

Obstacles of eHealth Capacity Building and Innovation Promotion Initiative in African Countries

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Abstract. eHealth applications and tools have the potential to improve coordination, knowledge, and information sharing between health professionals as well as continuity of care. One of the main obstacles hindering its full integration and use, particularly in the healthcare sector in developing and low and middle-income countries is the lack of qualified staff and healthcare personnel. To explore obstacles that hinder capacity and innovation promotion initiatives, a survey was conducted among BETTEReHEALTH partners. A questionnaire was used to collect quantitative data from 37 organizations. Although there are different buckets of capacity-building and innovation promotion activities going on, the findings showed very few targeting policymakers and eHealth specialists. The findings found that obstacles to capacity building and innovation promotion include lack of finance, poor infrastructure, poor leadership, and governance, and these obstacles are context or region specific. Findings from our study concur with those from previous research on the need to identify practical solutions and simple interventions to address eHealth obstacles to capacity building in developing countries. As measures to mitigate these obstacles, our study proposed the need for adequate policies, strong political commitment, the development of academic modules to be integrated into existing educational programs, and the creation of more in-country and on-site capacity-building activities. While this study contributes to the discourse on eHealth capacity-building and innovation promotion initiatives among healthcare and public health professionals, the study has a limitation as data was collected only from BETTEReHEALTH partners.

Keywords. eHealth, ICTs, capacity building and innovation activities, BETTEReHEALTH

1. Introduction

The United Nations (UN) report on "global perspective human stories" reported that about half of the world's population does not have essential health services [1]. At the same time, more than 800 million people spend at least 10% of their household budgets on healthcare expenses. This forces people into financial hardship as many survive on only \$1.90 a day [2]. For example, many people are at risk of health conditions but have limited access to health services [3]. At the fifty-eight World Health Assembly (WHA), the Director-General (DG) of WHO challenged for those reasons developing countries

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to unlock the potential of eHealth, by integrating these tools and applications in the healthcare sector [2]. That way, they can improve access to and quality of health, which in turn supports the achievement of health-related United Nations Sustainable Development Goals (SDGs) [3]; otherwise, a third of the world's population will be underserved by 2030 [4].

eHealth is a common term that refers to “health services and information delivered or enhanced through the internet and related technologies” [5]. It refers to the use of digital technologies including information communication technologies (ICTs) and data to support and deliver health and healthcare [6], services provided by eHealth include physical and psychological diagnosis and treatment, telepathology, vital signs monitoring, electronic prescribing, and teleconsultation [7]. According to the World Health Organization (WHO), integrating eHealth services make healthcare delivery cost-effective and the use of ICTs to deliver healthcare services led to better healthcare [3]. In the past decades, eHealth tools and applications have emerged as a potential “game changer” enabling accessible, affordable and effective healthcare for all [8]. It is believed that eHealth tools and services are necessary for achieving the goals of Universal Health Coverage (UHC) [3], because they can improve individuals' health-related knowledge and behavior [9] and facilitate exchanging and sharing of information between health care provider and healthcare recipient [10]. Melchiorre et al. [11] added that eHealth applications can improve coordination and continuity of care between health professionals by enhancing opportunities for digital data sharing, communication and consultation at a distance which reduces healthcare utilization costs. It is presumed that in the long term, accelerated innovations in eHealth will transform the workflow in healthcare [12]. The increase in demand for eHealth tools has pushed global investment in eHealth innovations exponentially in the last five years to respond to market needs [3].

1.1. Factors Influencing the Integration and Use of eHealth

Despite the effects of eHealth services, WHO [13] indicates there are shortcomings that thwart the widespread of eHealth, especially in developing countries. This includes low or no budget for information and communication technologies (ICTs), poor infrastructure in the maintenance of health services, unreliable or erratic electricity supply, low level of human resources capacity to adopt eHealth, and resistance to change on the part of healthcare professionals. The findings of a study conducted in Tanzania to identify the challenges of integrating eHealth revealed eHealth is constrained by inadequate ICT skills, high cost of ICT, under-developed IT infrastructure including the lack of IT equipment, small proportion of internet users, and lack of information about suitable ICT solutions [14]. As explained by Anderson [15], though eHealth has the potential to positively influence the quality of care successful integration and use is hindered by several factors such as the high cost of acquisition of ICT, especially at the initial stage, and the lack of technical skills. Maintenance costs and costs of buying ICT equipment have also increased post-implementation costs of eHealth [16]. In a qualitative study on factors affecting the implementation of a standardized information system conducted in Cameroon, the findings showed that the centralized and bureaucratic organizational structure deters the allocation of finance to ICT-related activities, particularly at the lower level (district level) of the health system [17]. A study conducted by Staton et al. indicates that resistance to change on the part of healthcare professionals hindered eHealth and limited involvement in eHealth standard development [18]. Similarly, Adebessin et al, [19] attributed low integration of eHealth

to the inability of Health Information systems (HIS) to interoperate. Similarly, Stiawan [20] added that the inability of HIS to interoperate to distribute information concerning eHealth standards among the institutions in the healthcare sector is a major barrier to integrating eHealth. A survey on barriers and challenges to adopting eHealth in Africa using 200 questionnaires reveal that African countries' active participation in eHealth standards development is limited to the requirements of the International Organization for Standardization (ISO). Sluijs et al. [21] noted that poor strategic and lack of standards consume government budgets without reaching good results. Similarly, a study conducted by [22] found that the low adoption rate of eHealth has been attributed to both macro-level factors (e.g., supportive policies) from the perspective of the public healthcare organization and system, and micro-level barriers from the perspective of healthcare providers (e.g., physicians' perception of technological complexity). Other studies found as challenges to eHealth integration the non-existence of inadequate government policies that address a well-defined health system that incorporates eHealth [23], poor leadership and governance [24]. The lack of leadership and governance lead to no direction and coordination of eHealth initiatives at the national level, as a result, health goals in the country are poorly aligned with health strategies [24]. Luna et al., [25] added that in most LMIC, it is difficult to find clear policies and coordination between governance agencies and eHealth initiatives, which poses a huge challenge to integrating eHealth. In addition, unstable government makes it difficult to find long term policies as developing policies requires long term political term.

Other obstacles are the lack of hardware resources like phone lines, computers, and internet connections. The lack of computer resources hamper the widespread of eHealth services [22]. Another study conducted to explore technical factors hindering integrating electronic in referral hospitals indicated insecurity, inadequate funding for eHealth infrastructure, and lack of computer proficiency [26]. Alsahrani et al., [27] observed a significant number of physicians with poor skills and technical knowledge in dealing with eHealth tools resulted in resistance. Cardellino et al., [28] added that inadequate human resource capacity remains a threat to the integration of eHealth. According to a study on eHealth integration in developing countries, the authors found low adoption of eHealth to poor computing skills among clinicians [29]. A similar study by [30] opines low internet use among doctors in Pakistan to the unavailability of proper technology and lack of training. Asangansi et al., (2013) noted that lack of adequate ICT training could lead to health professionals' resistance to aversion to technology. In a similar vein, a study on eHealth adoption conducted by charitable organizations and trust groups concluded that eHealth applications cannot be fully integrated and used when the users lack basic IT skills. Studies from LMIC revealed that the lack of qualified health professionals is a chronic problem [32]; [33]. A scoping review and a qualitative case study exploring health professionals' ICTs skills in South Africa suggests that healthcare professionals struggle daily to keep up with technical developments in an ever-changing health environment [9].

eHealth services cannot tap their full potential if they do not fit the intended users' capabilities, and expectations. Thus, studies from LMICs suggest that education and training of health staff and professionals are essential to improve ICT skills [9]; [34]. Previous studies have examined the role of health workers in eHealth in Africa and LMIC but have focused on the availability of human resources rather than on their competencies and skills. Arguably, our review found few relevant articles on capacity-building activities among health professionals, hence the need for this study.

2. Objectives

The study explores constraints that influence eHealth integration and use among healthcare workers in developing countries. Empirical data was drawn from an online survey on capacity building and innovation promotion activities in Africa. Building healthcare staff in eHealth is critical because a well-trained workforce in eHealth will strengthen health systems and ensure adequate service deliver [35]. The findings will be used to guide the provision of eHealth-related information and resources to BeH partners and others.

3. Methods

The study adopted a survey design and data was collected using an online survey. The online survey was developed using Google Forms. Email invitations containing a brief explanatory text (informed consent) and a link to the online survey were sent to the four BeH partners, who then forwarded the survey to eHealth organizations/institutions in their respective region. The online survey was available in English and was open for participation for two months. Three follow-up requests for participation were sent each fortnight. Responses to the online survey was exported to an Excel spreadsheet, and all metadata on respondents was scrubbed from the file to safeguard the anonymity of respondents. Ethical clearance to conduct this study was obtained as part of a larger BeH project. A total of 37 organizations/institutions from 13 countries responded to the survey. One organization did not indicate the country's name and was excluded from the analysis. The online survey contained four sections:

1. eHealth capacity building and innovation promotion activities and target groups
2. Factors that hinder eHealth capacity building among health professionals
3. Health workers IT literacy
4. Proposed suggestions to build IT skills

Section 1: Survey responses to eHealth capacity building and innovation promotion activities. *Section 2:* Survey statements on factors hindering eHealth capacity building. *Section 3:* Responses to variables were grouped as 1= leadership support, 2=governance of eHealth, 3=resistance to change, 4=motivation, 5= time, 6=infrastructure, 7=financial support. *Section 4:* Proposed suggestion to build IT skills, open-ended questions, and content analysis were used to analyze the responses. Content analysis involves the subjective interpretation of text data through a systematic identification and coding of themes [36].

Pursuant to the online survey, four managers were randomly identified and informally interviewed to have a better perspective on eHealth capacity-building and innovation promotion activities in their respective organizations. Quotes from these interviews were used to substantiate the results. Content analyses was applied to analyze comments from the online survey. Finally, the results reported from the survey do not represent any organization apart from itself. Therefore, the parameters for generalizability from this sample to the larger population is limited.

4. Results

4.1. Characteristics of Respondents (Organizations)

Thirty-seven organizations from 13 countries responded to the online survey. The countries were grouped into four geographical regions: East, West, South, and North Africa. The list of countries is presented in Table 1. Thirteen (13) responses were from government organizations, 15 were from the institute of higher education, four were from non-governmental organizations (NGOs), three were from private companies, and two were from professional organizations. Of the 37 organizations, most responses came from South region and the least number of responses came from the North and West regions. See Table 1.

Table 1. List/description of respondents who participated

Names of country	No. of responses /countries	Regions
Malawi (Hub)	6	South
Tanzania	2	
South Africa	2	
Mozambique	4	
Ethiopia (Hub)	5	East
Kenya	3	
Uganda	1	
Ghana (Hub)	4	West
Togo	3	
Tunisia (Hub)	3	North
Mauritania	2	
Morocco	1	
Algeria	1	
Total = 13 countries	37	

The findings were categorized into the following criteria: capacity-building and innovation activities and target groups, factors that hinder eHealth capacity-building activities, health workers' ability to use a technology, health workers' IT literacy skills, and suggestions for building IT skills for health workers. The following sections provide descriptions of the respondents' capacity-building activities.

4.2. Capacity Building and Innovation Promotion Activities

The findings show that countries use diverse capacity building and innovation promotion activities, ranging from pre- and in-service education and training to the publication of training materials. However, "support from specialists from outside the workplace" was less used, as depicted in Figure 1. One of the managers had this to say. "...training support from specialists from outside the organization requires finances which most organizations do not have....".

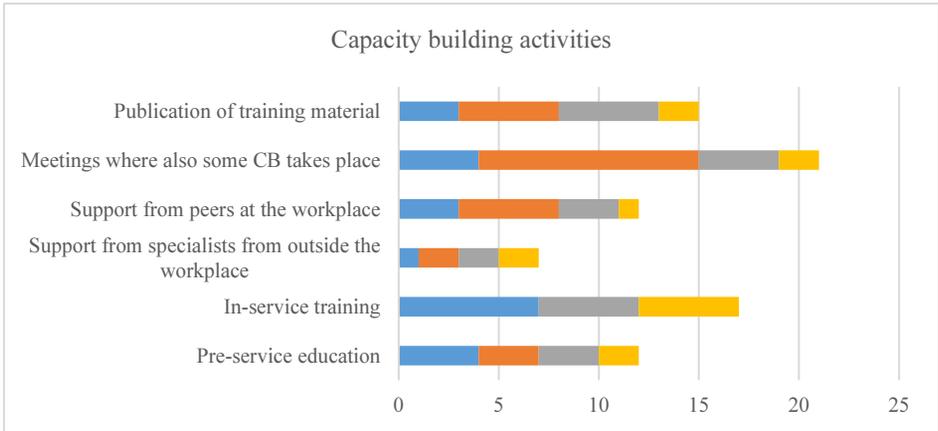


Figure 1. eHealth Capacity-building and innovation promotion activities

Those capacity-building activities were mostly organized for clinical health personnel and managers/administrative health personnel, while no policymakers and eHealth specialists have been targeted as presented in Figure 2.

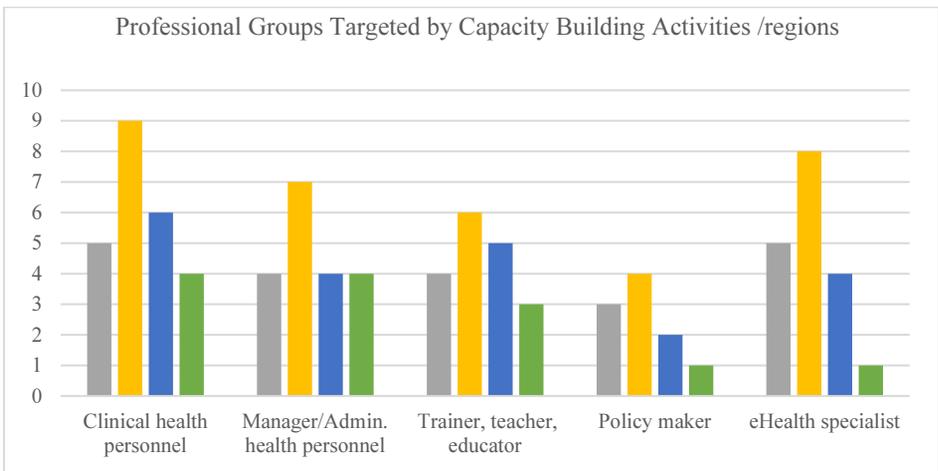


Figure 2. Professional groups targeted for capacity building

4.3. Obstacles to eHealth Capacity Building and Innovation Promotion Activities

There are numerous obstacles hindering eHealth capacity-building activities including financial, infrastructure, motivation, time, leadership support, and governance. The data was further analyzed regarding geographical regions, and the findings revealed that factors hindering eHealth capacity building in the North region are infrastructure and the lack of motivation. Lack of financial support and infrastructure constrain eHealth capacity building in the East and South regions.

4.4. Health Workers' Ability to Use Technology

While health workers use technologies (e.g., feature and smartphone, keyboard, and computer) for different purposes, however, the findings showed that in North, health workers' ability to use a feature phone for voice and text is low, and their ability to use a smartphone is high. In the East and South, health workers' ability to use a feature phone is high, but low to use a feature phone for the internet and to use the keyboard and computer. Then in the West, health workers' ability to use all four technologies is low.

4.5. Health Workers' IT Literacy

In this information age, health workers need to have the required skills and are willing to use eHealth tools. The study asked for the respondents' perception of the IT literacy of four cadres namely, clerks, primary health care staff, hospital managers, and health managers. The overall response was low literacy for all groups. There were, however, some differences across regions. In the North, IT literacy skills of clerks and primary healthcare workers are low, compared to those of hospital health workers and health managers. While in the East, the IT literacy skills of clerks and primary health workers are high, while those of hospital health workers and health managers are low. This is contrary to expectations, and may be due to the low number of respondents, but it might also indicate that IT is used more in the primary care in these countries. In the West, the IT literacy skills of primary healthcare workers are higher than clerks, while the skills of the hospital health manager are even lower. Then in the South, the IT literacy of all four groups of health workers was low, and those of primary healthcare workers are even lower. See Figure 3 for more details on health workers' skills.



Figure 3. Health workers IT literacy /Region

4.6. Proposed Suggestions to Build IT Skills of Health Workers

50% of the respondents suggested in-service training activities to build the IT skills. A responded added, “health workers should be trained on digital skills and visual presentation.” Another mentioned, “in my institution, there is need for more pre-and in-service training activities, especially in eHealth, to prepare users in the health sector to operate systems without any problems.” See Figure 4 for more suggestions.

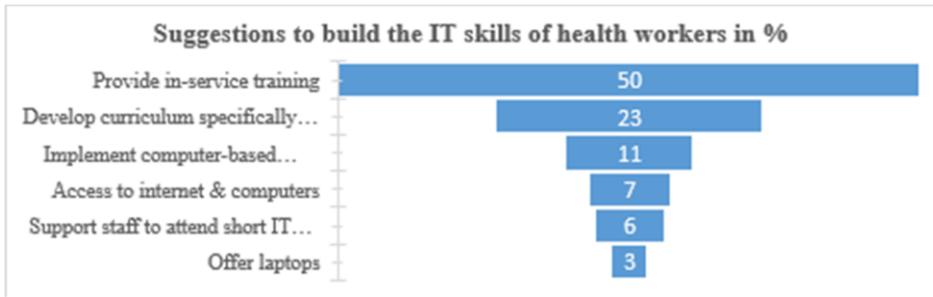


Figure 4. Suggestion to build IT skills of health workers

5. Discussions

The purpose of this study was to explore obstacles influencing capacity building and innovation promotion initiatives among BeH members and institutions. The findings from our study revealed that several obstacles hindering capacity-building and innovation promotion of eHealth initiatives, hence might thwart it widespread integration and use [4], especially in LMICs [37]. From the organizations studied, the findings showed they offer a wide range of eHealth capacity building and innovation promotion activities targeting various cadres of staff and healthcare professionals. However, few of the capacity building activities were for eHealth specialists and policymakers. There exist many obstacles which, are context/region-specific. Generally, the use of technology and IT skills of healthcare workers and professional, most particularly clerks and primary healthcare workers were low. The findings are consistent with earlier findings from other scholars who attributed low integration and use of eHealth to lack of computer skills among clinicians [26]. For a successful integration and use of eHealth, health professionals and staff involved must have at least basic computer skills. Addressing these obstacles is vital, whether related to lack of finance or staff’s ability to use ICTs this study provided suggestions. Provision of in-service training was top on the list. Looking at the list of proposed suggestions to develop IT skills there seemed to be a disjunction between these suggestions and those on section 4.3 (obstacles to eHealth capacity building. Although there are numerous potentials of integrating and using eHealth services, findings from our study revealed that several challenges.

The findings from this study reinforce previous evidence on the need to identify practical solutions and simple interventions to address eHealth obstacles to capacity building [9]; [32]. Our analysis showed that lack of finance, infrastructure, leadership support, and governance in eHealth are obstacles deterring eHealth capacity building and innovation promotion initiatives among BeH members and institutions. To mitigate these barriers, while the availability of finance is essential to develop infrastructure, purchase

technological equipment, pay for training, and recruiting qualified personnel, finance can only be effective and efficient when there are adequate policies, strong political commitment, and good leadership [32].

In addition, to addressing these challenges and creating sustainable capacity and capable healthcare staff and professionals, the American Medical Informatics Association suggested a system-wide approach where education and training should be offered. For instance, leaders/policymakers, health professionals, and eHealth specialists are taught in seminars, degrees, and certificate programs [9]. Other strategies emphasize on the importance of education including developing curricula and integrating them into existing training programs for health professionals to be taught both formally and informally. These are some of the activities BeH is focusing on. For example, in May 2022, the DEDICATED project (HISP Centre) has designed 10 eHealth modules in partnership with the following five universities: the University Eduardo Mondlane in Mozambique, the University of the Western Cape in South Africa, the University of Dar Es Salaam in Tanzania, the University of Malawi, and the University of Gondar in Ethiopia. The modules will be taught to undergraduate and graduate students in all five universities [38]. While this approach will target future eHealth professionals, research has shown the need of training initiatives from the national to the district levels for health professionals delivering care [39], which in most cases have limited resources. On-site training should be complemented with continuous support and mentoring. In-service training is wanted. It requires funds and infrastructure, and these two conditions are not met. One viable response that has shown promising results is on-the-job training, mentoring, and supervision by superusers or others in the workplace who are knowledgeable and have the time to help colleagues [40]. While training is still one of the most important approach to build the capacity of health professionals in eHealth, training alone cannot succeed without strong eHealth policies, committed leaders and good governance [24].

6. Conclusions

The healthcare sector is an ever-evolving sector requiring numerous staff and professionals with diverse skills. The staff and health professionals must have adequate skills and capabilities to respond to the evolving needs of the industry. As already mentioned above, eHealth education and training cannot be fully implemented without sufficient finance, adequate infrastructure, strong leadership, and governance [24]. The findings of this study reinforce the message from previous research [32] that IT training and education are essential for all practicing health professionals in the entire health sector, and more should be invested to staff at the district level who often need more. There is no doubt that integrating eHealth will increase efficiency the delivery of healthcare delivery, but on the other hand, there are many obstacles such as lack of IT skills, lack of finances, poor eHealth policies and governance, and lack of infrastructure that may thwart its adoption. Our study concludes that training of health workers and professional aimed at building eHealth skills and capacity should be versatile, to cater for diverse groups with different needs, and should adopt to the local context. The findings from this study may guide on aspect of obstacles to eHealth capacity building to address in to improve eHealth integration which will in turn improve health service delivery and the goals of achieving UHC. This study contributes to the discourse on eHealth capacity-building and innovation promotion initiatives among public health and

healthcare professionals. This study has a limitation as there was only 37 respondents from the 15 African countries. Future studies could extend the coverage of the sample. Nonetheless, our results are consistent with findings of previous studies.

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