

Best Practices and Lessons Learned in eHealth in Four Low and Lower Middle-Income Countries in Africa

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Abstract: Studying best practices and lessons learned is important to improve performance and avoid previous mistakes of projects and interventions. In this paper, the analysis of ehealth interventions in four African Low and Lower Middle-Income Countries, Ethiopia, Ghana, Malawi and Tunisia is performed to extract best practices and lessons learned. A two-level evaluation methodology is proposed, where the first level is based on data available on the Global Digital Health Index platform, and the second level is a qualitative analysis based on a set of criteria. The findings obtained reveal 7 best practices and associated lessons learned in the studied countries. Although the extracted best practices represent successful interventions, the analysis indicates that certain aspects represent challenges to their success, namely, sustainability, transferability, innovation and impact.

Keywords: eHealth, best practices, lessons learned, Low and Lower Middle-Income Countries.

1. Introduction

According to WHO recommendations on digital interventions for health system strengthening [1], a digital health/ehealth intervention is defined as ‘a discrete functionality of digital technology that is applied to achieve health objectives and is implemented within digital health applications and ICT systems, including communication channels such as text messages’. eHealth interventions can also be defined as health services delivered electronically through formal or informal care. Such interventions involve complex interactions between user, technology and the healthcare professionals, posing challenges for evaluation [2]. The studied ehealth interventions in this paper will cover both solutions and policies or strategies related to ehealth. eHealth solutions represent services and applications that uses ICT technologies in the health sector.

Several evaluation frameworks exist to assess ehealth interventions, where the adopted methodology depends on the study context, scope, and evaluation objectives [3-5]. The present study was undertaken as part of BETTEReHEALTH (BeH), a H2020 project aiming at support and coordination of eHealth in Low and Lower Middle-Income Countries (LLMICs) in Africa [6]. Under the BeH framework, best practices and lessons learned from Ethiopia, Ghana, Malawi and Tunisia are extracted to learn from their success and use the gained experience in future eHealth interventions. According to the authors of [7], the term ‘best practice’ was first used by businesses, in the 1960s, looking to improve performance and maintain competitive advantage. Best practice is generally given to solutions, policies, interventions, actions, or procedures that are deemed successful and may assist other parties with a similar context.

Lessons learned are the documented information that reflects both the positive and negative experiences and the learning gained from the process of performing a project [8]. The main goal for documenting and sharing best practices and lessons learned is to enable persons and organizations working in the health sector to learn in order to improve the expected outcomes and avoid the mistakes of others. It also enables a continuous learning about how to improve and adapt activities through feedback, reflection, and analysis to implement more effective interventions. Building on previous experiences will enhance organizations capacity and skills for a continuously improved performance. The present study can also serve as an advisory document for health policymakers in the four partner countries (Ghana, Ethiopia, Malawi and Tunisia). Likewise, countries with similar context will be able to learn from this study and exploit the results in order to ensure the impact and sustainability of their interventions.

The remainder of this paper is organized as follows. Section 2 presents the main objectives of the study, section 3 explains the qualitative data collection tools, the evaluation methodology and the set of criteria used to extract best practices and lessons learned. Section 4 presents an overview of the obtained findings and provides insight on key elements that are critical to the success of eHealth interventions. The conclusion is given in Section 5 including a summary of the main results.

2. Objectives

The present paper aims to:

- Investigate existing ehealth interventions in four LLMICs in Africa (Ghana, Ethiopia, Malawi and Tunisia) in order to extract good/best practices and lessons learned, and
- Identify critical elements to the success of eHealth in the studied countries based on findings analysis.

3. Methodology

3.1 Overall methodology

For the scope of this study, the authors adopt the following definition of a best practice [9]: *‘A best practice is a relevant intervention implemented in a real life setting and which has been favorably assessed in terms of adequacy (relevance, ethics, and evidence) and equity as well as effectiveness and efficiency related to process and/or outcomes. Other important criteria are transferability, sustainability, intersectorality and participation of stakeholders’*.

A two-level evaluation methodology is designed, a primary evaluation based on the Global Digital Health Index platform (GDHI) and secondary evaluation based on assessment criteria. A set of criteria was developed to evaluate interventions and select the good and best practices. Likewise, assessment questions were given to extract lessons

learned from past experiences and projects related to ehealth. A working group including researchers, officers and IT professionals from partner organizations, namely, HealthTECH Cluster (Tunisia), Ghana Health Services (Ghana), Jimma University and University of Gondar (Ethiopia) and Health Information Systems Programmes organization (Malawi) has been created. Partner organizations performed data collection and analysis of ehealth interventions according to the developed methodology to finally report best practices and lessons learned.

3.2 Primary evaluation: Global Digital Health Index

In order to facilitate and accelerate the search process, available data from the GDHI platform are exploited. The GDHI is based on the WHO/ITU 2012 National eHealth Strategy Toolkit and tracks the progress of eHealth interventions according to seven key aspects [10, 11]: Leadership and Governance, Strategy and Investment, Legislation, Policy and Compliance, Workforce, Standards and Interoperability, Infrastructure, Services and Applications. Each aspect is assessed according to several defined indicators that allow its evaluation on a scale from 1 to 5, where 1 indicates a very low level and 5 indicates a very high level. Among the available projects on the website, partners will further analyse aspects that achieved a score equal or superior to 3/5 to extract potential good/best practices.

3.3 Secondary evaluation: Set of criteria to select best practices and key questions to extract lessons learned

To extract best practices in eHealth, certain evaluation criteria are defined (Figure 1). For the scope of the study, assessment criteria are classified into exclusion, core and qualifier criteria [9]. Exclusion criteria are designed to assess the adequacy of the studied intervention. In case exclusion criteria are not fulfilled other criteria will not be checked and the studied intervention will be excluded. The Exclusion criteria include the following aspects: Relevance, Intervention characteristics, Evidence and theory based and Ethical aspects. Core criteria will entail the assessment of the effectiveness and efficiency of the practice as well as how the practice has addressed equity issues. Qualifier criteria will assess the quality of the intervention in terms of its implementation and transferability. The following aspects are specifically evaluated: Transferability, Sustainability, Participation and Intersectoral collaboration. Evaluation questions were formulated for each criterion to guide the search and collection of best practices.

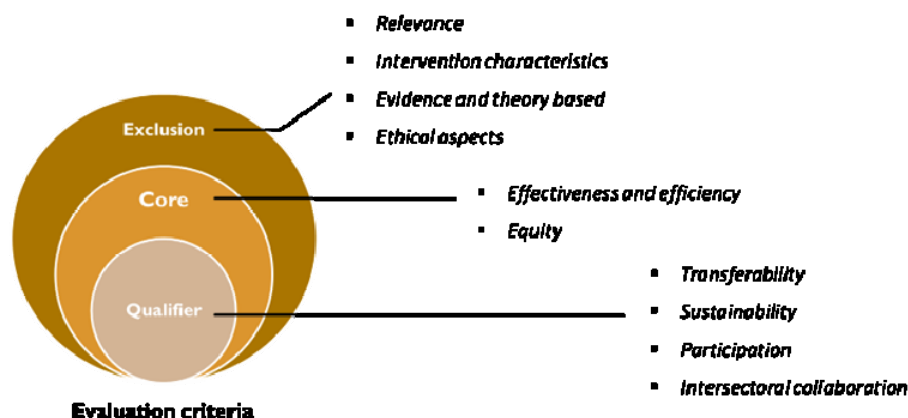


Figure 1 Set of evaluation criteria

3.4 Qualitative data collection method

There are a variety of qualitative data collection methods including observations, textual or visual analysis (e.g. from books or videos) and interviews (individual or group) [12].

Qualitative data collection and analysis of best practices and lessons learned in the partner countries took part from August to December 2021, with a total duration of 5 months. Researchers from partner organisations were responsible for collecting the necessary information in their countries using a ‘data collection and analysis document’ developed under the framework of the study.

The following methods were adopted in a progressive manner starting with the most basic tool and progressing with the other methods if required information were not available:

- Desk research and documents review: data from the GDHI website related to existing eHealth interventions were exploited. Official reports published online by donor organizations, health ministries or other governmental bodies were also reviewed and analysed.
- Surveys, interviews and focus groups discussions: in the event that relevant and up to date data were missing from published documents, researchers conducted surveys, online interviews and focus group discussions with eHealth experts, representatives from ministries of health and eHealth projects to extract the necessary information.

Collected information was evaluated using the guiding questions that enable to assess whether the studied intervention is compliant with exclusion, core and qualifier criteria. Selected interventions must comply with exclusion, core and most of qualifier criteria.

4. Findings

4.1 Overview of good/best practices

The data collection and assessment activities in the partner countries provide insight into 7 good/best practices distributed as follows (See Table 1):

- Two solutions from Ethiopia: ET1: District Health Information System 2 (DHIS-2) and ET2: ‘Electronic Community Health Information System eCHIS;
- One policy from Ghana; GH1: The national ehealth strategy;
- Two solutions from Malawi: MW1: Integrated community health information system (iCHIS) and MW2: Open Logistics Management Information System and District Health Information Software 2 Integration (OpenLMIS and DHIS-2); and
- Two interventions (with the same applied solution) from Tunisia; TN1: Set up of a Medico-Economic Information System (MEIS) in a pilot sector and TN2: The consolidation phase of the MEIS.

4.2 Main extracted lessons learned

Lessons learned from ET1 and ET2 include:

- In order to ensure the required data quality, evidence-based performance indicators have to be used by the implementing body. Regular assessment of these indicators is made based on the defined objectives.
- Participation and inclusion of all categories of stakeholders, mainly end user (patients, health workers), the public sector and the civil society play a key role in the successful implementation of an eHealth solution and limit the resistance of change.
- A successful eHealth intervention is characterized by a Human-Centered Design approach.

Table 1 General characteristics of good/best practices

	Policy/ solution	Features	Level of implementation	Duration/ date	Established collaboration	Target group
ET1	Solution	The DHIS-2 software aims to improve the monthly reporting system of the country between the public and private health facilities and the MoH. It assists the reporting and feedback systems of Routine Health Information system in Ethiopia.	National	2017- continuing	National collaboration, international funding	Public and private health facilities
ET2	Solution	The eCHIS is a suite of mobile applications with a web-based monitoring portal. It intends to capture electronic data on the Health Extension Program (HEP) and other community-level services to improve performance and community health outcomes. It serves as a job aid to Health Extension Workers (HEW) and to improve data quality.	Community	2019-date	Governmental funding	Patients and health workers
GH1	Policy	The ehealth policy supports the digital transformation in the health sector and streamlines the regulatory framework for health data and information management. It seeks to build the health workers capacity and increase access to health services.	National	5 years	National	Patients, health workers, health institutions
MW1	Solution	The iCHIS is an initiative to provide accessible, affordable and context aware community healthcare, through an integrated and configurable digital platform which builds on DHIS-2.	Community	-	-	Patients, health workers
MW2	Solution	The OpenLMIS and DHIS-2 integration aims to strengthen the existing Electronic Logistics Management Information System and facilitate the integration with the DHIS-2 which supports data analysis and visualization in Malawi.	National	2018- 2020	The Malawi MoH, University of Oslo, HISP Malawi	The Malawi Government, the MoH
TN1	Solution	The set-up of a MEIS in a pilot sector aims to strengthen public health governance capacities It also aims to improve the quality and efficiency of services provided by public health facilities to contribute to the achievement of national health objectives.	Pilot sites	2012- 2014	MoH, funded by the EU	The General Directorate of Public Health, MoH 5 pilot hospital sites
TN2	Solution	Consolidates the already developed MEIS and extend its implementation to public hospital structures.	Pilot sites	2015- 2017	MoH, funded by the EU	The General Directorate of Public Health, MoH 10 hospital sites

- A renowned IT infrastructure represents the foundation for a successful deployment of ehealth solutions. Geographic coverage and interoperability are crucial components in facilitating ehealth infrastructure;
- Institutionalization of ehealth systems is crucial for the sustainability of IT projects; and
- The development of terminology/data standards in order to adopt them during the development phase is required to have interoperable eHealth systems.

Lessons learned from GH1 include:

- There is a need to develop policies and legal frameworks to minimize the frequent failures usually encountered in the adoption of new technologies in the health sector;
- The strategy document must be accomplished in a transparent way and must be available to the public, in particular, investors and innovators; and
- The unavailability of operational documents/plans disrupts the implement of identified ehealth projects and initiatives.

Lessons learned from MW1 and MW2 include:

- In addition to legislative texts, continued engagement with frontline technical staff enables identifying ethical grey areas through the use of periodic pre-field tests;
- Participatory and Human-Centered Design approach in situation assessment and development phases of ehealth interventions have to be ensured through consultative workshops, field visits, stakeholder interviews and engaging users in co-creative methods;
- The infrastructure and dashboards have to be developed according to global standards whilst considering factors presented in the local context; and
- The interoperability concept is a new concept that involves a lot of learning activities and requires continuous development of specific technical skills.

Lessons learned from TN1 and TN2 include:

- An ehealth intervention has to be preceded by a situation analysis that includes the following aspects: current status, limitations, infrastructure and development perspectives of the current information system;
- Good practices from successful experiences are considered as references for capacity building activities with respect to the actual context;
- Performance indicators and monitoring tools ensure the achievement of the required objectives and impact in an effective and efficient way; and
- The lack of a legal framework is a major obstacle to the smooth running of ehealth interventions.

4.3 Findings synthesis

Key findings from collected data related to best practices and lessons learned from partner countries cover different areas, e.g., the IT infrastructure, capacity building and legislations. Yet, they can be classified under common categories: human, technical and public policy. This classification is inspired by several theoretical approaches [15-17] and ensures a holistic interpretation of the factors influencing the outcomes and impact of eHealth interventions. Table 2 presents the synthesis of the best practices and lessons learned from the reported eHealth interventions. Based on data analysis, these key elements are critical to the success of eHealth interventions.

Table 2 Critical elements to the success of ehealth

Category	Synthesis of Best practices and lessons learned
Human factors	<ul style="list-style-type: none"> • Stakeholders' involvement and ownership during the different intervention phases • Need-based capacity building activities for health workers and patients and learning from the lessons learned of previous experiences • Participatory and user-centred design and process
Technical factors	<ul style="list-style-type: none"> • Working with open-source codes to foster innovation • Enhanced coordination, the use and continuous adjustment of evidence-based performance indicators and monitoring tools • Renewal of IT infrastructure considering geographic coverage and interoperability • Adopting global standards while considering the local context when developing the infrastructure
Policy factors	<ul style="list-style-type: none"> • Developing policies and legal frameworks which is the foundation of ehealth support • Transparency of legislative and strategy documents and availability of operational plans • The importance of a prior holistic situation analysis

Although the studied interventions represent successful initiatives, the analysis indicates that certain aspects represent challenges to their success in the African countries, namely, sustainability, transferability, innovation and impact. Explicit sustainability strategies that reflect contextual factors like health policies and availability of funding are not developed in most of the studied interventions. Yet, considering sustainability early during the design process can lead to the development of more innovative services. Likewise, the collected data related to the transferability aspect do not present relevant information. Certain interventions indicate the possibility to transfer the technology to similar contexts, however no evidence has been provided except for the (DHIS-2). Innovation and impact also represent challenges to the successful deployment of eHealth in the studied countries. While several problems related to paper-based procedures have been solved through the adoption of eHealth solutions, issues related to standardization and interoperability challenge their advancement and innovation. According to the collected data, most of good/best practices in the considered countries are totally or partially funded by international donor organizations. This reflects the lack of governmental and local support of eHealth initiatives in these countries. A legal framework and a renowned infrastructure that considers interoperability prove to be the catalyst of innovation in eHealth in these countries.

Authors of [16] focused on the scaling up phase of digital health interventions in LLMICs and presented five key elements that are crucial for its success, namely, intrinsic characteristics, human factors, technical factors, as well as the healthcare ecosystem and broader extrinsic ecosystem. However no concrete analysis methodology has been performed to extract these elements. The literature review conducted in [17] extracted best practices and lessons learned for action research in eHealth design and implementation. The paper focused specifically on research studies and reviewed projects with different context. Recommendations include paying attention to the training of stakeholders' academic skills, as well as the various roles and tasks of action researchers. The study also highlights the need for constant reflection and accessible dissemination suiting the target group.

Approximately a third of the papers included were published more than 10 years ago, which means that some of the described technologies are relatively old. Directions for best practices to develop e-health focusing mainly on patient empowerment aspect were proposed in [18]. The paper considered applications and services developed exclusively in the Netherland and reviewed Dutch e-health studies to propose directions that promotes patient empowerment such as the design and implementation of e-health, its information content and usability, awareness, and acceptance.

The search of best practices in eHealth in literature included only ehealth services and applications, yet in our study we covered interventions that cover both solutions and policies/strategies. Our study focuses on current or recent real-world interventions that are being implemented in four African countries with similar context (LLMICs) so that their replication in other LLMICs around the world would be feasible. Also, our analysis followed a holistic approach that allowed to cover all the factors influencing the outcomes and impact of eHealth interventions. In addition to extracting the key elements that are crucial to the success of eHealth interventions, we also gave insight into aspects that represent challenges and hinder their development.

4.4 Challenges and weaknesses of the study

Access to information and documentation were the major difficulties faced by data collectors in all partner countries. Due to the lack of information sources, the data collection was based on interviews with contact persons from related institutions and ministries to generate primary data. Reported answers from interviewees can be influenced by their subjective opinions, thus, the interpretation and generalization of such information must be done thoroughly.

5. Conclusion

This paper focused on identifying and collecting relevant information about best practices and lessons learned in eHealth interventions in the participating African countries (Ethiopia, Ghana, Malawi and Tunisia). An evaluation methodology has been developed to assess several aspects of eHealth interventions and to identify good/best practices and lessons learned from solutions, policies, health and care services and health infrastructures. Reporting best practices in eHealth enhances their replication in other similar contexts, whereas documenting lessons learned from past projects helps build skills and experience of involved organizations from partner African countries. Key findings from the present study highlights the impact of human factors, mainly the importance of engagement and capacity building activities for all stakeholders' categories, and the necessity to adopt a user-centred approach to ensure patients outcomes. The technical factors cover essentially, the adequacy of the infrastructure and the importance of the interoperability to ensure communication of the different eHealth systems. On the other hand, developing policies and legal frameworks proves to be the foundation of eHealth at the national level. While it is crucial to build a favourable environment considering the aforementioned factors, it is equally important to consider certain aspects that represent challenges to the success of eHealth in the African countries, namely, sustainability, transferability, innovation and impact.

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