

Evaluation of the Ghana Health Service Adolescent Health-Mobile application (GHS- ADH-MAPP)

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DEDICATION

This work is dedicated to my children Ellen, Ellon, Eva, husband Prosper K Yeng and my entire family for their prayers and support.

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ABSTRACT

The use of mobile phones and other mobile devices has tremendously transformed many aspects of healthcare. The mobile phone has become a daily tool in healthcare settings. This has led to an increased growth of medical and health related apps. There are now a broad array of apps that exist to assist the healthcare professional with answering clinical practice and other questions at the point of care. These apps have lots of benefits for healthcare professionals including access to point-of-care tools which supports better clinical decision-making and improved patient outcomes. Despite the benefits they offer, there are barriers to the use of mobile devices and apps in the healthcare setting. This study evaluates the GHS-ADH-Mapp by assessing the perceived usefulness of the app, and its features as well as identifying challenges that impede usability and suggestions to improve it. In-depth interview was conducted to gather data for the evaluation. Results show that the GHS-ADH-Mapp is an effective tool to enhance communication and interaction between healthcare professionals and the adolescent patient. It has made practice of evidence-based healthcare at the point of care more convenient. Also, this study revealed positive attitude of healthcare professionals toward the use of mobile devices and apps in the clinical settings and that the GHS-ADH-Mapp has become a daily reference tool for healthcare professionals' delivery adolescent-friendly health services. Challenges to the use of the GHS-ADH-Mapp is poor internet connectivity, the distraction of normal service delivery, and the inability of users to afford or use a smartphone. Findings were discussed and recommendation suggested for the improvement of the app.

Keywords: GHS-ADH-Mapp, adolescent health, mobile devices, mobile apps

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LIST OF ABBREVIATIONS

ADH	Adolescent Health
ANT	Actor-theory network
CDSS	Clinical Decision Support System
DHMT	District Health Management Team
GHS	Ghana health service
GSS	Ghana Statistical Service
Mapp	Mobile application
MOH	Ministry of Health
RHA	Regional Health Administration
STIs	Sexually Transmitted Infections
UN	United Nation
UNFPA	United Nation Population Fund
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

CHAPTER ONE

1.0 BACKGROUND/PROBLEM STATEMENT

There are approximately 1.2 billion adolescents in the world, 88% of this population live in developing countries, with many of them at risk of unplanned pregnancy, Sexually Transmitted Infections (STIs) and HIV/AIDS (WHO, 2017). WHO described adolescence as the period in human growth and development that occurs after childhood and before adulthood, from ages 10 to 19 years (WHO, 2016). It is a time of opportunity as well as risk. It is said that adolescents see themselves as adults mature enough to have sex yet have little knowledge of the consequences (Atuyambe et al, 2015). Thus, they face numerous critical challenges as they transition from childhood to adulthood including unplanned pregnancies, unsafe abortions, sexual coercion, STIs including HIV/AIDS (UNICEF, 2014). This stage of life is characterised by remarkable physical, cognitive and psychological changes (Senderowitz, Hainsworth, & Solter, 2003). Studies shows' that, the changes that occur in adolescence often lead them to asking questions about their bodies, health and relationship which is often personal or embarrassing to them (Suzuki, & Calzo, 2004). It is said that fear, lack of privacy, operational barriers and concerns of confidentiality make them feel reluctant to consult health personnel for personal health questions especially those of sexual and reproductive health related (Suzuki, & Calzo, 2004, Atuyambe et al, 2015). Per WHO reports about 16 million adolescent girls between the ages of 15-19 years gets pregnant every year with 95% occurring in the developing countries and more than 2 million adolescence living with HIV/AIDS (WHO, 2017). Pregnancy and STIs in adolescence is often not intended but rather a lack of access to essential reproductive and sexual information and health care (UNFPA, 2014). Access to accurate confidential sexual and reproductive health related information has always remained a major challenge for most adolescents living in developing countries such as Ghana. WHO again recognises the period of adolescence as challenging, hence the need to provide accurate, easily accessible, trustworthy, non-threatening sexual and reproductive health education and confidential health services enabling them to make positive and responsible decisions in dealing with their sexual and reproductive issues and needs (WHO, 2011).

In Ghana adolescents constitute a little over 22% of the population, which is a huge proportion. Many of these adolescents are exposed to several physical, social and reproductive health risks

and challenges (Ghana Statistical Service, 2010). According to the Ghana demographic health survey, adolescent pregnancy and motherhood is a major social and health issue in Ghana that reduces women education and employment opportunities. It is said that lack of proper education and access to reproductive health information are some of the factors that increases these health problems (Ghana Statistical Service, 2014). Ultimately, the adolescent need health and counselling services that contribute to preventing health problems, and respond to them when such problems occur (Priya N et al, 2012, USAID, 2012). To provide good and effective health and counselling services, the health professional needs specialized skills in consultation, interpersonal communication and interdisciplinary care (WHO,2012, USAID, 2012). Unfortunately, studies have reported that health workers lack the skills and knowledge to provide adolescent friendly services (Tilahun et al, 2012). Hence, most are unable to provide age appropriate information and education to the adolescent. At the same time, it is reported that, healthcare professionals have high interest in developing these special skills to work effectively with the adolescent but their educational needs are unmet (WHO, 2015). Most of these deficiencies of health care providers in the adolescent field are reported to be associated to undefined work processes and lack of resources (WHO, 2015)

A great resource to use in bridging this informational gap is the mobile phone. According to the 2011 Emergency Obstetric and Newborn Care (EmONC) assessment report, mobile network coverage for the major telecommunications in Ghana is estimated to be 92% throughout the country (MHO/GHS, 2011). This development has led to cell phone ownership to grow rapidly (PewResearchCenter, 2015). It is against this backdrop that the adolescent health unit of Ghana health services in conjunction with UKaid and Palladium Ghana developed a mobile app that was launched in December 2015 for service providers called GHS-ADH-Mapp. The mobile app is to help service providers to be able to deliver quality health services especially to the adolescent. The app is also to serve as a means where care providers and adolescents seeking health information can meet to interact.

1.2 PURPOSE/IMPORTANCE OF THE STUDY

Adolescent sexual and reproductive health is very important and crucial for national growth. Providing adolescents with accurate, easily accessible and trustworthy reproductive health information will ensure positive behavioural practices. Besides, healthcare professionals need to be empowered with the necessary skills and tools to deliver these services. Hence the

development of GHS-ADH-Mapp to provide a guide to accomplish these tasks. The results from this study will go a long way to improve the app as a reference tool for healthcare professionals in Ghana and also as a health promotional tool to promote healthy behaviours among Ghanaian adolescents.

1.3 AIM OF THE STUDY

The aim of this study is to evaluate the usability of the GHS-ADH-Mapp

1.3.1 OBJECTIVES

1. To evaluate the perceived usefulness of the app and its features.
2. To identify challenges that health workers encounter using the app
3. To contribute information for the enhancement of the app.

1.3.2 RESEARCH QUESTION

1. How useful/effective is the ADH-Mapp in the delivery of adolescent friendly health services.
2. What are some of the challenges to the use of the ADH-Mapp.
3. What is the impact of the ADH-Mapp to reproductive health care delivery to the adolescent

CHAPTER TWO

LITERATURE REVIEW

2.0 ADOLESCENT HEALTH ISSUES

Adolescence is a period of opportunity as well as risk. Decisions or actions taken during this stage can set the pace for a healthy life in adulthood or poor health in adulthood (WHO, 2016)

Per the UN reports, the current adolescent population is the largest ever with 1.8 billion of the world population being young people. Over 80% of this population live in developing countries with most of them not achieving their potentials because of so many challenges including lack of information (UN, 2015).

According to WHO many adolescents make it through to adulthood in good health but sadly many others too do not transition to adulthood in good health. An estimated 1.3 million adolescent death occurred in 2012 with most of them occurring in developing countries. Sadly, most of these deaths occurred from causes that are very preventable or treatable. The cause of deaths varies between boys and girls. With boy's majority of the deaths are related to violent behaviour and among the girls most deaths are related to maternal causes (WHO, 2014 and Priya N et al, 2012). Also, there a lot of health challenges that prevents adolescents from learning and working effectively as they should. These challenges prevent them from reaching or achieving their full potentials, such, include teenage pregnancy, HIV, alcohol abuse, and mental health problems. Unfortunately, most of the adolescent population adopt unhealthy habits that lead them to sickness and deaths later in life yet this period is thought of as a healthy period of life (WHO,2014). Such unhealthy habits include unprotected sex that results in early pregnancy and STIs. For example, WHO reported that an estimated 11% of all birth globally occurred among girls between the age of 15 to 19 years in 2014 with majority in developing countries (WHO, 2016). Road injury, HIV, suicide, lower respiratory infections and interpersonal violence were the leading cause of death among adolescents in 2012 (WHO, 2014). Effective measures from health organizations is very crucial to curtail these issues. According to WHO, to be able to reduce the above health challenges during adolescence, they need to have access to timely and safe information and service to make decisions that will enhance and protect their health (WHO, 2011). Besides, because most adolescents are not fully aware of the risks in their environment, they need a safe and supportive environment to live and achieve their potentials through play, work, and studies (Priya N et al, 2012). One very

crucial intervention necessary to tackle most of the health problems during adolescence is access to confidential health and counselling services. This prevent health problems and mitigate them when they do occur (WHO, 2011).

Unfortunately, studies have reported that health workers lack the skills and knowledge to provide adolescent friendly services (Tilahun et al, 2012). Most health workers are unable to provide age appropriate information and education to the adolescent. Besides, adolescents have also been reported having discomfort discussing health problems with health worker especially those related to reproductive and sexual health issues. Also, they are disappointed with how healthcare workers answer their questions or interact with them. According to Olson et al, 2009, both adolescents and parent wish health care professionals discuss broad range of health issues with them. A survey of adolescents showed more than 50% said their physicians never addressed any of the health risk that adolescent wanted to discuss. Studies have it that due to lack of skill and knowledge by some health care providers, adolescents have been denied some crucial services or treated in a disrespectful manner (Tilahun et al,2012, Neema et al, 2004 and Asare et al, 2004).

It has been recognized that adolescent friendly services are very necessary for adolescents to receive health services especially reproductive and sexual health services. Adolescent friendly services are health services prepared to be convenient and utilized by adolescents, they include counselling, contraceptive services, post-abortion care, VCT, and STI information and management, including referrals. Unfortunately, such services are limited, and when even available most adolescent don't access them because of incompetent staffs and lack of confidentiality (Neema et al, 2004). Other studies also suggest that healthcare workers have high interest in developing these special skills required to work effectively with the adolescent but their educational needs are unmet (WHO, 2015). WHO suggest that these deficiencies of health care providers in the adolescent field are associated to undefined work processes and lack of resource.

2.1 THEORETICAL FRAMEWORK

ACTOR NETWORK THEORY

New innovations in technology have become the order of the day in almost all organizations such as the Ghana Health Service. Yet for new technological innovations to be effective or

successful they must be accepted and use by people in the various organizations (Venkatesh et al, 2003); in this case the nurses, doctors, health promotion officers etc. Besides, the introduction of every new technological innovations often comes with challenges. And there are human and non-human factors that influence the success of new technologies (P. Seuwou et al, 2016). Therefore, the way the health workers perceive the GHS-ADH-Mapp will certainly influence how quickly they all adopt it. Also, their willingness to use the app will determine the success or effectiveness of the app. To guarantee the success of a new technological innovation like this mobile app, it is very necessary to consider the human nature of the health workers (P. Seuwou et al, 2016)

Several theoretical models have been employed to explain reasons why people accept and use or reject a new technological innovation (P. Seuwou et al, 2016). In this study, the researcher used the Actor Network Theory (ANT). ANT is used to investigate the social and technical aspects of an organisation that is people, organizations and technology entangled in a network (Walsham, 1997, Monteiro, 2000). The ANT theory views the mobile as an actor and a tool for creating a network that links all other actors. ANT helps to identify and understand that both human and non-human actors in a network are heterogeneous. Therefore, they are treated the same way and also given a collective name '*hybrid collectif*' (Callon and Law, 1995; Walsham, 1997)

ANT theory study the relationship between both human and non-human actors in a network. It was first established from the works of Bruno Latour, Michel Callon and John Law.

According to Michel Callon ANT is a break from the orthodox models of social science. He says that 'ANT is based on no stable theory of the actor; rather it assumes the radical indeterminacy of the actor'. Characteristics such as the actor's size, psychological make-up, and the motivations behind the actor's actions are not predetermined (Calon M and Blackwell O, 2007). In ANT, the actor or actant is described as the "*source of an action regardless of its status as a human or non-human*"(Cresswell et al, 2010). An actor can be a person, an idea, object, a software, or an animal that influence an action in the network (P. Seuwou et al, 2016). In this study, the actors are the health workers, the mobile phones, the app, and internet availability. Another thing worth considering under this theory is the relationship between the actors for example in this case the ability of the health worker to afford a smart phone, use a smart phone and communicate through the app to other colleagues and the head office all influence effective use of the mobile app. Also, ANT identifies how networks are formed,

actors are enrolled, and how networks achieve temporary stability (Creswell et al 2010, Latour B, 2005). Overall E. Monteiro simplifies this by saying that for one to be able to use the mobile app, it is influenced by the person's ability to own a smart phone, prior experience with similar apps or smart phones and so forth. These according to him are connected or associated to how the person uses the app. It is also said that the use of the app should not be considered alone but with all the other factors that are influencing the act (E. Monteiro, 2000)

2.2 WHAT ARE APPLICATIONS (APPS)?

The use of mobile phones and other mobile devices has tremendously transformed the healthcare setting over the years (Ventola CL 2014). Several studies have reported positive attitude and acceptance of both healthcare professionals and patients toward the use of mobile devices in healthcare service delivery (Hassan and Fleegler, 2010, Koehler N et al, 2013). This transformation according to Ventola CL, (2014) is partly associated to the rising availability and quality of medical and health software applications. An app is a piece of software program designed to perform a specific function either on the computer, mobile phone or on the internet (Wallace S. et al, 2012). There is a broad array of apps that exist to assist the healthcare professional with answering clinical practice and other questions at the point of care. They include: drug reference guides, medical calculators, clinical guidelines and other decision support aids (Ventola C. L. 2014).

Medical and health related apps have doubled over the past two years, there are now over 165,000 mobile health and medical apps on the market (Misra, 2015). These apps are used for various purposes in the clinical setting including administration, health record maintenance and access, communications and consulting, reference and information gathering, and medical education (Ventola C. L. 2014). Besides, there are even mobile apps for surgical purposes from surgical simulation, to procedure illustration (O'Neill et al, 2013).

Ultimately the use of medical and health apps has become so popular in the healthcare and medical education settings. Franko & Tirrell, 2011 reported in their survey that more than 85% of medical providers own a smart phone with over half reported using apps in their clinical practice. Several other studies reported over 70% of healthcare professionals and medical students using at least one medical app regularly, with 50% using their favourite app on daily basis (Murfin, 2013, Wallace S, Clark M, White J, 2012).

Increase in the usage of medical and health apps was further transformed in 2008 by the launch of the Apple iTunes Appstore, which gave users of iPad, iPhone, and iPod Touch (iTouch) users the ability to shop for and download apps from an online market. This was further enhanced when Apple created the “*Apps for Healthcare Professionals*” section within the medical category of the Appstore (Murfin, 2013, Ventola C. L. 2014).

2.3 BENEFITS OF MOBILE APPS IN THE HEALTHCARE SETTINGS

Mobile devices and apps has revolutionized healthcare delivery. They enable healthcare professionals access evidence-based decision support and patient management systems in a timely fashion. This improve clinical decision making and improve patient outcome (Mickan et al, 2013, Ventola LC, 2014, Davis et al, 2012). Mobile devices present fewer barriers related to time of day or location. This prevents medical errors and facilitates accuracy (Mosa et al, 2012, Patrick et al, 2009). The increase in use of mobile devices and apps has made healthcare delivery more convenient. They are portable, one can easily access information and it has made communication flexible (Wallace, Clark, & White, 2012). Healthcare professionals and medical students refer to instant access to information like updates about new books, guidelines, reviews, and medical literature as a key convenience (O'Neill et al, 2013, Mickan et al, 2013).

Besides, it is evident that, mobile devices improve completeness and accuracy of patient documentation (Mickan et al, 2013, Divall et al, 2013). It is said that, documentation using mobile devices is significantly better than paper especially when it came to detailed description of clinical findings and correct progress assessment (Ventola C. L. 2014). Mickan et al, 2013, in their review observed that the use of mobile devices has led to more reporting of accurate diagnostic coding and frequent documentation of side effects. Fewer discrepancies and errors were observed when mobile devices like PDAs were used in recording of neonatal patient weight in intensive care and to create discharge order lists (Mickan et al, 2013).

Furthermore, the use of mobile devices and apps in the clinical settings has improved the practice of evidenced based medicine. They have become invaluable tools in clinical decision-making at the point of care (Ventola C. L. 2014, Mickan et al, 2013). Healthcare professionals such as pharmacist, physicians, nurses, medical students etc. cited drug reference, medical textbook, disease diagnosis, and medical calculator apps as the most useful mobile tools for supporting evidence-based medicine and clinical decision-making (Mosa et al, 20112). Divall et al, 2013, reported an increase in the appropriateness of diagnoses and treatment decisions

when a clinical decision support system (CDSS) app was used to support clinical decision. There were twice as many adjustments in patient management decisions; changes in drug prescription when an electronic reference app was used compared to cases in which only paper resources were used (Ventola C. L. 2014, Mickan et al, 2013).

The use of mobile devices and apps has increased efficiency among healthcare professionals. There are now reported fewer errors in patient documentation, more complete records, rapid access to new information, and improved workflow patterns (Mickan et al, 2013). *“Physicians who used mobile devices during patient rounds reported spending less time accessing, retrieving, and recording data and said that the increased efficiency freed up more time for direct patient care”* (Ventola C. L. 2014).

Going forward the use of mobile devices and apps in the healthcare sector has been reported to enhance productivity (Ventola C. L. 2014). Mickan et al, (2013) found that, the use of mobile devices has cause a significant increase in the average rate of electronic prescribing, from 52% to 64%. Thorough documentation was observed among pharmacists that used a mobile device, they recorded more information and completed more fields (Mickan et al, 2013). Similarly, mobile apps have been observed to increase pharmacist productivity by allowing important drug information, such as contraindications and interactions, to be checked quickly, resulting in more rapid processing of prescriptions (Ventola C. L. 2014).

2.4 CHALLENGES

Even though the use of medical apps on mobile devices provides clear benefits, there are disadvantages as well as significant risks (Franko, & Tirrell, 2011). Such challenges or risks could include distractions; healthcare professionals using a mobile device could be interrupted from their normal work by beepers from email sign ups, advertising banners, pop-ups and phone calls (Franko, & Tirrell, 2011, Wallace S, Clark M, White J., 2012). A survey of 439 medical technicians found that 55 percent of technicians who monitor bypass machines acknowledged they had talked on cell phones during heart surgery with half of this number saying they had texted while in surgery (Richtel, 2011).

Furthermore, infrastructural constrains poses a challenge to the potential benefits of mobile devices and apps in the healthcare settings. According to Franko, & Tirrell, 2011 most of mobile devices and apps are only as good as the availability of Internet and bandwidth or the

speed of interaction. This impact on clinical use especially in developing countries where internet availability and connectivity is a challenge (WHO, 2011).

Privacy and security of data is a major concern to the use of mobile devices and apps in the healthcare settings. Franko, & Tirrell, 2011 reported that, most mobile devices have root kits (which are stealthy types of software designed to conceal the existence of processes or programs from normal methods of detection). These programs enable continuous privileged access to a digital device. Cookies are sometimes inserted into downloads to track browsing history. This information can be sold to other interested organizations such as medical suppliers and pharmaceutical companies (Franko, & Tirrell, 2011).

Again, it is vital that technological innovations for healthcare such as medical and health apps are reachable by all probable users, including adolescents, elderly, those with low literacy, and those with disability. But often, mobile phone technology for health is displayed on sophisticated devices like a smart phone that has complicated user interfaces necessitating some levels of skill to operate (Patrick et al, 2009)

2.5 PROVIDING HEALTHCARE TO THE ADOLESCENT THROUGH TECHNOLOGY

Mobile health (mHealth) interventions are growing rapidly in developing countries. And they have become important method of connecting adolescents to health information and services. Traditionally, the source of health information especially reproductive and sexual health for adolescents was parents and relatives. But now several studies have found out that this is no more the case (S. J. Bleviss, 2011, S.K. González). More challenging is the fact that adolescents are becoming more secretive in discussing their problems and challenges with health care providers. This leads to difficulty in providing the best of care to them (Hassan and Fleegler, 2010). Technology could be the answer to these issues because technology enhance access to knowledge and information when used properly (M.W. Baldwin and S.D. Dandeneau, 2009). According to González in her master's thesis, she found through focus group discussion that the youth have interest in using apps related to sexual and reproductive health (S.K. González).

Several studies attest to the fact that the use of new technological innovations such as computers, personal digital assistance (PDA) in healthcare has become acceptable to patients and very supportive to health workers (Hassan and Fleegler, 2010). According to S.L. Mackenzie et al, 2007 people consider computer based programs to be confidential and non-

judgemental. Therefore, people tend to give more accurate and honest answers to very sensitive enquiries. One study conducted in America about a substance abuse screening tool called CRAFFT found that adolescents preferred computer based questionnaire when asked about substance abuse than to answer questions face to face with a doctor or a nurse (JR Knight et al, 2007). Besides there is high openness by adolescents in very sensitive topics like sexual and reproductive health when it came to using multimedia computer based interviews (Watson et al, 2001). Watson et al concluded in their study that multimedia computer -assisted self-administered interviews enhance perceptions of privacy and confidentiality, which to a large extent improve honesty of responses. There are several new technological innovations that provide, educate and increase the zeal of adolescence to seek healthcare services (Hassan and Flegler, 2010). Besides, technological innovations give opportunity to health care providers to explore and create new ways to engage and listen to adolescents to provide very effective health interventions (C.W Evers et al, 2013). Some of these technological innovations include mobile apps, text messaging, personal digital assistant and computer interventions.

2.6 THE USE OF MOBILE PHONES IN HEALTHCARE SERVICE DELIVERY

Over the years' clinical practice has been transformed by mobile phones and other mobile devices. Koehler N et al, (2013) have reported positive attitude of healthcare professionals toward the use of mobile phones and other mobile devices in service delivery. These positive attitudes have led to a tremendous growth in medical and health software applications (Ventola C. L. 2014). At present, there are wide range of mobile apps available to assist healthcare providers in their daily duties, such include, patient management and monitoring, reference and information gathering, time management, clinical decision making and many more (Wallace S. et al, 2012). It is evident that the use of mobile phones and apps has increased access to point of care tools meaningfully. This has led to better clinical decision-making and improved patient outcomes (Mickan, S, 2013, Ventola C. L. 2014). Healthcare providers need these resources to better communicate and access information. It is apparent that healthcare service providers access different types of resource during service delivery (Ventola C. L. 2014). According to Mosa et al, 2012, mobile phones and apps enable healthcare professionals make voice calls, sent and receive emails and text messages, access electronic health records, online medical literature, guidelines, medical calculators, disease diagnosis aid and many more resources within the clinical settings.

2.7 THE GHS-ADH-MAPP.

The GHS-ADH-Mapp is an educational app for Ghana adolescent health program service providers. It was also design in such a way that adolescent can communicate through the app to healthcare providers. Below is the home screen, it features the main menu items: resources, job aid, forum, newsletters, Events and frequently asked questions (FAQ). It also has the logo of Ghana Health service (GHS) and the other partner organizations.



Figure 1 The Interface of the GHS-Mapp

2.7.1 THE RESOURCE SECTION

Here you will find a collection of information, educational and communication (IE&C) materials design to assist care providers in attending to the adolescent effectively. Some of the materials include the GHS Reproductive Health (RH) policy, family planning flip charts, manuals, standards for adolescent and youth friendly health services (AYFHS), brochures and posters.

2.7.2 JOB AID

It is a handy desk reference tool for service providers. It is in three parts: part one is to do with the clinical interaction between the adolescent and the health worker. It includes how to establish rapport with the adolescent, take their history, do physical examination, communicating findings to the adolescent and so much more.

Part two contains answers to predetermined frequently asked questions from adolescents. They include questions and answers ranging from puberty issues, menstrual issues to pregnancy related issues. Below is an example of how to interact with an adolescent who has irregular menstrual cycle.

ASK

Irregular periods

How old were you when you had your first period?
When was your last period?
How many days are there usually between your periods?
What is the most number of days between your periods?
What is the least number of days between your periods?
Do you have spotting or bleeding in between your periods?
If so, does this occur frequently?
Do you use contraceptive pills or do you use any medications/ contraceptive pills to regulate your periods?



Figure 2 Screenshot of some predetermined questions

Part three contains general information the health worker is to provide to the adolescent and any other accompanying adult. Information here ranges from nutrition, physical activities, substance abuse, and how to handle violence or abuse.

The forum is where health service providers can meet and discuss series of issues. Here adolescents can also meet with care providers and ask questions. There are series of topics one can choose. Below is a screen shot of the forum.



Figure 3 Screenshot of the forum section

Events like conferences, meetings etc. that are taken within the organization are poster on this section. Here staffs can check for incoming events and plan accordingly.

FAQ sections: here you find frequently asked questions and the correct answers.

CHAPTER THREE

3.0 RESEARCH SETTINGS AND METHODOLOGY

This chapter has details of how the entire research was planned and carried out. It has a brief description of the study country, Ghana, its healthcare system as well as the profile of the study site. This chapter also details the research methodology; research design, the data collection procedure and the data analysis strategy.

3.1 RESEARCH SETTINGS

This study was conducted in Ghana, at the Brong Ahafo Regional capital, Sunyani. Specifically, the study was conducted in the Sunyani municipal health directorate area. This place was chosen because it one of the municipalities in Ghana championing adolescent health. It is also because the researcher is a former employee, this make it easier to access the research site. The municipality is also the residence of the researcher, it helped in reducing transportation cost.

3.1.1 STUDY COUNTRY PROFILE-GHANA

Ghana is a West African nation, it situated in the coast sharing boarder with Burkina Faso in the North, Togo in the East, Cote d'Ivoire on the west and the Gulf of Guinea on the south. Ghana was the first country in Sub-Sahara Africa to gained independence, 6th of March 1957 from its colonial masters, the British. Ghana adopted the English language as its official language since it is a British colony. However, it is a multi- lingual state with over 50 languages and dialect. Ghana is a developing country, it occupies an area of 239,460 square km. It is naturally endowed with Gold, timber, diamond, bauxite, petroleum, rubber, manganese and other natural resources (World Fact book, 2017). According to the 2010 census report Ghana has a population of about 24, 658, 823 people with 22% of the population being adolescents (Ghana Statistical Service, 2013). There are ten administrative regions which are divided into about 216 districts. Below is the political map of Ghana (World Fact book, 2017).



Figure 4 Ghana map showing the ten regions

Source: <https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html>

3.1.1.1 HEALTHCARE SYSTEM IN GHANA

Over the years, Ghana has been committed to providing universal healthcare to Ghanaians through the national health insurance scheme. Comparatively Ghana has a well developed healthcare system than most African countries (IICD, 2014). Healthcare is mainly financed through the national health insurance scheme. Those who are not signed up pay out of their pocket at the point of service delivery. In Ghana, even though religious mission and private individuals provide healthcare, the government is the main provider of healthcare through the Ministry of Health (MOH) and Ghana Health Service (GHS). The GHS is monitored by the MOH, it has the responsibility of providing comprehensive healthcare at all levels except the teaching hospitals which include Tamale, Komfo Anokye teaching hospital and Korle-Bu teaching hospitals. The MOH regulates health services, formulates policies, mobilization of resources and monitoring and evaluation of healthcare service delivery in Ghana. There are five levels of healthcare delivery in Ghana: the community, sub-district, district, regional and national.

Basic preventive services and treatment of minor ailments are treated at the community and household level through the Community-based Health Planning and Services (CHPS). At the

sub-district level, the health centres provide both curative and preventive services, they also provide outreach services which is mostly child growth monitoring and reproductive health services to communities within their catchment area. The sub-district also provides minor surgical care like incision and drainage.

At the district level, the district hospital provides medical and surgical services whilst the District health management team (DHMT) provide the public health services. The regional level healthcare service is delivered through the regional hospitals. The regional hospitals serve as a referral point for cases from the district level. In addition, the regional hospital provides primary curative care. The DHMT provide preventive services at the regional level with the Regional Health Administration (RHA) playing a supervisory role for the districts and sub-districts within the region.

The teaching hospitals provide tertiary curative and specialist care. They serve as a referral point for the districts and regional hospitals. Students in medical schools do their practices here.

It is undeniable that traditional healers and herbalist do provide healthcare. But this is mostly common in the rural areas of the country.

Ghana's healthcare system like all other developing nations is bedevilled with certain challenges. Inadequate and unequal distribution of human resource is one major challenge crippling effective healthcare in Ghana. Majority of healthcare professionals that Ghana have are concentrated in the urban areas. This makes it difficult for rural dwellers to access specialist care. They have to travel long distances to receive care (Saleh, 2012). According to WHO, Ghana's 2014 ratio of doctor to patient is 1: 9,043, a nurse to patient is 1:959 and midwife patient ratio is 1: 1,374 (WHO, 2015).

3.1.1.2 STATE OF EHEALTH IN GHANA

Ghana like all other developing countries faces challenges in providing healthcare to the rural community. As a country, Ghana seeks to improve and cut down cost in healthcare delivery through new technological innovations. In 2010 Ghana launched a National e-health strategy provide a framework for the design and rolling out of e-health projects in the health sector (Ghana e-Health strategy, 2010). The national strategy has four main strategies: to streamline the regulatory framework for health data and information management, build sector capacity for a wider application of e-health solutions in the health sector, increase access and bridge the

equity gap in the health sector with ICT and to achieve a paperless records and reporting system in the health sector of the country (Ghana e-Health strategy, 2010).

The eHealth strategy is yet to come into full force because of certain challenges. The health sector is fragmented and also lack the human resource required to undertake large-scale e-health projects. Interoperability is also another big challenge to the rolling out of the eHealth strategy, various facilities use ICT systems from different vendors. Besides there is no regulatory body to monitor the development of various e-health applications (Ghana e-Health strategy, 2010).

Ghana has a nationwide health information system; District Health Management Information System (DHMIS2). DHMIS generates electronic data from all the districts to help in monitoring and evaluation of public health issues. The electronic data is based on the International Statistical Classification of Disease and Related Health problems (ICD10) standards (IICD, 2014). DHMIS2 like all other electronic health record system have some challenges, some districts or facilities submit incomplete information making it difficult for the system to work effectively.

Besides this, several international organizations have initiated some pilot eHealth projects. Afarikumah E. 2014, in his study identified about twenty-two (22) pilot eHealth projects that are at various stages of implementation in Ghana. According to him most of these projects are donor initiated. These projects can be classified into five categories which include data management, hospital management information systems, public health systems, telemedicine and eLearning systems (IICD, 2014)

3.1.2 THE RESEARCH SITE-SUNYANI MUNICIPAL HEALTH DIRECTORATE

The research was conducted in the Sunyani Municipal health directorate area. It is situated in the capital of the Brong Ahafo region of Ghana. The Sunyani Municipality covers a total land area of 506.7 Km². It is bordered on the north by Sunyani West District; west by Dormaa East District south by Asutifi District to the South and east by Tano North District. The Health directorate comprises of Six hospitals, twelve clinics, seven CHPS compound, three maternity homes and three health centres. It has a population of 123,224 with about 26,928 being adolescents (Ghana statistical service, 2014)

3.2 THE RESEARCH APPROACH

The purpose of this study is to find out if the GHS-ADH-Mapp is use effectively as it should. To achieve this, the views of those using the mobile app is very important and crucial. To gather user experiences about the app qualitative research was considered appropriate.

Research objectives

The primary goal of this study is to access how usable the GHS-ADH-Mapp is as a communication tool and a reference. The other objectives include

1. To evaluate the perceived usefulness of the app and it features.
2. To identify challenges that health workers encounter using the app
3. To contribute information for the enhancement of the app.

Research questions

1. How useful/effective is the GHS-ADH-Mapp in bringing informational gap between health workers and the adolescent.
2. What are some of the challenges to the use of the GHS-ADH-Mapp as an effective tool for bridging the gap between technology and health service.
3. How has the GHS-ADH-Mapp impacted healthcare delivery to the adolescent

3.2.1 RESEARCH DESIGN

According to Myers “A research method is a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection. The choice of research method influences the way in which the researcher collects data” (Myers, 2009). Mostly the research problem determines which research design is appropriate. It enables the researcher use the information obtained from the study to effectively address the research problem. To understand user experiences there are several research designs available to use. In this study, qualitative research method was used. Below are the two major research methods that can be used to access user experience.

3.2.1.1 QUALITATIVE VERSUS QUANTITATIVE RESEARCH DESIGNS

Most researchers use either one of these methods to conduct research but others also combine one or two research method (triangulation) for their study (Myers,2017). Quantitative research method according to Stoop & Berg, 2003 are appropriate for “*establishing the size, extent or duration of certain phenomena (how much), or to establish that a specific cause or intervention results in a prespecified effect*”. On the other hand, qualitative research seeks to negotiate and construct meanings in social interaction. It focuses on the “*meaning that people attach to experiences, the relationship between knowledge, experiences and action and the social factors that shape these processes*” (Popay & Williams, 1998). In quantitative research data is collected through questionnaire/survey, experiments, time studies etc. and analysed through statistical inferences and numerical comparisons while in qualitative study data is mostly collected through interviews and participants’ observation and analysed by themes (Simply Psychology, 2008).

Quantitative research method is said to ignore the relationship between the context, human behaviour and the technology (Benbasat et al., 1987). Qualitative methods like user participation and sociotechnical approach is recommended for a successful design and implementation of new technological innovations (Walsham, 1997). Therefore, Qualitative research method seems suitable for this study since it will help understand how and why users interact with the GHS-ADH-Mapp.

3.2.1.2 INTERPRETIVE RESEARCH APPROACH

Interpretive research approach was adopted under this study to get views or perspective of users about the GHS-ADH-Mapp and how it has impacted service delivery. Trauth (2000) said, “*Interpretive studies assume that people create and associate their own subjective and inter-subjective meanings as they interact with the world around them... The intent is to understand the deeper structure of a phenomenon ... to increase understanding of the phenomenon within cultural and contextual situations....*” Interpretive research enables the researcher to understand how new technological innovations influences and is being influence by individuals and organisational culture (Walsham, 1995).

There have been lots of criticism regarding the quality and validity of interpretive research. To overcome these criticism Klein and Myers (1999) propose these seven principles; these principles were the fundamental guide during data collection and interpretation of this study.

1. The Fundamental Principal of Hermeneutic Circle. This principle proposes that “we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships” (Klein & Myers,1999).
2. The second principle requires the researcher to critically examine the social and historical background of the research setting. It is the Principle of Contextualization (Klein & Myers,1999).
3. The Principle of Interaction Between the Researchers and the Subjects requires some sort of social interaction between the researcher and participants to get full understanding or picture of the situation (Klein & Myers,1999).
4. The Principle of Abstraction and Generalization. It requires discussing findings in relation to existing theories (Klein & Myers,1999).
5. The Principle of Dialogical Reasoning requires sensitivity to contradictions of the researchers preconceive ideas and the facts generated from the research (Klein & Myers,1999).
6. The Principle of Multiple Interpretations require the researcher to report the different perspective of all participants (Klein & Myers,1999).
7. The Principle of Suspicion requires the researcher to exercise caution against possible biases and systematic distortions in the views of participants (Klein & Myers,1999).

With the above it is very much appropriate to consider interpretive research approach when trying to find how health workers perceive the GHS-ADH-Mapp.

3.2.3 SAMPLING TECHNIQUE

The population under investigation are healthcare professionals within the Sunyani Municipal health directorate. However, this study population was limited to only those who work with adolescents and were trained on how to use the app. The study took about two weeks to complete.

3.2.3.1 SAMPLING METHOD AND SAMPLE SIZE

Sampling ensure accuracy in research. The study used purposive and convenient non-probability sampling techniques in identifying the research participants. Purposive sampling was used because the researcher had a group of persons in mind, in this case they were healthcare professionals delivery adolescent friendly services in the Sunyani municipal directorate area. Convenient sampling on the hand was used to identify specific users of the app. Usually staffs of the various sub-district under the Sunyani health directorate brings their weekly report to the head office for submission every Monday, the researcher use this opportunity to interview any of them that uses the GHS-ADH-Mapp and willing to participate in the study. However, the sample size was determined by the principle of saturation. This was to prevent the collection of repetitive data that do not add any value to the research (Walker JL,2012).

3.2.3.2 SELECTION OF PARTICIPANTS

During the pretesting of the interview guide the researcher realized that some of the health professionals involved in adolescent healthcare services did not know about the existence of the mobile app because they were yet to go for workshop/refresher course on the app. The national office used workshops as a means of introducing the staffs to the app. Those who were yet to get this training and not using the app were excluded in this study. All those who participated in the study could speak and write English language.

3.2.4 DATA COLLECTION METHODS

The aim of the research was to gather views of health professionals regarding the GHS-ADH-Mapp. Considering the research objectives and reviewing both research approaches qualitative and quantitative, the researcher thought it wise to use a qualitative approach (interpretive) with focus on in-depth interviews to gather adequate information from participants.

Data was collected within a period of three weeks. As stated above interviews were conducted the municipal health directorate head office. Each interview lasted not less than ten minutes. Interviews provide insight to a complex phenomenon. According Robson, 2011, interviews require some level experience and amount of skill by the researcher. In all six interviews were conducted, these included four community health nurses, the municipal health promotion officer and the focal person on adolescent health. Interview guide was used to ensure that all necessary information needed to answer the research questions were asked. To encourage a

good interaction between the researcher and the respondents open-ended questions were used. Open-ended questions ensure that responses are in the respondent own words not predetermined words by the researcher. All interviews were conducted in English language. This made it easier for the researcher to transcribe and interpret/analyse the data. All interviews were tape recorded with permission from the respondents. It was later transcribed and subsequently deleted.

The study also sought to interview the national coordinator of this project and the developers of the mobile app but this proof futile. The researcher contacted the national coordinated through phone call to schedule an appointment for the interview. The coordinated agreed to do the interview but later refused to pick the calls. Further, emails were sent out to get their responses but none of the emails were responded to.

To make meaningful presentation of qualitative data the researcher is required to think clearly as an analyst (Robson, 2011). Qualitative data involves the analysing of words in the form of descriptions of experiences from research participants. The Interviews guide for the study was structured according to themes to reflect the main objectives of the study. This made it easy to analyse transcribed data. Themes were formed from the research objectives and the literature. Some of the themes included; perceived usefulness of the app and it feature, challenges that health workers encounter using the app and some contribution for the enhancement of the app. The steps used in this data analysis was adopted from the one described by Aronson, 1994. Phrases, words or patterns of experiences from the transcribed data were first listed and labelled. Secondly, all phrases, words, experiences related or similar to the classified pattern were also identified. Lastly, the listed patterns were now linked to the various themes listed above.

3.4 ACCESS TO RESEARCH SITE

The researcher was present at the study site for a period of three weeks. All respondents the researcher contacted were willing to be interviewed. This was made easier because the researcher is a former staff member of Sunyani municipal health directorate. Initial contact with the national coordinator for adolescent health and the municipal health director made it much easier.

3.5 ETHICAL CONSIDERATION

Before the researcher started data collection a letter of permission from the researcher supervisor was presented to the municipal Health director seeking approval to conduct the study in the municipality. The health director also gave an approval letter to forward to the Ghana health service ethical committee board. This study was granted approval from both the University and Ghana health service ethical committee board.

Also, participants were duly informed of the purpose of the study. Their consent was sort before tape recording. They were made to also understand that participation was voluntary and they could stop at any time they wish. Besides, no name of any respondent was requested to ensure anonymity.

3.6 LIMITATION OF THE STUDY

Evaluative studies tend to benefit from the use of multiple research approaches like interviews and observations but in this study, only one approach that is in-depth interview was used therefore reliability of the results may be questionable. Interviews rely only on the personal views of respondents; this is liable to bias and inaccuracies.

The approach use in this study is qualitative approach, unlike quantitative it becomes very difficult to generalize the findings when qualitative research approach is used. As mentioned earlier triangulation would have been appropriate for this study.

Lastly, because the researcher could not get the views of the national coordinator and developers of this app, it makes it difficult to get a full picture of the situation.

CHAPTER FOUR

4.0 Data Interpretation

This section provides finding from the interview conducted. Those interviewed were health workers who are currently using the GHS-ADH-Mapp or have ever used it. The findings are presented based on the research objectives i.e. To evaluate the perceived usefulness of the app and its features, to identify challenges in using the app and to contribute information for the enhancement of the app.

In all, six interviews were conducted including the municipal focal person for adolescent health, the municipal health promotion officer and four community health nurses. These four community health nurses were trained on adolescent friendly health services and the use of the GHS-ADH-Mapp. Among the six participants, five of them are current users of the app. Only one is not currently using the app. When enquired why the participant was not using the app she said she just changed a phone and is yet to install the app on the new phone. All six participants also agreed that the app contained information not only necessary for adolescent health but for reproductive and sexual health in general. As to the frequency of use, most said they use it on a daily basis; it has become their daily guide. Also, none of the participants have ever used a similar app; it is the first of its kind in Ghana.

4.1 USEFULNESS/EFFECTIVENESS OF THE GHS-ADH-MAPP

Data from the interviews pointed that the app was useful although not every aspect of the app was being used effectively. Before the development of this app, health workers used to carry bulky documents to the field for health education. From the interviews, all participants agreed that the app has been convenient and helpful, it has made going for field work simpler and easier; no need to carry bulky documents, all what you need is on the app. One of the community health nurses interviewed cheerfully said, *'it is very good, it has come at a time where we have a lot of adolescent reproductive health issues, it helps all health workers to provide quality health services to adolescents without any prior training on adolescent health. Also, once downloaded you don't need the internet to view important information like the*

protocols and the reproductive health policies; instead of carrying a lot of books to the field it is now easier and simpler to carry your mobile phone'. Besides, the focal person for adolescent health in the municipality said 'I think it is very good, it is going to help the adolescent reach their reproductive goals. It serves as a reference source for health workers delivery adolescent reproductive health services.' They liked the app because it reminds them things that they might have forgotten of during service delivery.

All participants said the GHS-ADH-Mapp has become a daily tool that they use in the delivery of adolescent friendly services. A participant in the study said, *'this app is very helpful and I use it every time an adolescent patient is before me. I remember the other day an adolescent walked into my office with an issue, I didn't have an idea of how to go about it, but after going through the policies and resources on the app I was able to refer her to right person and she got the help that she was looking'.*

The mobile app, first of its kind in Ghana was launched in 2015 by the Ghana National Adolescent Health programme to assist the health care provider deliver quality health services especially reproductive and sexual health to the adolescent. It is also to provide information and a platform for adolescents to communicate with care providers. The app has a resource section where you can find a collection of health information, education and communication materials including; how to conduct counselling, reproductive health policies, family planning and pictures to show the audience during health education sessions. When a question was asked about the most part/section of the app they use very often, all six participants said they use the resource section on daily basis. Because it provides them with all the information they need in their daily interaction with the adolescent patient.

4.2 IDENTIFY CHALLENGES TO THE USE OF THE APP

For every ICT tool to work effectively the knowledge and ability to afford is very crucial. All participants involve in the study were very knowledgeable with the use of smart phones. But they lamented that the older generation will have problems using the app since they are not conversant with the use of smart phones. They also lamented that the app would have been widely used if they could get it on all other phones rather than smart phones, not all especially the adolescent can afford to own a smart phone considering that Ghana is a developing country where poverty is at its highest peak. Most participants were of the view that one key challenge of the app is because it is only smart phone supported, one participant recounted *'one big problem about the app is you have to have a smart phone to be able to use and it is not that*

easy to afford a smart phone'. The participant went further on to say that *'you cannot use the app if you are not conversant with the use of a smart phone'*.

The study also sorts to find out how fast a user who has never seen the user interface before can accomplish basic tasks. Considering the question whether one needed technical guidance or support to begin the use of the app, 66% of all those interviewed said there was no need for any technical support. They said if one is acquainted with the use of other mobile applications like WhatsApp and Messenger there is no need for any training or assistances. One said *'if you are used to a smart phone that shouldn't be a problem, it is just like any other app like Facebook or WhatsApp'*. The remaining 34% said one needed support or guidance to navigate the app for the first time. One of them bemoaned *'yes, it is very difficult to go around the app without help, even with help it takes time to be able to use it comfortably I suggest they make it user friendly in the sense that when you download it you wouldn't need any help to use it. Comparatively there are a lot of apps we download from our app store and start using without any help so this app too should be like that.'*

The GHS-ADH-Mapp has section for communication, it is a place where one can ask a question and get answers from experts without being identified. But this platform all the participants lamented that is not working properly even though it has the potential to improve communication between them and their colleagues and the adolescent patient. They also complained that this section is dependent on the availability of internet. One person said *'this section of the app has great potentials but I don't use it because it is dependent on the availability of internet. Besides the intended purpose of that section is not being achieved, you ask a question and you never get an answer.'* This section was intended to be a platform where health workers attending to adolescents could ask their colleagues and superiors questions whenever they face a challenging situation. It was also intended for adolescents to ask anonymous questions since most of them do not feel comfortable talking to health care providers face to face on sensitive matters. One of the community health nurses providing adolescent friendly services in the municipality mentioned that because of the non-response to questions asked on the platform the adolescents' prefer to communicate directly with her through Whatsapp and text messages.

Another challenge identified during the study was about the size of the phone screen. Most of them lamented that it becomes very difficult to use the pictures during health education sessions

because of the small nature of the phone screen. But generally, all of them were comfortable using it on their phones because according to them it is just like any other application and that it is very easy to carry around and can be used effectively in the remotest part of the country.

Furthermore, even though the primary audience of the app is the health worker but it is also meant to serve as an empowerment resource for the adolescent and the public. All participants lamented that the terminologies used on the app was okay for them the health workers but it will be a little bit difficult for the adolescent and the public to understand. The municipal health promotion officer said, *'for us the health workers' terminologies used are very okay but for the adolescents and the public they may find it challenging.'*

As to whether the sections of the app were appropriately label all participants agreed that sections were appropriately labelled. They all agreed that there was no confusion about the labelling and that labelling was done per laid down standards.

4.3 SUGGESTIONS TO IMPROVE THE APP

Among all the six participants interviewed only one participant said the app was perfect and does not need any improvement but most agreed that the language should be made simple for not just the adolescent but for the public to use it effectively.

They also suggested that, a newer version of the app should be made to be used by all phones not just smart phones, because most adolescents can't afford smart phones.

Besides, they suggested that the app should be in such a way that anybody can download it, understand and use it without any assistance and that the chat section should also be improved so that they can use it like other mobile applications like whatsapp.

One participant further suggested that they should add short demonstration videos for service providers to see how to properly they should carry out specific activities example counselling.

Lastly, one also mentioned that information on the app should be updated regularly as adolescent health issues changes every now and then.

CHAPTER FIVE

5.0 DISCUSSION

This chapter discusses and describe key findings from the study in relation to the research objective. It is divided into three main parts. Part one discusses with the usefulness of the GHS-ADH-App. This part also referred the findings to the theoretical framework. Part two talked about the challenges of the app and lastly part three took into consideration the suggestions by participants to improve the app.

5.1 USEFULNESS OF THE GHS-ADH-MAPP

From the findings, it is proven that mobile phones are a great way to enhance communication and contact between healthcare professionals and the adolescent patient. Now health workers have access to adolescent health information at a click of a button. This finding affirm what Ventola LC, (2014) asserted in her study, that, mobile phones are a feasible platform to improve communication and interaction between healthcare professionals and patients. The GHS-ADH-Mapp has become a daily resource tool for adolescent healthcare service providers. Participants suggested that they use the app as and when they have an adolescent client before them. This has supported what Wallace, Clark, & White, 2012 said, mobile phone has become an everyday tool in the healthcare setting. Mobile phones such as the smart phones facilitate learning through access to key facts (Davis et al, 2012). The GHS-ADH-Mapp is such tool, it serves as a reference source and a validation tool for healthcare professionals at the point of service delivery. The GHS-ADH-Mapp has made service delivery convenient. Before the development of this app, health workers used to carry bulky documents to the field for health education. The healthcare professionals in this study described this mobile app as a suitable tool in their daily dealings with the adolescent patient. They said it is convenient in the sense that, it is very easy to carry around and that it provides rapid access to information like guidelines, protocols and policies. They no longer need to carry books along for field work. A participant said, *'it is very good, it has come at a time where we have a lot of adolescent reproductive health issues, it helps all health workers to provide quality health services to adolescents without any prior training on adolescent health. Also, once downloaded you don't need the internet to view important information like the protocols and the reproductive health policies; instead of carrying a lot of books to the field it is now easier and simpler to carry your mobile phone'*. They also cited that it has the potential to improve communication between

them and their colleagues and the adolescent patient. Other studies have confirmed the availability of similar apps and that increasing number of healthcare professionals are using them (Visser, and Bouman, 2012). Similarly, Wallace, Clark, & White, 2012, also agreed that mobile phone apps are convenient tools for healthcare professionals. Medical students in their study agreed that mobile apps are very convenient since no longer need to carry reference books. They continue to say that apps such as this facilitates communication among healthcare professionals, and that it has the potential to enhance both patient care and learning (Wallace, Clark, & White, 2012). So, did Mickan et al, (2013) say, apps such as this help healthcare professionals to stay current through access to updates and new medical literature

Furthermore, medical apps for mobile devices are vital tools. They make clinical decision making easier at the point of care (Mosa et al, 2012). Divall et al 2013, reported an increased in correctness of diagnoses and treatment decisions when mobile devices were used for clinical decision support. It was also found out that, electronic references led to modifications in patient management decisions and that healthcare professionals' knowledge of drug prescribing accuracy enhanced (Divall et al, 2013, Mickan et al, 2013). The GHS-ADH-Mapp contains information that help healthcare providers to handle the adolescent patient properly and answer their questions accurately per the guidelines. From the study, some of the participants mentioned that the app help them in the diagnosis of adolescent health issues. Some also said they now have the confidence to handle adolescent health issues because the app has increased their knowledge on adolescent health issues. When a question was asked about the relevance of information on the app to adolescent health services. All participants agreed that the GHS-ADH-Mapp provide quality information for adolescent health services. Likewise, a study conducted in Norway among cancer patients to access the usability of a mobile app called Connect system also found out that participants agreed that the system provides quality information for the management of their condition (Mirkovic et al, 2014).

These benefits of the GHS-ADH-Mapp has been realized probably because the people the app is intended for have accepted to use it. Because according to Venkatesh et al, (2003) new technological innovations can only be effective or successful if they are accepted and use by the people it is intended for. These responses from the participants in this study can also be explained in relation to the theoretical framework. Regarding the actor network theory, it can be observed that, all the principal actors such as the health workers, the smartphones and the user's ability to use the app in their smartphones all influenced the acceptance and usability of

the app. According to Monterio (2000), all these actors are associated with the use of the app, which ultimately led to its acceptability and usefulness for the participants.

5.2 CHALLENGES/BARRIERS

The use of mobile phones in the healthcare settings simplify conveying of critical information from one point to the other in a quick manner, it presents fewer barriers related to time of day or location. This prevents medical errors and facilitates accuracy (Mosa et al, 2012, Patrick et al, 2009). According to Reynoldson et al 2014, mobile phones and apps offer great potential for improving communication between health professionals and patients. The GHS-ADH-Mapp have that potential to improve communication between healthcare professionals and the adolescent patient. It has a section meant for communication between the adolescent and healthcare professionals and between healthcare professionals and their colleagues. But participants in this study lamented that, this potential is not being achieved. Because this part of GHS-ADH-Mapp is not working according to plan, that whenever they post a question on this section they never get a feedback, therefore they prefer to use other available options like Whatsapp to communicate. Besides, this section is dependent on the availability of internet which mostly is unavailable or fluctuating due to poor connectivity in the area. The study recall a participant saying, *'this section of the app has great potentials but I don't use it because it is dependent on the availability of internet. Besides the intended purpose of that section is not being achieved, you ask a question and you never get an answer.'*

Again, it is vital that technological innovations for healthcare such as the GHS-ADH-Mapp is reachable by all probable users, including adolescents, elderly, those with low literacy, and those with disability. But often, mobile phone technology for health is displayed on sophisticated devices like a smart phone that has complicated user interfaces necessitating some levels of skill to operate (Patrick et al, 2009). Similarly, the GHS-ADH-Mapp can only be use on smart phones. Also, the primary audience of the app is the health worker but it is also meant to serve as an empowerment resource for the adolescent and the public. These, participants say is making it difficult to achieve it intended purpose. Because according to them the older generation do not have the required skills to operate smart phones. Also, some health workers and adolescent can't afford a smart phone thereby making it difficult to benefit from the app. One participant echoed this, *'one big problem about the app is you have to have a smart phone to be able to use and it is not that easy to afford a smart phone'*. The participant went further on to say that *'you cannot use the app if you are not conversant with the use of a*

smart phone'. Besides, effective use of every app is dependent on the user's ability to understand the content. Participants in the study also lamented about content of the app. They said it contain technical language making it difficult for the ordinary person to understand the content. The municipal health promotion officer said, *'for us the health workers' terminologies used are very okay but for the adolescents and the public they may find it challenging.'*

Another thing that was also observed during this study was that, the ability to adopt to a new technology in a timely fashion is partly dependent on ones' experiences in the past. Participants were of the view that because they are used to using smart phones and other mobile apps it was quite easy to adopt to the GHS-ADH-Mapp. One said *'if you are used to a smart phone that shouldn't be a problem, it is just like any other app like Facebook or WhatsApp'*. This discovery is consistent with other studies. Mirkovic et al, 2014 observed in their study that in performing tasks, participants mostly relied on their prior experience with mobile devices. They concluded by saying that use of standard design rules across all apps can help users transfer their knowledge of one app to another.

For app to be used effectively by those it is intended for, the hardware characteristics of mobile devices like the screen size must also be taken into consideration during the development process. These issues impact ease of input, screen readability, and glanceability (Mirkovic et al, 2014). Mirkovic et al, 2014 in their study found out that participants were not able to accomplish certain task on their mobile devices because their screens were too small to display all the information at once. In this study, participants reported that, they did not have any issues with the size of their phone screens when it came to display of information. But they, complaint that the screen size of their mobile phones was too small to display images clearly. This made using the app for health education purposes a little bit difficult. The ability to adopt to small mobile screens could also have to do with age, from Mirkovic et al, 2014, their participants were quite old as compared to participants in this study. The average age of participants in this was twenty-six years while the average age in Mirkovic et al, 2014 was sixty-one years.

Even though the use of technological innovations such as computers, personal digital assistance (PDA), and mobile phones in healthcare has become acceptable to both patients and health workers (Hassan and Fleegler, 2010), certain consequences have been observed; disruption of normal patient care. The mobile phone (Smart) is integrated with multiple functions, like voice call, text messaging, internet, video-conferencing and social networking software, this make it

liable to distractions when in active use (Wallace S, Clark M, White J., 2012). Participants complained that they are sometimes disrupted during their consultation sessions with adolescents. They said they sometimes receive calls or messages anytime their devices are active. A participant in the study said, *'our professionalism is always brought to question. We use these same phones for our personal things so sometimes when you are very busy in a counselling session your phone rings and disrupt you, it becomes very difficult to ignore or even to continue with whatever you we are doing, you are confused and patient realizes it.'* Participants suggested that they should be given separate phones to use for the app, so that they can put their personal phones away during counselling sessions with the adolescent patient. These findings are in support of what Wu et al, 2011 discovered, they investigated the communication patterns of physicians and residents using smartphones. They observed that using smartphones for communication was more efficient but it enabled the interruption of normal activities and affected the relationship between team members to the extent that team members preferred communicating in person than through text. Wallace S, Clark M, White J., 2012 also observed same pattern in their study, they interviewed medical students, residents and faculty members in a large Canadian medical school concerning the use of iPhones in medical education. The study showed that mobile technology provides quick access to information and simplifies communication between team members, and that can probably enhance both patient care and learning. They also said that, mobile technology has unexpected effect which include the potential for distraction and superficial learning, because medical student carrying an iPhone can be recipient of direct phone and video calls, text messages, instant messages and emails at any time the device is active. Davis et al, 2012 also cited interruption to clinical experiences as a barrier to the use of mobile technology in healthcare delivery.

5.3 SUGGESTIONS TO IMPROVE THE GHS-ADH-MAPP

All participants in the study agreed that the GHS-ADH-Mapp is a helpful tool and that they will use it in the care of adolescent patient. Participants were of the view the GHS-ADH-Mapp should be made available across all modalities including all type of mobile devices and possibly laptops and desktop computers. This finding is consistent with the evaluation of the Connect mobile app by Mirkovic et al, 2014 participants agreed that it was useful and that they would use it in the future for managing their health conditions. Participants also suggested that the

connect mobile app should be available across multiple modalities including Web and mobile devices.

The GHS-ADH-Mapp is meant to remind and teach healthcare workers on how to offer adolescent friendly services to the adolescent patient. It contains several activities that the healthcare professional should carry out when attending to the adolescent client. Such activities include how to conduct counselling, creating rapport between the healthcare professional and the adolescent and many more. Participants suggested different system features that could further improve and enhance learning from the app. A participant suggested that they should add short demonstration videos for service providers to see how to properly carry out specific activities example counselling. This finding is consistent with what Mirkovic et al (2014), participants in their study suggested using new information formats such as images in messages and blog modules to help them share their experience and health issues with others.

Lastly participants suggested that the GHS-ADH-Mapp should be updated frequently. This according to them, adolescents' issues keep changing.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

This study was carried out in the Sunyani municipal directorate area among healthcare professionals to evaluate the usability of the GHS-ADH-Mapp. This app is the first of its kind in Ghana. It was launched in December 2015 for adolescent healthcare service providers. The outcome of this study suggests the GHS-ADH-Mapp offers the potentials to enhance and improve adolescent-friendly health service delivery. It was realized that the mobile phone is a great tool to improve communication between healthcare service providers and the adolescent patient. The findings further suggest that the use of mobile phones in healthcare settings has become a daily thing. The GHS-ADH-Mapp has made service delivery convenient because health professionals no longer carry heavy and bulky papers for field work. As a reference tool the GHS-ADH-Mapp has increased the confidence level of healthcare professionals in their dealings with the adolescent patient.

Notwithstanding all the numerous benefits of the GHS-ADH-Mapp, it uses also comes with certain challenges or barriers. The app can only be used on a smart phone making it difficult for it intended to benefit to be realized, because not all it is intended for can afford a smart phone nor have the skills to operate one. A section of the app which was supposed to facilitated communication between healthcare professionals and adolescents is not being used as it should. Poor internet connectivity is associated with this. Since the app is a smart phone app, the mobile phone (Smart) is integrated with multiple functions, like voice calls, text messaging, internet, video-conferencing and social networking, it was observed to facilitate distraction of normal activities and this is detrimental to their professional image. It is required that users develop an attitude of discipline to manage their changing relationship with technology.

Finally, this study has confirmed that the use of technology in the healthcare setting in developing countries is increasing and healthcare professionals are willing to embrace it.

6.2 RECOMMENDATION FOR FURTHER STUDIES

From the limitation of the study approach, it is recommended that further studies adopt both quantitative and qualitative research approaches in similar studies to produce varied responses from participants.

It is also recommended for further studies into the development process of the app.

It is recommended for further studies to evaluate the impact of the GHS-ADH-Mapp from the perspective of the adolescent. This will reveal the intended benefit of the app to adolescent health in a diversified picture.

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APPENDICES

Appendix 1

1. Interview guide

The interview guide is based on usability heuristics by Jakob Nielsen and the SUS usability scale by John Brooke

Part 1- Participant demographics

1. Age
2. Gender
3. Educational level

Part 2- Usefulness and ease of use of the ADH-MAPP

1. Do you often use the app (if yes why and if no why)
2. What sections/part of the app do you use frequently and why?
3. How long have you used the app
4. Have you ever use any similar mobile app?
5. Does screen size of your mobile phone affect your ability to use the app?
6. Is the use of terminologies consistent? (if no why)
7. Are the various functions of the app well integrated?
8. Is the labeling of the various section of the app appropriate?
9. How easy is it to find necessary information?
10. Do you need technical guidance to use the app?
11. How easy is it to understand information and instructions on the app?
12. Are buttons and links labeled appropriately with existing trends?
13. Does it help you to recognize and recover from errors?
14. Does the app contain information necessary for adolescent health education?
15. What are your suggestions for improving the app. What do you think should be added and what features should be deleted from the app to make it user friendly?

Reference: John Brooke. SUS - A quick and dirty usability scale. 1986 and Jakob Nielsen. Ten Usability Heuristics for User Interface Design. 1st Jan 1995.

UNIVERSITETET I TROMSØ UiT

FACULTY OF HEALTH SCIENCES
DEPARTMENT OF CLINICAL MEDICINE

Your reference:
Our reference:
Date: 18. August 2016

To whom it may concern

Masters project of Portia Ereng-muo

Portia Ereng-muo is a student at the Master Programme in Telemedicine and eHealth at the Arctic University of Norway (UiT).


She plans to collect her data on the topic "Usability Evaluation of Adolescent development health-mobile app (ADH-MAPP)" at Sunyani Municipal among health workers.

As the research involves health workers she will apply for permission from the Ghana Health Service Ethical Committee Board. Informed consent will also be sought from those participating in her study.

I will be her principal supervisor for her Master thesis with Peter Nimber of Catholic University College of Ghana as her local supervisor.

I hope you will support her in this important project

Sincerely



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