REVIEW ARTICLE

Digital health information technology utilization for enhanced health services delivery in Africa: Unravelling barriers to adoption among Primary healthcare providers

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Abstract

In tandem with the current drive to achieve the SDG 2030 goals, the Universal Health Coverage (UHC) is been projected as a strong propelling strategy with key indicators, all aimed at achieving universal access to health services without having to endure financial difficulties in individual countries. Currently, Africa is lagging in meeting the targets of the UHC with between 5% - 25% coverage across countries.

Adoption of new innovations are critical for the actualization of Universal Health Coverage in Africa. Digital health technology offers one of such novel approaches to providing quality healthcare services and can help countries achieve the Universal Health Coverage targets. It has been suggested that digital health provides an opportunity to overcome the longstanding problems of inefficiency of health information gathering, sharing, and access. In addition, literature is already replete with various factors that can aid countries to achieve UHC and one of such factors is the urgency of generating valid and quality evidence to inform decision-making.

Although the Primary Health Care remains at the core of the achievement of Universal Health Coverage, the utilization of digital health technologies remains very poor at the grassroots in Africa and this poses a huge barrier to effectiveness and quality of healthcare delivery. Given the foregoing, it is obvious that there is an urgent need to understand the landscapes, issues and barriers to utilization of digital health at the Primary Health Care levels. However, there remains a paucity of data to support evidence-based decision making about full implementation of digital health services across the continent while also taking into cognisance the peculiarities of individual countries.

Hence, there is a critical need to determine the current levels of knowledge, skills, attitude, practice and readiness to adopt digital health in service delivery by healthcare workers at the Primary Health Care levels across the continent. The generation of such data from major stakeholders such as health workers and health managers, providers among others will provide important evidence needed for attaining optimal utilization of digital health in the context of health for all. Summarily, a clear understanding of the contextual and implementation bottlenecks highlighted from such assessment(s), especially as it relates to individual African countries, will go a long way to guide decisions to address the low utilization of digital health technologies in health services delivery in Africa.

Keywords: Digital health technologies, willingness to adopt, Primary Healthcare providers, Universal Health Coverage, Africa.

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Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the writing of this paper.

Author contributions

CO: Conceptualization; **CO, PO and OF**: Writing- Original draft preparation, **CO, PO and OF**: Writing- Reviewing and Editing.

Introduction

The Universal health coverage (UHC) target is a strategic ambition with an overarching goal that all individuals and communities receive universal access to good quality health services without having to endure pain and financial difficulties [1-3]. In tandem with the SDG-2030 goals these 'coverage' refers to an array of services encompassing promotion, prevention, treatment, rehabilitation and palliation, particularly the health-related goals of the SDGs [3].

UHC is widely recognised as a priority track to aid and accelerate the achievement of the SDG-2030 goals and consequently three key indicators for the achievement of UHC have been defined:

(1) equity in access to health services (those who need health services irrespective of whether they can or cannot afford them should receive them);
(2) quality of healthcare services (health services should be good enough to improve the health status of those receiving them); and
(3) financial risk protection (the guarantee that health service costs do not expose people to financial problems) [4,5].

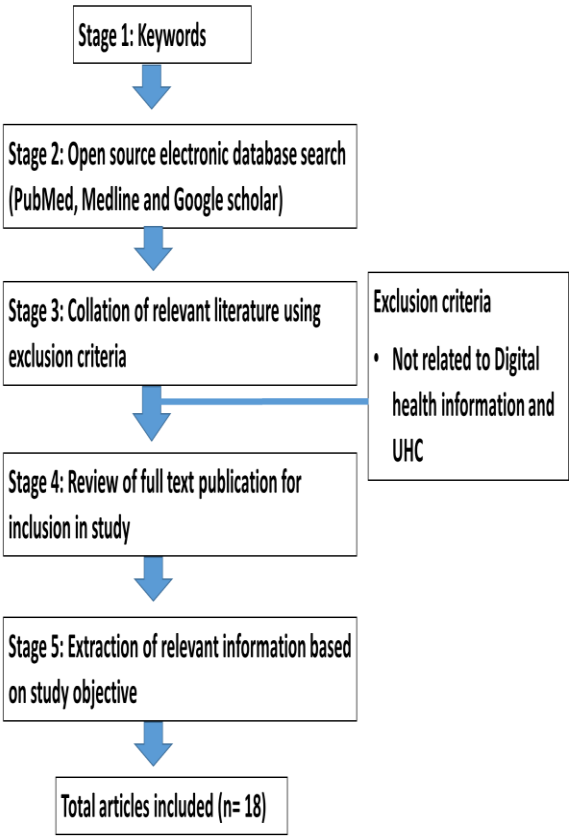
Several factors can help countries to move towards the achievement of the UHC goal and literature is already replete with suggestions of possible factors that can propel countries towards achieving UHC. One of such factors is the urgency of generating valid and quality evidence to inform decision-making. All these factors are important for all stages of the UHC process including the exploration, development and sustenance of interventions- including novel strategies such as utilization of Digital Health information technology- at the Primary Healthcare level.

The aim of this paper is to enumerate and describe barriers identified from available literature as limiting the adoption of Digital Health information technology among Primary Healthcare providers and proffer the way forward to enhance adoption in order to ultimately propel the African continent towards the actualization of the UHC targets.

Method

A preliminary search of literature was conducted to determine the need for the study. This was important and helped to refine the initial broad concept of digital health and gave clarity and objectivity to the choice of topic. Then literature searches of electronic databases (PubMed, Medline and Google scholar) were carried out from May through November, 2020. In addition, the snowballing technique of literature search was employed and this involved searches through the references of relevant published articles that were retrieved from the electronic databases. Keywords used in the search included 'Digital health technologies' or 'mobile health' and 'willingness to adopt' and 'barriers to adoption', 'Primary Healthcare' and 'Universal Health Coverage'. The inclusion criterion was that published articles should be published in English. Furthermore, articles not related to the aim of the study topic were excluded. Figure 1further describes the stages of the literature search process that was undertaken during this review.

Figure 1: Stages of the literature search process



Discussion

Factors limiting the actualization of Universal Health coverage (UHC) targets in Africa

Currently, Africa is lagging in meeting the targets of the UHC with between 5% -25% coverage across countries. Several barriers limit the actualization of the targets of the UHC in Africa. These barriers are far reaching and include high operational and financial costs required for the expansion of health service access to areas or communities currently lacking access [6]; paucity of data due to lack of appropriate researches [5]; extensively weak health systems; poor infrastructure; inefficient transport; inadequate physical access to several communities due to inaccessible, difficult topography, insecurity; and sociocultural barriers [7]. These barriers limit the potential of current approaches to health service delivery and may in the long run hinder the achievement of the UHC targets given the realities on ground. This is worrisome especially in the face of dwindling economic capabilities of these African nations and the prevailing political and social environments. It is imperative to begin to consider new paradigm shifts and innovations in the achievement of the UHC targets in Africa for the ultimate actualization of the

SDGs goals. Hence, adoption of new innovations is key for the actualization of Universal Health Coverage in Africa.

Digital health technology: a novel approach to delivering quality healthcare services and achieving the UHC targets in Africa

Digital health technology offers one of such novel approaches to providing quality healthcare services and can help countries achieve the Universal Health Coverage targets [7]. It has been suggested that digital health provides an opportunity to overcome the longstanding problems of inefficiency of health information gathering, sharing, and access [5]. Digital Health information technology is a term synonymous to mobile health (mHealth) or eHealth. This refers to a broad range of information and communication technologies that are used to gather, collate, transmit, display and store patient data [8-10]. The World Health Organisation (WHO) defines digital health as the use of mobile telecommunications and multimedia technologies to address health-associated issues within health service delivery and public health systems [11]. This concept encompasses a range of technologies, products and services comprising but not limited to medical devices, tele-monitoring instruments and devices, remote mobile health technologies, cloud-based services in addition to assistant and sensor technologies [12]. Digital Health information technology has the potential to enhance the quality, efficiency of health service delivery for improved results, client safety and may possibly reduce healthcare delivery costs in resource poor settings as prevalent in Africa. [13,14]. Digital Health approach finds application in several spheres of health service delivery including patient data management (e-health records), health information and services provision via mobile technology (mHealth), remote services (telemedicine/telehealth), health knowledge learning and management [7].

Application of Digital Health information technology ensures the prompt deployment of health information and thereby enhances accessibility of health services by all stakeholders including patients, health service providers and relevant agencies of government. Also, it can reduce medical mistakes, costs, and paperwork associated with medical service delivery. This subsequently increases efficiency, quality of health service delivery while enhancing the empowerment of patients and healthcare providers including clinicians [15]. The various applications of digital health have shown its potential for use in promoting individual health and public health at large. Furthermore, these technologies can improve efficiency of health care services; reduce cost of health services delivery [16]; enhance the dynamism and timeliness of decision making by expediting speedy transmission of real time public health information; and enhance the monitoring and evaluation capacity of the health system in general. This provides ample opportunity for enhanced planning, organization, and management of health services at all levels including the Primary Health care level. However, in spite of the potential benefits of the Digital Health information technology, adoption is a huge challenge especially in low and middle income countries including Africa. This has greatly limited the utilization of the technology in health care service delivery. It is therefore imperative to identify the obstacles to the adoption of Digital Health information technology among relevant stakeholders across levels in the health care service delivery network especially at the primary healthcare level.

Barriers to adoption of Digital Health information technology among Primary Healthcare providers.

A key impediment to adoption of Digital Health information technology in resource low communities is low level of technology knowledge and limited accessibility to technological devices. A study conducted in Iran found that the level of technology literacy was poor; utilization of these technologies among health care personnel was limited [17]. In addition, computer possession and use among health care professionals and students were low [17]. This may be due lack of structured trainings and limited access to technological devices such as computer in these settings [17]. Despite the fact that majority of the respondents owned a computer, only a few number of them had acceptable skills and practice habits. Another study in Nigeria reported that just 18.9% of health personnel and medical students had good knowledge of computer while 58.8% had average knowledge and 22.3% revealed poor knowledge [18]. Similarly, Mohammed *et al*. [19] reported that only 33.7% of health workers had sufficient knowledge of computer or other digital devices. In more developed countries the case is different, as 57.91% of health personnel were well-informed about digital information technologies including use of computers in India [20]. And majority (82%) of health workers in countries like Poland were knowledgeable about the concept of telemedicine [21]. Studies have shown that digital knowledge and experience of healthcare personnel have considerable impact on their readiness, perception, attitude, and probability of adopting and utilizing these health technology applications in practice [22,23]. Healthcare professionals with sufficient and requisite information technology knowledge and experience are likely to have better and positive disposition towards the utilization of new innovations like digital health technology applications. Thus the need to focus on developing context-specific training on digital health in order to fill the knowledge gap. Another barrier to adoption is the low level of acceptance of the innovation in most of low and middle income countries [14]. These maybe due to the fact that very few healthcare workers know and understand the enormous benefits of digital health information technology [24] in providing prompt and efficient services at any level of the healthcare system. Resistance to the use of digital health technologies from healthcare professionals may be due to low level of digital literacy and limited skill in the use of digital health technology applications [25]. In addition, absence of motivation, poor organizational and management level policies also pose very formidable barriers to the adoption and utilization of these technologies [26]. Poor technology infrastructure in relation to hardware, software, and networking facilities is also a main obstacle to healthcare personnel's decision to embrace e-health technology applications [25- 29]. This is due to the fact that most digital infrastructure projects in countries have previously been run as pilot projects resulting in duplication of efforts and technologies with little or no focus on sustainability [7, 26]. Another salient limitation to adoption in low and middle income countries (LMICs) is monetary barriers especially with respect to budgeting and funding [26,30-32]. Although the level of funding varies across countries, however most developing countries allocate very little funding for the health sector which are mostly lower than the World Health Organization (WHO) benchmark, that requires countries to apportion at least 13 percent of their annual budgetary spending to the health sector. This makes funding of such investments such as digital health grossly inadequate in developing countries when compared to more developed countries.

Administrative issues including political will and bureaucracy related to organizational and management policies go a long way to determine the level of adoption of these technologies [33]. These could pose very formidable barriers to the efficiency of the implementation of these technologies at all levels of health service delivery. Security barriers related to privacy and trust arise both among healthcare workers and patients [26]. This could be due to prevalent myths and sociocultural beliefs especially in African countries with the potential to negatively impact decisions when contemplating the adoption and utilization of digital health technology.

Although evident in most of the barriers discussed, it is important to consider human resource barriers distinctly in addressing the issue of technology adoption. This is important especially in relation to individual attitude, readiness and belief of the overarching goal and benefits of digital health technologies. This has significant influence on the individual's intention to adopt and use available digital health technology applications. Table 1 provides a summary of barriers identified from available literature in the field.

Table 1: Identified barriers to adoption and utilization of digital health information technology applications in most of low and middle income countries.

S/N	Identified barriers to adoption	References
1.	Low level of technology knowledge and limited accessibility to technological devices.	17-21
2.	Low level of acceptance of the innovation in most of low and middle income countries	14, 24.25
3.	Low level of digital literacy and limited skills in the utilization of digital health information technology applications in most of low and middle income countries	21-23, 25
4.	Poor technology infrastructure in relation to hardware, software, and networking facilities	7, 25-29
5.	Absence of motivation, poor organisational and management level policies to drive adoption of novel interventions at the Primary healthcare level	26
6.	Monetary barriers especially with respect to budgeting and funding	26, 30-32
7.	Administrative issues including political will and bureaucracy related to organizational and management policies	33
8.	Security barriers related to privacy and trust arise both among healthcare workers and patients	26
9.	Human resource barriers distinctly in addressing the issue of technology adoption	17-21, 25,26

Way forward to enhance adoption of Digital Health information technology among Primary Healthcare providers.

There is an urgent and critical need to determine the current levels of knowledge, attitude, practice and readiness to adopt digital health in service delivery by healthcare workers especially at the Primary Health Care levels across the continent.

A mixed study approach including a longitudinal study is recommended to enable the collection of quality information. The generation of such data from major stakeholders such as health workers and health managers, providers among others will provide important evidence needed for attaining optimal utilization of digital health in the context of health for all. In addition, the deployment of

context-specific digital health information technologies is essential in African countries, if the full potentials of the strategy are to be realized. It is also important to evaluate the outcomes, effect and cost effectiveness of proposed models of digital health alongside the development of clear sustainable funding models with contextual relevance to target countries. The need for community and stakeholder engagement, mobilization and education cannot be over-emphasised as enablers and drivers of dynamic participation in Digital Health initiatives and activities at the primary care level in African countries. Hence, policy and public health interventions such as creation of awareness and promotion of use of digital health will go a long way to enhance its integration into the mainstream healthcare system in countries.

Conclusion

The Primary Health Care remains at the centre of the actualization of Universal Health Coverage and digital health technologies have huge potential to enhance service delivery and access to health with minimal financial burden to both individuals, communities and nations. However, the utilization of digital health technologies remains very meagre at the grassroots in Africa and this poses immense impediments to the efficiency and quality of healthcare delivery. In addition, there remains a paucity of data to support evidence-based decision making about full implementation of digital health services across the continent; aside from the reality of the inherent peculiarities of individual countries. This paper has identified some of the barriers to adoption of digital health approach in LMICs especially in Africa and posits that there is an urgent need to understand the contextual and political landscapes, issues and barriers to the utilization of digital health at the Primary Health Care levels. In addition, some recommendations have been proffered as the way forward is sought to improve adoption level of digital health in Africa. Summarily, a clear understanding of the contextual and implementation bottlenecks highlighted from such assessment(s), especially as it relates to individual African countries, will go a long way to guide decisions to address the low utilization of digital health technologies in health services delivery in Africa.

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