Assessing Strategic Priority Factors in eHealth Policies of Four African Countries

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Abstract: The use of electronic health systems is rapidly spreading in low- and middle-income countries (LLMICs). Empirical evidence shows that eHealth systems can improve access, quality, and equitable healthcare delivery, especially for the poor and vulnerable. Studies suggest that a lack of systems thinking leads to inadequate technical infrastructure, lack of interoperability, streamlining of patient- and health information sharing. This article assesses the BETTEReHEALTH strategic priority factors from four African countries: Ethiopia, Ghana, Malawi, and Tunisia. The primary data source was eHealth policies from the four countries. A document analysis was conducted, complemented by deductive, qualitative content analysis. The results show these countries have adopted and implemented eHealth policies. They have dedicated governing bodies that aim to strengthen the coordination of eHealth efforts. However, there is a need for more robust government support and regulation in creating a sustainable national eHealth environment.

Keywords: eHealth, policies, LLMICs, Africa, BETTEReHEALTH, eHealth strategy

1. Introduction

Electronic health (eHealth) systems have rapidly spread in low-and lower-middle-income countries (LLMIC) without much government regulation [1-3]. In Africa, eHealth has experienced a fast growth trajectory in recent years [4]. eHealth offers the promise of improved access to quality and equitable healthcare, especially for poor and vulnerable communities. Studies suggest a positive link between eHealth use and health outcomes [4-6]. However, robust governance mechanisms are critical to achieving sustainable eHealth systems that can advance population health [7-9] since a lack of systems thinking leads to inadequate technical infrastructure, poor interoperability, and streamlining of health information sharing [2,10-12]. To advance eHealth systems, governments in LLMICs must regulate the development and use of standards as well as the implementation, use, accessibility, and security of eHealth systems [2,3]. National eHealth strategies make up the basis of eHealth initiatives in countries as they potentially govern, prioritize, monitor, and evaluate these initiatives [13].

This paper investigates the eHealth policy documents in four African countries: Ethiopia, Ghana, Malawi, and Tunisia. These four countries are partners and key nodes for African Regional Hubs in the BETTEReHEALTH (BeH) project, an EU-funded project

that aims to support the deployment of eHealth in African LLMICs. The four countries' governments are working to facilitate the development of eHealth ecosystems with more streamlining and increased interoperability between small-scale systems. They have eHealth strategies, but some policy documents are outdated and vary substantially in programming and coverage. Table 1 below provides some background information from the four countries that serve as a relevant context for the eHealth policy field.

Table 1: Background information from the four African countries included in the study.

	Ethiopia	Ghana	Malawi	Tunisia
Population, in Million (2020, National Statistics, data.worldbank.org)	114.9	31.0	19.1	11.8
Life expectancy at birth (2019, National Statistics, data.worldbank.org)	67	64	64	77
Educational attainment (2019, National Statistics, data.worldbanck.org)	3.2	8.0	6.4	8.3
General government health expenditure as % of government expenditure (WHO Global Health Expenditure Database, 2019)	3.24	3.42	7.39	6.96
% Universal Health Coverage (UHC Index, 2019)	46.5	49.1	55.5	68.1
% Population covered by mobile-cellular network (2020) [14]	97	97	86	99
% Households with internet access (2018/2019) [14]	15	22	10	51
% Individuals using internet (2019/2020) [14]	24	58	10	72
Main eHealth Policy Publication Year	2018	2010	2020	-

Studies have disclosed that successful development and deployment of eHealth demand long-term national-level legislative and fiscal planning (Public Policy factors), sufficient technical infrastructure (Technical factors), and ICT literacy among healthcare staff (Human factors) [15-18]. The BeH project advocates for applying a holistic approach to eHealth by addressing these three strategic priority factors – public policy-, technical-, and human factors to realize the potential benefits of eHealth.

2. Objectives

The objective of this study is to analyse and assess the strategic priority factors in the eHealth policies in Ethiopia, Ghana, Malawi, and Tunisia. The underlying notion is that policies are critical tools for reaching the needed consensus for eHealth strategies, goal setting, and prioritising initiatives. Assessing national policy documents and eHealth strategies can potentially yield valuable input to policy roadmap processes in LLMICs. This paper advocates for a more systematic approach to the planning, development, and implementation of eHealth systems through an analysis of eHealth policy documents of Ethiopia, Ghana, Malawi, and Tunisia using the BeH holistic, three-factor concept.

3. Methodology

To achieve the study objective, a document analysis design [19] was employed, complemented by a deductive, qualitative content analysis. Content analysis involves the subjective interpretation of text data through a systematic identification and coding of themes [20]. Given the heterogeneity of the content of the policy documents, this method was the most appropriate for displaying the results from the four countries' policy documents.

The primary data source was national eHealth policy documents or in the absence of these, health and/or technology-related policy documents [21-29]. Data extraction was conducted by four groups of two to three persons each from October to November 2021. Data were extracted from identified relevant documents using the World Health Organization and International Telecommunication Union's (WHO-ITU) eHealth Strategy

Toolkit [30] as a guide. The toolkit comprises seven components representing key eHealth building blocks: Leadership and Governance; Strategy and Investment; Services and Applications; Infrastructure; Standards and Interoperability; Legislation, Policy, and Compliance; and Workforce. Since data on all seven components could not be obtained from the available documents [31], data was re-grouped based on the three BeH factors: public policy-, technical-, and human factors. Summaries of the findings are presented for each of the four countries, and all information has been extracted from these documents [21-29] unless otherwise referenced.

4. Results

4.1 Public Policy Factors

4.1.1 Ethiopia

The Federal Ministry of Health (FMoH) is the main government organization responsible for health strategy and planning. FMoH has established the WoredaNet system to ensure internet connectivity and eHealth services at regional and district (woreda) levels, but several initiatives such as AgriNet, EthERNet, SchoolNet, and E-government programs are implemented by the government, signalling a broader digital transformation of Ethiopia. The government has also initiated massive electrification programs countrywide, especially in rural areas. The policy document identifies five strategic areas of intervention: 1) adapt eHealth standards 2) implement a national ICT infrastructure 3) establish eHealth governance and leadership 4) eHealth educational promotion to all stakeholders and 5) support eHealth human resource development and capacity building.

Thus, policies focus on improving standardization, establishing proper infrastructure, and building capacity among both management and health care workers. Policies focus on the entire health sector to support the realization of national eHealth goals. Emphasis is placed on national alignment and connectivity, but regions and districts can take "*different approaches to solving their specific eHealth challenges*". Investments in eHealth and the broader health ICT environment are from the government, the Healthcare Financing reform, and development partners. The government performs investment management roles for national infrastructure development.

4.1.2 Ghana

The Ministry of Health (MOH) and its agencies are responsible for health strategy and planning. Thus far, financing the country's eHealth transformation has been shared between funding from the government and development partners. Currently, no coordinating body or framework exists for investments in eHealth infrastructure, however, the MOH highlights this as an important area for improvement. The strategies in the current eHealth policy include streamlining health data regulatory framework, building eHealth capacity, increasing access, and bridging equity gaps using ICT, building a paperless record- and reporting system, and investing in improving the health information technology infrastructure.

4.1.3 Malawi

The Ministry of Health and Population (MoHP) is responsible for health strategy and planning at the national level. The MoHP has established a division within the Ministry - Central Monitoring and Evaluation Division (CMED), which coordinates and stewards health data and information systems, and harmonizes monitoring and evaluation activities. A key strategic aim is ensuring the availability of high-quality data and the health sector's capacity to use data for decision-making. The policy level also addresses capacity building within the MoHP, ensuring managerial capacity to plan, coordinate, and implement eHealth

systems. Alignment of investments and financing in eHealth is also high on the policy agenda. The MoHP has established a digital health investment framework to ensure national eHealth infrastructure development.

4.1.4 Tunisia

The Ministry of Health is responsible for health strategy and planning. A key priority in eHealth is improving hospital information systems (HIS) and enhancing electronic health records. Other critical policy areas are personal data protection and reducing the great divide between rural and urban areas with regards to digital health and access to digital health solutions. The government also aims to include all care structures in eHealth implementation and allow for a less top-down management approach. This, the government acknowledges, will demand proper procedures, training, communication, user groups, and diffusion of project management techniques.

4.2 Technical factors

4.2.1 Ethiopia

The eHealth systems consist of several sub-systems, and current eHealth applications are small-scaled isolated efforts. Systems are unable to effectively communicate with each other, or use data in a cooperative, coordinated manner. The national strategy is to streamline solutions and adopt standards and guidelines for eHealth implementation. Improved interoperability will be ensured through applications guidelines, unique identifiers, facility master lists, and a national health data dictionary. The aim is also to enhance evidence-based planning and decision-making in the health sector using digital data. Necessary ICT hardware and other related accessories will be made available to a greater extent to all healthcare service levels.

4.2.2 Ghana

Most of the implemented eHealth systems are "silos" using different operating systems, reporting formats, and data sets. Computerization of patient information, medical records, and patient management processes in hospitals have only partly succeeded, due to poor quality of computing infrastructure, especially in the public sector. Information systems support to varying extents the healthcare processes, and patient records in hospitals remain paper based. The national health insurance ICT platform for automation of health insurance services does not support any shared services yet.

To improve interoperability and integration of data, Ghana has appointed a National Information Technology Agency (part of the Ministry of Communication) that has developed an Interoperability Framework. A Technical Team on Standards has defined, reviewed, and recommended a set of standards for eHealth implementation in the country. Increased systematic efforts are being made to ensure that health solutions comply with the national technical standards policies and regulations.

4.2.3 Malawi

Malawi's government has extended a fibre network to all districts and introduced legislation to improve digital governance. The Baobab Health Trust has deployed a network backbone connecting districts and facilities to a wide area network through a virtual private network. By 2022, the aim is for 50% of Community Health Teams to use mHealth for integrated service delivery, data collection, and supervision. A key challenge is the lack of interoperability between eHealth subsystems, which creates difficulties in providing uninterrupted patient care. Efforts to improve standardization and streamlining of solutions are planned.

Constant and prolonged power interruptions negatively affect digital health systems implementation. Alternative sources of energy are being tested, for example, solar energy is used for vaccination refrigerators. National ID cards that can store health information in the future are implemented for all citizens above the age of 16. However, more secure alternatives that include all age groups, and immigrants, are planned.

4.2.4 Tunisia

The Ministry of ICT is leading the National Strategic Plan "Digital Tunisia 2020", whereas the Information Technology (IT) Centre of the Ministry of Health (CIMS) is the key actor in digitizing the health sector. Tunisie-Telecom, the main telecom operator, is collaborating with the government and other private companies in the field of eHealth in the country. Computerization in the health sector remains essentially local, site by site, application by application, resulting in a low level of integration. Efforts are being made to upgrade and modernise the hospital information system and develop innovative telemedicine projects to connect all levels of care, secure digital infrastructure, and in general improve the ICT infrastructure, especially in remote urban and rural areas.

4.3 Human factors

4.3.1 Ethiopia

There is scarcity of health information system personnel in health facilities and offices and a lack of healthcare personnel. The FMoH is responsible for the development of training programs for healthcare providers. Existing educational programs to support the delivery of care include a diploma in Health Information Technology, Bachelor of Science (BSc) and Master of Science (MSc) in Health Informatics, and Capacity Building and Mentoring Program. Recognized qualifications are BSc, MSc, and Doctor of Philosophy programs in Health Informatics. The FMoH's strategy is to further strengthen the human resources development, and plan for upgrading e-learning and tele education.

4.3.2 Ghana

The health sector in Ghana lacks health staff with adequate skill sets in eHealth and ICT. The human resource scheme does not recognize some professional ICT training obtained by staff, and yet, there is no routine or formal ICT training for staff and medical professionals. The health sector has a high density of computers and modern equipment, but most of the staff have basic skills limited to the use of word processing and spreadsheet applications. Hence, implemented new diagnostic equipment with electronic data transfer capabilities are underutilized.

eHealth challenges can be attributed to little exposure to ICT at training institutions, lack of proper professional training for persons responsible for eHealth infrastructure and initiatives, misassignment of staff with ICT experiences such as biostatisticians, lack of recognition of some professional ICT training, and misdirected focus of ICT capacity building initiatives i.e., focus on user training instead of transfer of technical skills for the long-term sustainability of the projects. A diploma program for middle-level health professionals offered at the Rural Health Training School is the only health sector program that focuses on ICT to some degree. At the agency level, some ad hoc programmes focus on the use of computers in information management. The policy document presents key actions in two broad areas in capacity building; 1) improve the human resources capacity for eHealth; 2) develop institutional capacity for the deployment of eHealth solutions.

4.3.3 Malawi

The policy document refers to the MACRA 2014 Survey on Access to ICT and Computer Services reporting that in the public, 36% of households have mobile phones. There is an increasing proportion of individuals using the Internet. More healthcare workers continue to get access to end-user computing devices, connectivity, training, and digital systems to support health service delivery. However, there is a significant lack of competent staff with adequate skills in digital health systems, which hampers existing digital health systems utilization. Public and private universities and colleges offer a variety of training programmes in the design, implementation, and operation of health ICT, eHealth, IT, health informatics, medical engineering, and computer sciences to healthcare workers.

4.3.4 Tunisia

In 2020, there was 99% penetration of mobile phones in the general public, 51% of households with a computer, and 72% of individuals using a computer [14]. Healthcare providers do not have recognized skills in health information systems. Implementation and use of HIS remain low, especially in the district and regional hospitals, due to lack of human resources, users' insufficient IT practice, resistance to change, and lack of adaptation to local conditions.

5. Discussion

Analysing eHealth strategies according to public policy-, technical-, and human factors illustrate a strong prioritizing of eHealth adoption and implementation in the four countries. There are dedicated governing bodies that aim to strengthen eHealth coordination efforts and key stakeholder groups are involved in national strategy implementation. Legal and regulatory frameworks for the advancement of eHealth systems are being improved and the vision across the four countries is to ensure standardization and interoperability. This will improve the use of data and enhance population health, health planning, and management. National regulation and coordination are critical, especially in LLMICs, where reliance on donor funding without sufficient integration into national health systems has resulted in small-scale, isolated eHealth systems [4].

It is also evident from this study that principles of accessibility, scalability, capacity building, and security are emphasized. Lack of sufficient digital literacy skills, shortage of connectivity, and unstable electricity supply were highlighted as areas of concern. However, while addressing capacity building among health system managers, staff, and medical professionals, the strategies fail to address in detail patients' and health workers' needs. Assessing the human factors, there is a need to facilitate a more user-centred design as this can improve legitimacy, ownership and usability of solutions [32].

Overall, the policy documents focused on technical aspects but did not address how the implementation of digital technologies support the broader health system objectives. While there clearly is consensus across the four countries that digital health canenable improved health coverage in the population, there is a weak emphasis on an integrated approach between eHealth and health. The countries' digital health strategies are to a large extent separated from their national health strategies. Previous studies [1,5,6] suggest directing focus towards tracing the health outcomes related to digital health interventions to facilitate increased use of digital tools, improve the digital health evidence base, and advance digital health integration into overall health strategies.

Common to all countries' policy documents was the lack of guidelines specifying when the policies would be reviewed. Also, these are visionary documents with strategic goals formulated either very broadly or vaguely and falling short of laying out consolidated action plans, roles, and responsibilities of different actors. While this represented a

challenge when ascertaining the state of the policies for this study, this may indicate that establishing national or regional platforms for sustainable eHealth systems is a complex and challenging endeavour. However, policies should be used as critical instruments for making and solidifying important and necessary political choices [33].

Two of the three official national eHealth policy documents were outdated and did not reflect the progress made or the eHealth being implemented in these countries. According to Dodoo et al. [10], Ghana has for instance made great progress in the implementation of eHealth. The available policy document, which is from 2010 however, does not reflect this progress. An updated national eHealth policy reflecting a country's current eHealth status is important because it ensures the proper allocation of government and donor funds for the development of its eHealth environment.

The WHO-ITU eHealth Strategy Toolkit provides a comprehensive guide that can be useful in supporting countries to strengthen, accelerate and align their eHealth efforts. We experienced that some eHealth components were not entirely addressed in the policy documents. Some countries' policies predate the publication of the toolkit, which explicitly suggests that countries choose components that are relevant to them [30]. Nevertheless, a better understanding of eHealth components relevant to African LLMICs, with subsequent prioritization could be significant for future policy development.

The study might be limited by geographical scale, having been conducted in four countries, but they represent four distinct geographical areas in Africa and also LLMICs. Further research is required involving more African countries.

6. Conclusions

The commitment of the countries' governments to cultivating their eHealth environment suggests that eHealth could be a means of improving health coverage in low-resource countries. However, achieving a thriving eHealth environment requires more capacity building within the health sector, which was lacking in all four countries. This study highlights the gaps in the four countries' policy documents that can be addressed.

To maximise the positive impact of foreign and domestic eHealth investments, policies must be updated regularly to reflect the eHealth status. Governing bodies need to secure long-term funding for eHealth to ensure sustainability of eHealth initiatives. Additionally, digital registries can be created to summarize a country's eHealth initiatives and priority areas. This will create opportunities for strategic collaboration between the international community, including Europe and LLMICs in terms of knowledge sharing, investment, and research in eHealth.

Addressing the public policy, technical, and human factors when developing national eHealth policies will produce a more comprehensive policy to guide successful eHealth deployment in low-resource countries. The use and effect of the WHO-ITU eHealth Strategy Toolkit in LLMICs needs further research. Finally, user-centric, country-specific, and effective eHealth policies require active and wide involvement of a variety of stakeholders –including patients and health professionals– in their development.

Acknowledgments

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