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Original Article

Benefits and Opportunities of M-Health Adoption in Healthcare Among Nurses and Consumers

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ABSTRACT

M-Health use in the health sector is exponentially increasing day and night. The rate at which is being adopted into health is at high speed despite some impediments. This advancement signals the potential to advance nursing research, promote health, prevent diseases, and bring health services closer to consumers thus cost-effectiveness of health services, promoting health education and improving medical care by use of drugs. The objective of the study was to discuss the benefits and opportunities of M-Health adoption among nurses and consumers. A desktop search strategy was utilised to retrieve and review articles from five major scientific databases namely: PubMed, Google Scholar Science Direct Scopus and Cochrane Library. Inclusion criteria; articles published between 2013 and 2022, all articles that touched on M-Health in LMICs and HICs. Exclusion criteria; articles published before 2013 this was due to the robust advancement of M-Health technology. The articles retrieved, solely touched on both benefits and opportunities of M-Health. The most highlighted benefits and opportunities were as follows: M-Health has improved the quality of health care, especially in maternal and child health care, care of patients with either infectious or non-infectious diseases), Communication between nurses and nurses and consumers, the cost-effectiveness of health care services. The use of M-health to guide nurses in clinical practice, administration, research and education. The magnitude at which M-health is pervading the world is of great joy despite a few impediments. LMICs are required to continue to emulate the HICs' strategies in order to achieve a total adoption of M-Health in the healthcare system. This is due to the benefits and opportunities accrued with M-Health to the healthcare system, especially for nurses and consumers.

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INTRODUCTION

Globally, M-Health use in the health sector is tremendously increasing day and night. The rate at which is being adopted into health is at high speed despite some pitfalls such as; connectivity and infrastructure pitfalls, data insecurity and lack of privacy, digital illiteracy, lack of cultural acceptance, lack of funding and inadequate regulatory frameworks (Doswell *et al.,* 2013). In spite of the aforementioned drawbacks, the advancement of M-health signals the capability to advance nursing research, promote health, prevent diseases, and bring health services closer to consumers thus cost-effectiveness of health services, promoting health education and improving medical care by use of drugs. According to a study conducted in India, the use of M-health has improved the performance of Community health workers (CHWs) and the consumers at large. Nursing informatics users are nurses who use M-Health to deliver nursing services. On the other hand, consumers in this paper refer to clients/patients who use M-health as well in the health care system. (Gopalakrishnan *et al.,* 2020). Therefore, the purpose of this term paper is to discuss the benefits and opportunities of M-health adoption among nurse practitioners and consumers.

BACKGROUND

Internationally, there are numerous challenges that hamper M-heath utilization these include; a lack of reliable internet connectivity, especially in rural and remote areas. Inadequate infrastructure can hinder the effective use of mobile health applications and devices. For instance, a study by Agyapong *et al.* (2021) highlighted that inconsistent internet access significantly limits the usability of M-Health solutions in developing regions in the adoption of M-Health into the healthcare system.

Furthermore, data security and privacy concerns are paramount in the adoption of M-Health. With sensitive health information being transmitted over mobile networks, the risk of data breaches and unauthorized access increases. According to Zhang and Cocosila (2022), the fear of data breaches has been a significant deterrent for both patients and healthcare providers in fully embracing M-Health technologies.

The varying levels of digital literacy among patients and healthcare providers present a significant barrier to the effective use of M-Health. As noted by Jimenez and Valle (2023), a substantial portion of the population lacks the necessary skills to navigate and utilize mobile health applications, which can

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lead to underutilization and inefficiency in healthcare delivery

Cultural factors also play a crucial role in the acceptance of M-Health. In some communities, traditional beliefs and scepticism towards new technologies can impede the adoption of mobile health solutions. For example, Okeke and Olatunde (2020) reported that in certain African communities, there is a mistrust of digital health interventions, which affects their uptake and effectiveness, the cost of developing, implementing, and maintaining M-Health systems can be prohibitive, particularly for low-income countries and healthcare providers with limited budgets. Additionally, lack of funding and investment in M-Health infrastructure is a recurring issue. A report by the World Health Organization (2021) emphasized that sustainable funding models are essential for the widespread adoption of M-Health.

Regulatory frameworks and policies often lag behind technological advancements, creating challenges for the deployment of M-Health solutions. Variability in regulations across different regions complicates the development of universally applicable M-Health applications. As highlighted by Lin and Wen (2022), harmonizing regulations and creating supportive policies are critical steps needed to facilitate the integration of M-Health into healthcare systems globally.

Despite the aforementioned drawbacks, the WHO prospects that the incorporation of M-health into healthcare has the potential to transform how clients access healthcare services and achieve an increased standard of health and well-being. Additionally, empirical evidence from some quarters postulates that M-Health is used to bridge the gaps of distance and expertise and underpin Sexual and reproductive health (SRH) services such as Antiretroviral Adherence, prevention of sexually transmitted infections (STI) and perinatal and postnatal care (Otu et *al.,* 2021).

In low-middle-income countries (LMICs) in Kenya, mobile technology adoption and usability have been explored to assist health providers especially nurses in providing clinical services such as maternal and child care, and outreach services in different setups across the globe. These gadgets support nurses in varied areas like administration, education, and research, thus improving their hands-on activities and morale. Elsewhere in Bangladesh, some studies postulate that there is a potential application of M-health by nurses in the delivery of healthcare services intervention for all (Jahan & Foote, 2022). In South Africa, another study claims that M-health adoption and application have been visualized as a silver lining through which the healthcare sector in LMICs can be improved (Ojo, 2018). Further, the magnitude and the penetration of M-health in developing countries have demonstrated a much-required honey and butter to smear on health care services in order to achieve quality health care to consumers. The speed and intensity of mobile technology are pervading the Sub-Saharan region and it is being utilized to handle health impediments. This is supported by the International Telecommunication Union (ITU) whereby it has been noted that in South Africa mobile ownership is over 149 per 100 individuals. The subscribers are well engaged with smartphone usability in improving health care majorly putting more emphasis on HIV/AIDs, women and children. Of great interest to highlight, M-health applications in South Africa have received a standing ovation due to their capability to improve health outcomes. Some of the applications include Cell-life MAMA SMS (It was an SMS solution targeting pregnant women and those who had babies up to three months) among other applications (Ojo, 2018).

In the same vein, many LMICs have resorted to the adoption and use of M-health by healthcare professionals in the health sector which has been considered as a feasible solution for monitoring patients' level of health. In addition, M-Health has been perceived as a vessel that helps reduce the costs and time taken to offer healthcare (Al-Azzam

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et al., 2019). Thus, nurses are motivated to stick to professional behaviour by reshaping. Further, the momentum at which mobile health systems are gaining in the health sector is of great significance to healthcare communication. Concerning its benefits, it goes beyond communication capturing opportunities like management, facilitation and delivery of health care delivery through smartphones. With varied mobile healthcare apps such as site-based health services and mobile telemedicine, they accentuate great joy to both the consumers and the nurses (Al-Azzam *et al.,* 2019; Betjeman *et al.,* 2013). Further, despite the fact that M-health activities are majorly in high-income countries for changing healthcare there is a remarkable adoption of mobile health into already established electronic health services in LMICs. Several studies show that in High-Income Countries (HICs), Mobile health apps are being used to transform the delivery of healthcare services. This is in terms of screening and diagnosing both infectious and non-infectious diseases like COVID-19, HIV/AIDS, TB, cancer, hypertension, diabetes, renal failure and so on (Osei & Mashamba-Thompson, 2021).

In addition, reports from some studies in HICs indicate that the use of M-health has really enabled the healthcare system. It provides interventions to consumers' conditions in terms of drug compliance, date of appointment reminders, disease surveys and identifying emergencies early enough. More so, in HICs it has been found that the adoption of M-health has facilitated frequent communication and tracking between nurses and their clients. Thus, this has necessitated the provision of quality healthcare services and reduced the costs of accessibility of healthcare services during this period of the COVID-19 pandemic in HICs (Osei & Mashamba-Thompson, 2021). Citing the UK as an example of HICs, some studies report that M-health use has supported clinical diagnosis and decision-making concerning patient care. There are improved clinical outcomes such as patient adherence and behaviour change (Rowland *et al.,* 2020). According to another study conducted in China, it shows that the government has strengthened nurses' informatics in the care of patients. Hence it has led nurses to deliver cost-effective rehabilitation services to consumers (Pan & Gao, 2021).

Notably, M-health has supported nurses in the provision of primary healthcare (PHC) services in far-to-reach and hard-to-reach areas. Some of the services include; Clinical decision-making during client consultation, information management, health promotion messages to health providers and consumers as well, and communication between health practitioners similarly between health workers and clients (Wa *et al.,* 2020). Elsewhere in Nigeria, some studies demonstrate that there is expansive penetration and utilization of M-Health which involves the integration of smartphones, tablets and other wireless gadgets to scaffold the attainment of Universal Health Coverage (UHC).

Opportunities concerning M-Health are that Mobile gadgets have caused a shift in the practice of nursing from the traditional nurse-patient meeting to electronic-aided communication and procedures. Reduced waiting times in consultation rooms, increased the frequency of contact, enhanced communication between caregiver and patients thereby building confidence and rapport, reduced visits to the emergency room and reduced travel time and transportation cost this has been aided by the use of smartphones (Otu *et al.,* 2021). The usefulness of mobile consultations on the telephone or via platforms such as Microsoft Teams, Zoom and Webex is further underscored by the current COVID-19 pandemic where social distancing measures are critical to reducing the transmission of the virus in clinical areas. These social media platforms are acceptable to a majority of the younger generation who form the bulk of clients requiring SRH services and should be exploited for this purpose. In Morocco, the effectiveness of portable ultrasound machines and 3G smartphones in improving diagnostic times for expectant mothers in rural clinics has greatly been noted. These

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devices are wireless and linked to reproductive health specialists in urban hospitals. Smartphone-connected electrocardiograms (ECG) are now a reality and smartphones have been successfully used to monitor heart rate, blood oxygen saturation, and blood pressure (Nemcova *et al.*, 2020).

On the same platform of discussion, M-health has been used to train front-line health providers, especially in remote areas enabling them to access valid and updated clinical information regarding patient management. Moreover, service delivery has been improved in varied ways following the inception of M-Health these include: Improved knowledge and skills with timely decision-making, decreased unproductive travel time, timely response to medical test results that are transmitted directly to smartphones, improved data management and record-keeping practices, improved communication, reducing medical associated errors and promoting general professional efficiency and work patterns (Otu *et al.*, 2021).

Both in LMICs and HICs approximately 500 million patients use M-Health applications to support their self-healthcare activities. In this sense, cardiovascular M-Health is the most used in the M-Health domain through innovation, research, and implementation in the areas of cardiovascular disease (CVD) prevention, cardiac rehabilitation, and education. Further, the most promising domains of M-Health use have to do with blood pressure monitoring, cardiac rehabilitation, arrhythmia monitoring, medication management, and social support. M-Health apps hold promise for delivering health information and services to patients, especially for chronic diseases such as CVDs, which require expansive self-management (Cruz-Ramos *et al.*, 2022). Shifting to another area of significance is maternal and child health whereby many interventions on the use of M-Health for improving maternal and New-borns' health outcomes in sub-Saharan Africa mainly focus on timely access to health facilities including reminders for antenatal appointments and referrals of mothers (Nishimwe *et al.*, 2022). For instance, the Comm-Care M-Health technology is a digital solution that has shown promising results in assisting healthcare providers especially nurses in data collection, decision support, communications with clients and health centres, and access to educational training materials. Safe Delivery M-Health Application (SDA) is one of the recent M-Health applications (loaded in smartphones) which avails BEMONC clinical guidelines to support nurses and midwives' clinical decisions. The SDA has been tested for its effectiveness through a randomized controlled trial (RCT) conducted in Ethiopia. The SDA has also shown a positive effect on nurses' and midwives' knowledge and skills in the management of Post-Partum haemorrhage (PPH) and neonatal resuscitation in Rwanda (Nishimwe *et al.*, 2022). Mobile technology's mobility, instantaneous access, and direct communication allow for faster transfer of health information, which in turn supports medical and public health practices. These characteristics define M-Health. M-Health could transform the worldwide delivery of health services, especially in low- and middle-income countries. M-Health is increasingly being used for patient communication, monitoring, and education, to reduce the burden of diseases linked with poverty, to improve access to health services, clinical diagnosis, and treatment adherence, and for chronic disease management. It is commonly stated that M-Health effectively improves the quality of care and that it can quickly be adapted on a large scale and at a low cost (Marcolino *et al.*, 2018).

METHODOLOGY

A Desktop literature search was done from various studies which included narrative reviews, randomised controlled trials, non-randomised controlled trials and cross-sectional descriptive studies using five databases: PubMed, Google Scholar, Science Direct, Scopus and Cochrane Library. Keywords that were used to search the articles included: M-health, Benefits, opportunities, adoption, Nursing informatics users and

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Consumers. The full text of articles in PDF were retrieved and reviewed. Mendeley software program was used to remove duplicated articles. More so, a manual checking was done. Considering robust advances in M-Health, the search included articles published between 2013 and 2022 while those published before 2013 were excluded.

RESULTS AND DISCUSSION

The study articles informed this work on information concerning study methodology, the objective of the study, the M-Health technology, the location, benefits, opportunities, adoption, nursing informatics users and consumers. The most highlighted benefits and opportunities were as follows: M-Health has improved the quality of health care especially in (PHC example maternal and child health care, care of patients with either infectious or non-infectious disease), Communication between nurses and nurses and consumers, the cost-effectiveness of health care services. The use of M-health to guide nurses in clinical practice, administration, research and education.

It has been reported that mobile technology adoption and usability have been explored to assist health providers especially nurses to provide clinical services such as maternal and child care, and outreach services in different setups across the globe. Similarly, a mixed-methods review by Konttila and colleagues (Konttila *et al.* 2019) reported that using digital devices impacted positively on the health worker-client relationship, delivery of healthcare services and communication. However, Contrary to Marcolino's reviews on the effectiveness of reviews (Marcolino *et al.*, 2018) where majority of the studies were conducted in HICs as opposed to this term paper literature search which basically relied on LMICs. There was no known rationale for the difference, nevertheless, it alludes need for wider studies done in LMICs and HICs. The findings of these studies on the benefits of M-Health adoption in the healthcare system resonate with results from primary studies that did not meet inclusion criteria, but which reported benefits similar to what was found when utilizing M-health to deliver services or support healthcare services. These include benefits such as; reducing travel time and related expenses for both nurses and consumers (Hurt, 2016), real-time communication, and the cost-effectiveness of healthcare services. The use of M-health to guide nurses in clinical practice, administration, research and education (Wang, 2018).

CONCLUSION

The magnitude at which M-health is pervading the world is of great joy despite a few drawbacks. LMICs are required to continue to emulate the HICs' strategies in order to achieve a total adoption of M-Health in the healthcare system. This is due to the benefits and opportunities accrued with M-Health to the healthcare system especially nurses and consumers at large.

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