participants while the data from the secondary source was gathered by studies in general textbooks, pertinent publications from earlier studies, articles, and relevant lecture note.

3.9 Method of data Analysis

Frequency tables and simple percentages were used in the analysis and presentation of the data gathered and compiled for this study. The data was practically presented using frequency tables to make it clear and easy for everyone to understand. The amount and figure of the respondents' psychological responses were analyzed using simple percentage. Additionally, for ease of understanding, the facts in the frequency table and the straightforward percentage were thoroughly explained.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

This chapter presents and analyses the data collected using the questionnaire. A total of 100 copies of the questionnaire were distributed online, and all were properly filled, making the sample size a total of 100 after administration, which accounts for 100%. 100 respondents therefore represent 100% of the sample size being studied. The analysis and presentation are based on data retrieved from respondents using the questionnaire, which will be analysed below using frequencies, percentages and tables for the presentation of data.

4.1 Data Presentation and Analysis

Table 1: Distribution of Respondents by Gender

Gender.	Frequency	Percentage
Male	37	37%
Female.	63	63%
Total	100	100%

Table 1 shows that the study is made up of male and female respondents; however, female respondents participated more in the research work.

Table 2: Distribution of Respondents by Age

Age.	Frequency	Percentage
18 - 30	29	29%
30 – 42	37	37%
42 – 54	16	16%
54 – 66	10	10%
66 and above	8	8%
Total	100	100%

Table 2 shows that the study was composed of respondents of various age distributions. It indicates that a greater proportion of the respondents are between the ages of 30 - 42.

Table 3: Distribution of Respondents by Occupation

Occupation	Frequency	Percentage

Student	20	20%
Self Employed	15	15%
Civil Servant	36	36%
Private Sector	29	29%
Total	100	100%

Table 3 shows that the study involved respondents with various occupational statuses. However, respondents who were civil servants participated more in the study.

Table 4: Distribution of Respondents by Marital Status

Marital Status	**Frequency**	**Percentage**
Single	38%	38%
Married	54	54%
Total	100	100%

Table 4 shows that the study was composed of respondents of various marital statuses. However, married respondents were more actively involved in the study, amounting to about 54% of the total respondents.

Table 5: Distribution of Respondents by Religion

Religion	**Frequency**	**Percentage**
Christianity	86	86%

Islam	11	11%
Traditional	3	3%
Others	0	0%
Total	100	100%

Table 5 shows that the study was composed of respondents from all three major religious groups in Nigeria (Christianity, Islam, and Traditional) and others. However, as seen above, respondents who are Christians were more involved in the study.

Table 6: Level of Awareness of Mobile Health (mHealth) Applications

Variable	Frequency	Percentage
Very High	16	16%
High	37	37%
Moderate	11	11%
low	28	28%
Very low	8	8%
Total	100	100%

Table 6 shows that a high number of the respondents are aware of mobile health applications. While the others shared different opinions on their awareness. This shows that the respondents are exposed to mHealth applications for health communication.

Table 7: Have you ever used any mHealth applications?

Variable	Frequency	Percentage
Yes	51	51%
No	39	39%
Can not say	10	10%
Total	100	100%

Table 7 illustrates that most of the respondents have used mHealth applications for health information.

Table 8: Familiar mHealth apps

Religion	Frequency	Percentage
MySngr (Diabetes Tracker)	11	11%
My fitness Pal	35	35%
Teldoc Health	3	3%
Calm	19	19%
Flo (period and pregnancy tracker)	25	25%
Others	7	7%
Total	100	100%

Table 8: The above shows that respondents are more familiar with the MyFitnessPal mHealth app.

Table 9: Frequency in the use of mHealth apps

Religion	Frequency	Percentage
Daily	6	6%
Weekly	15	15%

Monthly	8	8%
Rarely	50	50%
Never	21	31%
Total	100	100%

Table 9 shows the frequency of using mHealth apps for health information. From the data presented, a majority of the respondents agreed that they rarely use mHealth apps. This shows that the respondents rarely use mHealth apps.

Table 10: Perception towards mHealth apps

Variable	Frequency	Percentage
Positive	57	57%
Negative	5	5%
Neutral	21	21%
Can't tell	17	17%
Total	100	100%

Table 10 shows the variables used in determining the perception of respondents towards mHealth apps. This table indicates that an overwhelming number of respondents have a positive perception towards mHealth apps.

Table 11: Extent to which mHealth apps improve patient care delivery

Religion	Frequency	Percentage
Strongly agree	9	9%
Agree	37	37%
Undecided	26	26%

Disagree	19	19%
Strongly Disagree	9	9%
Total	100	100%

Table 11 indicates that a larger proportion of the respondents (37%) agreed that mHealth applications improve patient care delivery, while others share different opinions on the extent.

Table 12: Do you believe mHealth apps enhance communication between healthcare providers and patient?

Variable	Frequency	Percentage
Yes	59	59%
No	41	41%
Total	100	100%

Table 12 reveals that a slightly greater percentage of the respondents believes that mHealth applications enhance communication between healthcare providers and patients.

Table 13: Have mHealth apps contributed to more efficient management of patient information?

Variable	Frequency	Percentage
Yes, strongly agree	15	15%
Yes somewhat agree	51	51%
Neutral	25	25%

No some what disagree	9	9%
No strongly disagree	_____	_____
Total	100	100%

Table 13 shows the degree of respondents believing that mHealth apps contribute to more efficient management of patient information. According to the table, a higher number of respondents somewhat agree that mHealth apps contribute to more efficient management of patients' information.

Table 14: How likely of you to use mHealth apps to communicate over having direct conversations?

Variable	Frequency	Percentage
Very likely	10	10%
Somewhat likely	16	16%
Neutral	29	29%
Somewhat unlikely	43	43%
Very unlikely	2	2%
Total	100	100%

Table 14 indicates that respondents are somewhat unlikely to use mHealth apps to communicate over having direct conversations.

Table 15: Possible challenges encountered in using mHealth applications

Variable	Frequency	Percentage
Poor internet connectivity	10	10%
Concerns about data privacy And security	64	64%
Limited access to devices	10	10%
Others	16	16%
Total	100	100%

Table 15 reveals the challenges respondents have encountered in using mHealth applications. The above data shows that a large proportion of the respondents highlighted concerns about data privacy and security as the major challenge, while others shared their own opinions otherwise.

Table 16: How would you rate the ease of use of mobile applications you have encountered?

Variable	Frequency	Percentage
Very easy	19	19%
Easy	38	38%
Neutral	25	25%
Difficult	11	11%
Very Difficult	7	7%
Total	100	100%

Table 16 indicates that a greater proportion of respondents (38%) agreed that they find the use of mHealth applications easy.

4.2 Discussion of Findings

The research aimed to answer four research questions related to the use of mHealth applications for health communication in UBTH.

4.2.1 Research Question 1: What is the extent to which healthcare professionals and patients are aware of mobile applications for health communication?

In responding to this question, data presented in tables 6, 7 and 9 will be used.

Table 6 sought to know the level of awareness of the respondents of mobile health applications designed for healthcare service delivery. The data presented in Table 6 revealed that 16 respondents (16%) believe that the extent to which they are aware of mHealth applications for health communication is very high. 37 (37%) of respondents say it is high, 11 (11%) respondents reported that their level of awareness is moderate, while 28 (28%) agreed the level of awareness is low. 8 (8%) respondents say their level of awareness of mHealth apps is very low.

Table 7 seeks to know if respondents have ever used mHealth apps for health information. Table 7 indicates that 51 (51%) have used mHealth apps, while 39 (39%) have never used mHealth apps. However, 10 (10%) of respondents claim they can't tell if they have ever used mHealth apps or not.

Furthermore, Table 9 shows that 6 (6%) respondents agree that they use mHealth apps daily, 15 (15%) say it is weekly, and 8 (8%) believe it is monthly, while 50 (50%) agreed that they rarely use mHealth apps. The remaining 21 (21%) say they have never used mHealth apps.

These findings indicate that healthcare professionals and patients of UBTH are aware of mHealth applications for health communication. However, the findings also revealed that a majority of the respondents rarely use the applications. This is opposed to the study carried out by Adum and Mozie (2020), which found that there is a low level of awareness of mobile health applications among staff of UNIZIK due to such factors as high cost of internet subscription and limited awareness of mHealth applications.

4.2.2 Research Question 2: What is the attitude of healthcare professionals and patients of UBTH towards mobile health applications?

Tables 10 and 11 will be used to provide insights into the attitude of healthcare professionals and patients of UBTH towards mHealth apps.

The data presented in Table 10 revealed that 57 (57%) of respondents' attitudes towards mHealth apps are positive, 5 (5%) of respondents' attitudes are negative. 21 (21%) respondents are neutral, while 17 (17%) can't tell.

Table 11 shows that 9 (9%) of the respondents strongly agreed that mHealth apps improve patient care delivery, 37 (37%) of respondents agreed, 26 (26%) couldn't decide, while 19 (19%) disagreed that they improve patient care delivery. The remaining 9 (9%) strongly disagreed.

The findings indicate that the healthcare professionals as well as patients of UBTH have a positive attitude towards mHealth apps. This is as a result of the fact that the majority of the respondents believe that mHealth applications improve patient care delivery. This contradicts the research carried out by Ogundaini, Harpe, and McLean (2021), which inferred that mHealth ICTs can cause negative disruptions, and some participants perceived the use of mobile devices while engaging with patients as unprofessional.

4.2.3 Research Question Three: How effective are these mobile apps in improving health communication between patients and healthcare providers?

Tables 12 and 14 will be used in answering this question.

Table 12 shows that 59 (59%) of respondents believe that mHealth applications enhance communication between healthcare providers and patients, while 41 (41%) of respondents do not believe so.

Meanwhile, Table 14 indicates that 10 (10%) respondents are very likely to use mHealth apps to communicate over having direct conversations. 16 (16%) of the respondents are somewhat likely, 29 (29%) are neutral, while 43 (43%) are somewhat unlikely to do so. The remaining 2 (2%) are very unlikely to use mHealth apps over having direct conversations.

The findings indicate that mHealth applications are effective in improving health communication between patients and healthcare providers. However, there is the preference of having direct conversations over using mHealth apps, particularly in UBTH. According to the Health Belief Model, this result would suggest that healthcare providers and patients of the hospital do not perceive a clear advantage of using mHealth applications over traditional communication methods. The theory also agrees that the absence of institutional policies promoting the use of mHealth applications or success stories demonstrating their effectiveness may have caused the lack of motivation among healthcare providers and patients to integrate these tools into their practice.

4.2.4 Research Question 4: What barriers exist that impede the optimal utilisation of mHealth apps in UBTH?

Table 15 and 16 will be used responding to this question.

Table 15 seeks to know the challenges encountered in using mHealth applications. From the findings in Table 15, 10 (10%) respondents agreed that poor internet connectivity is the challenge they have encountered, and 64 (64%) respondents chose concerns about data privacy and security. 10 (10%) picked limited access to devices, while 16 (16%) chose others.

Also, the data presented in Table 16 revealed that 19 (19%) of respondents agreed that the use of mHealth applications they have encountered is very easy, 38 (38%) said they are easy, while 25 (25%) were neutral. However, 11 (11%) found the use of mHealth apps difficult, and the remaining 7 (7%) agreed that using mHealth apps is very difficult.

This implies that the major barrier that impedes the utilisation of mobile health applications is the concerns about data privacy and security. However, participants generally find the use of mHealth apps easy. This is in direct consonance with the study conducted by Fan, Ezekieldoka and Qalati (2024), where the findings of the study indicated that concerns about data security, lack of trust in technology, and cultural preferences for in-person consultations contribute to the resistance to eHealth services.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study was aimed at assessing the use of mobile apps for health communication in the University of Benin Teaching Hospital. It was carried out using the survey research method. The survey research method for gathering data for the study made use of a questionnaire as the research instrument to gather data from the respondents, which provided the findings of the study.

Below are the key findings of this study:

1. Findings show that healthcare professionals and patients of UBTH are exposed to mHealth applications, and the level of which they are aware is high.
2. Findings show that a majority of the respondents rarely use mHealth apps.

3. Findings show that the attitude of healthcare providers and patients of UBTH towards mHealth apps is positive.
4. Findings show that the majority of the respondents agree that mHealth apps enhance communication between patients and healthcare providers.
5. Findings show that respondents are somewhat unlikely to use mHealth apps to communicate over having direct conversations.
6. Findings revealed that concerns about data privacy and security are the major challenge in using mHealth applications.

5.2 Conclusion

Based on the results, it can be said that among healthcare professionals and patients of UBTH, awareness of the use of mHealth applications for health communication is high. The study has further revealed that mHealth apps improve communication between patients and healthcare providers. However, mHealth applications have not been successfully put to regular use in the hospital due to concerns about data security and cultural preferences for in-person consultations.

5.3 Recommendations

Based on the findings, this study recommends the following:

1. Developers of mobile health apps need to implement robust security measures, such as encryption, secure authentication, and data anonymisation.
2. Developers of mobile health apps should also focus on designing apps that are user-friendly, intuitive, and engaging. They should incorporate features that encourage regular use, such as reminders, rewards, and social networking features.
3. Government should establish and execute policies at the health policy stage that would make the use of mobile health applications a key aspect of healthcare delivery in the nation's healthcare system.
4. Relevant government and non-governmental health organisations should collaborate with both domestic and foreign software developers to create mobile health applications that would cater to each person's unique health needs and preferences.

5.4 Suggestions for Further Studies

1. Investigating Patient Perspectives on mHealth Applications: Understanding patient engagement, trust, and satisfaction with mHealth tools can inform strategies to improve patient-provider communication and overall healthcare delivery.

2. Exploring Gender Dynamics in mHealth Utilisation: Gender roles and dynamics can significantly influence the adoption and effectiveness of mHealth applications. Further studies could examine how gender influences mHealth adoption and outcomes, aiming to develop gender-sensitive approaches that promote equitable access and utilisation.
3. Evaluating Data Security and Privacy Concerns: Data security and privacy are critical factors influencing the adoption of mHealth applications. Further research could investigate the specific security concerns of both healthcare providers and patients and assess the effectiveness of existing security measures in mHealth applications.
4. Evaluating the long-term impact of mHealth: Most existing studies provide a snapshot of mHealth adoption and impact. Longitudinal studies tracking the long-term effects of mHealth applications on healthcare delivery, patient outcomes, and system efficiency would provide valuable insights into their sustainability and effectiveness over time.

5.5 Contribution to Knowledge

Contributing to the existing body of knowledge on mobile health (mHealth) applications, particularly within the Nigerian healthcare context, using the University

of Benin Teaching Hospital (UBTH) as a case study, this research provides empirical data on the awareness, usage, and perceptions of mHealth applications among healthcare professionals in a tertiary healthcare setting in Nigeria. This localised study fills a gap in the literature, offering context-specific insights that can inform both practice and policy.

5.6 Limitations of the Study

During the course of carrying out this research, the researcher encountered some challenges, such as finance, i.e., the cost of typing, printing and especially power supply. Similarly, the respondents were reluctant to fill out the questionnaire because they were sceptical about the mission of the researcher even in the face of repeated explanations that the exercise was purely for academic purposes.

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APPENDIX I

Department of Mass Communication

Faculty of Arts

University of Benin, Benin City, Nigeria

30th May, 2025

Dear Respondent,

REQUEST FOR COMPLETION OF ITEMS IN QUESTIONNAIRE

I am Ehimiaghe Joy Aimalohi, a Final year student of the above named department/ institution. I am conducting a research on, "**Assessment of the use of Mobile Apps for health communication in University of Benin Teaching Hospital".**

This research is in partial fulfillment of the requirement for the award of a Bachelor of Arts degree in Mass communication. You have been carefully selected for this study to provide reliable data. This study is strictly guided by research ethics which protects the anonymity of its respondents. All information you provide would be use for only academic purpose.

Thank you for your understanding and cooperation.

Yours faithfully,

Ehimiaghe Joy Aimalohi

Researcher.

QUESTIONNAIRE

Instruction: please tick (√) on the appropriate option that applies to your disposition.

SECTION A: Demographic Data

1. Gender: Male ( ) Female ( )

2. Age: 18 – 30 years ( ) 30 – 42 ( ) 42 – 54 ( ) 54 - 66 ( ) 66 and above ( )

3. Occupation: Student ( ) Self Employed ( ) Civil Servant ( ) Private Sector ( )

4. Marital status: Single ( ) Married ( ) Divorced ( )

5. Religion: Christianity ( ) Islam ( ) Traditional ( ) Other ( )

SECTION B: Psychographics

6. What is your level of awareness of mobile health (mHealth) applications designed for healthcare service delivery? Very high ( ) High ( ) Moderate ( ) Low ( ) Very low ( )

7. Have you ever used any mHealth applications for health information? Yes ( ) No ( ) Can't say ( )

8. Which of these mHealth apps are you familiar with? MySugr (Diabetes tracker) ( ) MyFitnessPal ( ) Teladoc Health ( ) Calm ( ) Flo (Period and pregnancy tracker) ( ) Others ( )

9. How frequently do you use mHealth applications? Daily ( ) Weekly ( ) Monthly ( ) Rarely ( ) Never ( )

10. How do you perceive mHealth applications? Positive ( ) Negative ( ) Neutral ( ) Can't tell

11. To what extent do you agree that mHealth applications improve patient care delivery? Strongly agree ( ) Agree ( ) Undecided ( ) Disagree ( ) Strongly disagree ( )

12. Do you believe that mHealth applications enhance communication between healthcare providers and patients? Yes ( ) No ( )

13. In your experience, have mHealth applications contributed to more efficient management of patient information? Yes strongly agree( )Yes, somewhat agree ( ) Neutral ( ) No, somewhat disagree ( ) No, strongly disagree( )

14. How likely of you to use mHealth applications to communicate over having direct conversations? Very likely( ) Somewhat likely( ) Neutral( ) Somewhat unlikely( ) Very unlikely( )

15. What challenges have you encountered in using mHealth applications? (Select all that apply) Poor internet connectivity ( ) Concerns about data privacy and security ( ) Limited access to devices ( ) Other ( )

16. How would you rate the ease of use of mHealth applications you have encountered? Very easy ( ) Easy ( ) Neutral ( ) Difficult ( ) Very difficult ( )