Adoption of ICT to Enhance Access to Healthcare in Kenya

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Abstract:
Kenya like other developing countries is faced with a burden of disease aggravated by poverty. Communicable and non- communicable diseases are increasing at an alarming rate and straining already overburdened and weak heath systems. Faced with a rapidly growing population, poorly equipped health workforce and meager resources to support the healthcare systems, there is a continuous search for tools to offer better healthcare in these resource constrained settings. ICT for development is one tool that has been adopted to improve access to quality healthcare for populations in resource constrained settings. While the tool has been shown to impact the health care sector positively, the use of ICT has brought in challenges of interoperability and usability of electronic systems in health. In this paper we investigate how Kenya has utilized ICT to spur development in the health sector and the measures she is undertaking to address these challenges. We advance that ICT for development is a tool that needs to be fully exploited by developing countries in order to bridge gaps in healthcare emanating from limited finances, poor infrastructure and an over-stretched healthcare workforce.
Keywords*: ICT, ICT for Development, Health, Interoperability, Usability*

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I. Introduction

Recent years have witnessed a developing world whose populace is faced with a healthcare burden amplified by economic hardships. With poverty come loads of communicable diseases that spread fast, affect large tracks of the population, require lots of resources to contain and leaves the majority of its victims poorer. Noticeably, the adoption of western life styles in the impoverished populations has seen emergence of non-communicable diseases as an even greater burden for an already resource and skill constrained healthcare sector. Further, today's population growth in most of the developing countries is at peak rates. Africa for instance is expected to double its population by the year 2050 [1] putting enormous pressure on the already stretched health industry.

The World Health Organization (WHO) identified funding shortage as the primary threat to access to affordable and quality care [2]. Similarly, most developing countries, healthcare systems are poorly funded with most countries relying on donor funds to run their healthcare sectors. In Kenya for instance, the expenditure for health in the year 2019 was USD23 per capita [3] against the WHO recommended expenditure of USD86 per capita [4, 5].

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Separately over the past few decades, the world has experienced a sustained growth in the adoption of information and communication technologies (ICT) at almost all social domains. In developing countries, the use of these emerging information technologies to improve the social conditions has generally been referred to ICT for development (ICT4D). The growth of ICT and especially the explosive adoption of mobile technology in Low and Middle Income Countries (LMICs) such as is Kenya provides new support for socio-economic and political development. For instance, the penetration of cellular mobile network in Kenya is near saturation as at the year 2019 at 114 per 100 inhabitants [3] implying that interventions that are based on technologies will pose greater impact on different social domains of the society; one such being the health sector.

In order to address the challenges facing their healthcare sectors, governments and policy makers in LMICs are thus ever more depending on the evidence of inherent benefits of ICT to prioritize and allocate health care resources. There has been an increase in adoption of different ICT-based approaches seeking to improve healthcare provision [6]. However the adoption of ICT for health sector development has not been challenge free. It is faced with the general obstacles facing health; under funding, poor infrastructure, few and demotivated labour force [2]. In the Kenyan case, the healthcare industry is being run under both public and private sectors [7]. This has seen various health institutions develop and adopt ICT at differentiated speeds and largely in an uncoordinated environment. The net effect of this is unfriendly systems that can barely talk to each other as well as fragmented health data domiciled in different places and in different formats and accessible through different protocols.

II. Problem Statement

In today's world, health has changed from being seen as a medical domain to being viewed as an intricate network of relationships between social, economic, political domains with the biomedical sphere. Health is as such placed firmly in the poverty and development debates [8]. The United Nations Millennium Development Goals (MDGs) as well their successor, the Sustainable Development Goals (SDGs), identified health as and similarly it is a major pillar of development. It is one of central component of the Kenya's government five-year Big 4 Agenda, 2018–2022 [3, 7]. As such, ICT have been employed to steer development goals towards achieving poverty reduction with an aim of improving the health of the most poor and vulnerable populations. To this end, the adoption of digital technologies for development in LMICs has not only impacted positively the social livelihoods of the populations but also introduced new bottlenecks and challenges that negatively impact development.

Whereas studies have shown increased access to care through adoption of ICT, one of the main challenges to this access has been interoperability between the various ICT solutions adopted. This refers to how Health Information Systems (HIS) communicates and share data with each other. Further, adoption of digital solutions in the health sector has introduced the problem of usability of the ICT tools being employed. Faced with practitioners who are over-stretched and patients who may have limited ICT skills, the need to have usable and friendly solutions while still maintaining privacy and confidentiality is central to every effort of tapping ICT to develop the Health sector.

III. ICT4D and Access to Healthcare

Target 3.8 of the United Nations, Software Development Goals, on Universal Health Coverage (UHC), requires that countries commit themselves to ensuring that every person has equal access to quality health services with protection from financial risk. Achievement of this target would thus imply that not a single person is left behind; particularly the poor and vulnerable populations [4]. Likewise, the 2010 constitution of Kenya grants to every person the right to receive the highest attainable standard of health in article 43 (1) (a) [9]. This target is central to the Kenyan government, where it a targets to achieve UHC by the year 2022 as shown by agenda three of the Presidents "Big Four Agenda" which targets 100% UHC by upscaling National Hospital Insurance Fund (NHIF) uptake [10].

In order to achieve this target, Kenya has continually integrated digital technologies in the health sector space by migrating to the fourth space of health care - "The digital space". The digital space utilizes ICT to expand access to health care services [11]. This space thus allows practitioners to break geographical barriers and utilize existing ICT infrastructure to reach marginalized populations.

Figure 1: Digital is the "Fourth Space" in Healthcare. Source [11]

Further, the growth of the digital space in Kenya has seen the roll-out of e-Health projects in a bid to cost-effectively address health and health systems challenges. The Kenyan ministry of health in its national e-health policy endeavors to increase the adoption of ICT in order to attain the highest standard of health for the population. Further, the policies underscore the many challenges faced by the healthcare sector today, ranging from equitable distribution of resources in the health sector to demand for high quality care. Consequently and owing to the aforementioned challenges, healthcare practitioners and the governments have now focused on e-Health as an adjunct to overcome these challenges [12].

In addition, by digitizing access to NHIF and other health insurance covers through the use of online portals, mobile applications and integration of Unstructured Supplementary Service Data (USSD), the government has seen the uptake of health insurance increase by 10.5% between the years 2018 and 2019 [3] pointing to more access to quality health care.

In adopting ICT for developments in the health sector the Kenyan government's has focused on increasing access to health information by various stakeholders, utilize telemedicine to deepen access to care, standardize metrics in the sector, improve network coverage, formulate policies and regulation of ICT usage in health, ensure inter-operability of health data, advance the usability of e-health technology as well as empower and grow its e-health human resource workforce.

Notably, tradition healthcare systems have been based on tested tools that largely are at the hands of health professionals. This reality has changed with the integrations of ICT in health. With technology moving these tools to non professional users, and introducing new tools at a faster rate than traditional systems, how usable these tools are has become a cardinal consideration. However, Martin et al notes that many electronic systems are not human centric, are designed and developed with little input from end users which negatively affects the usability of these digital systems [13]

Usability in this context is an evaluation of how well an end user can use a product/system to attain the desired objective successfully, proficiently and adequately [14]. It refers to 'the simplicity with which a specified consumer can learn to manage, organize inputs for, and construe the outputs of a system or component' [15]. Hence the value of ICT in developing the healthcare sector is tightly related to how usable the said ICT interventions are. This faced with the fact that many LMICs are faced with healthcare professionals shortage and thus the existing practitioners would rather spend time taking care of patients than learning new tools. Further with a population with low literacy levels compared to the first world counterparts [16], the simplicity of use of ICT interventions continues to affect their success in alleviating health poverty. In Kenya, the committee on ICT and mobile health is mandated to ensure usability of ICT solutions in the country to which end the committee is developing a definition of usable e-health systems for the country [12].

Svanaes recommends that usability of ICT solutions in health should go beyond graphical user interfaces to include social facets such as to what degree a system affects the face-to-face interaction between a health practitioner and a patient as well as ergonomic aspects such as the ability to free both hands from the solution to care itself[17]. It is therefore evident that there is need to undertake measures to ensure that new ICT and mobile health tools are tested in terms of usability if they are to substitute/replace traditional tools.

IV. Integration and Interoperability of ICT Systems for Health

The integration of information and communication technologies has spurred development in the health care sector in Kenya. However there have been challenges in this adoption as appreciated by the Ministry of Health (MoH) in its e-Health policy [18]. The problem of interoperability between the disparate electronic systems being utilized to offer care remains one of the major challenges. Evidenced by the fact that the country has adopted ICT at differentiated speeds defined by geographical settings, type of ownership, urban versus rural settings and the available funding, there remains a great gap in having the implemented technologies communicate with each other. To address this challenge the MoH together with its partners have developed the Kenya Health Information Systems Interoperability Framework (KHISIF) [7].

The KHISIF defines the Kenya Health Interoperability Architecture (KHIA) (figure 2) that all Health Information systems (HIS) should adhere to in order to be interoperable with each other. Further, the framework provides for legal and ethical accountability as well as governance and oversight of e-Heath systems in the country. Since KHIA is aligned to the international Open Health Information Exchange (OHIE) [19] framework it provides for a compliant health information system in Kenya being interoperable with any other system that is OHIE compliant
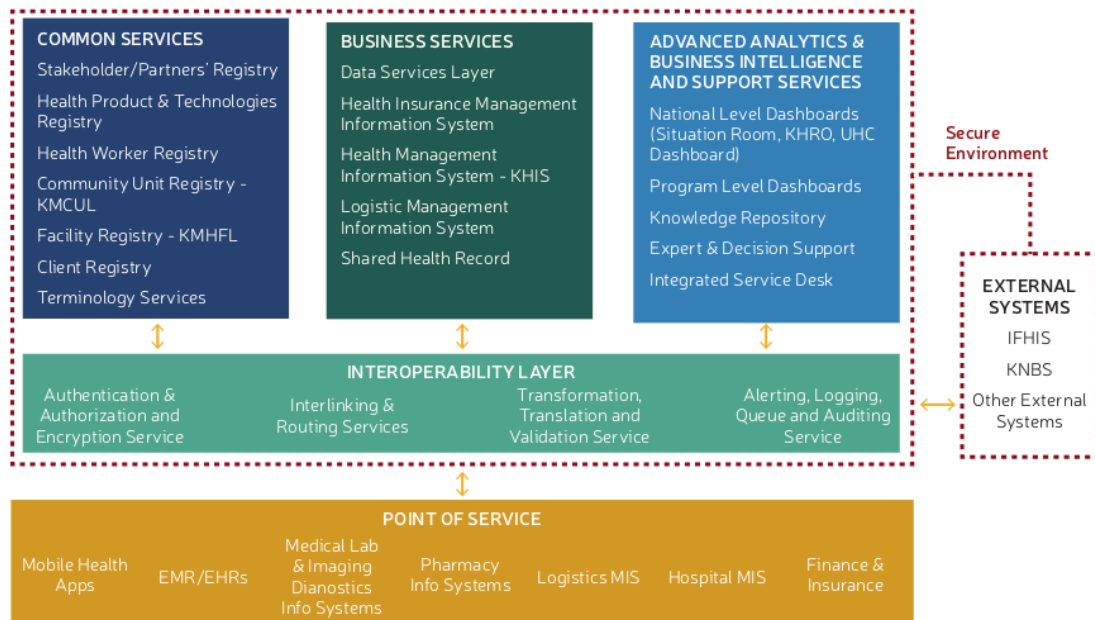
Figure 2: Kenya Health Interoperability Architecture. Source: [7]

The enforcement and adoption of the Kenya Health Information Systems Interoperability Framework by all stakeholders is expected to streamline the flow and exchange of information in the health sector hence addressing the problem of interoperability.

V. Benefits of Accessible, Interoperable and Usable ICTs in Health

By leveraging on policies and strategies for accessibility, inter-operability and usability of ICT for health development, Kenya has been able reap benefits and accelerate health service access [3]. Interoperable health information systems have been able to interact with each other both vertically (for government aggregated reporting) and horizontally (for sharing of patient data) [20]. The KenyaEMR, which is the nationally endorsed Electronic Medical Records System (EMR) supports patient care and health care indicators collection and integrates to the District Health Information Software (DHIS) system for government reporting. Further institutional specific health software systems are able to integrate with the DHIS by utilizing health information exchange standards like Health Level Seven (HL7), Fast Health Interoperability Resource (FHIR) and Open Health Information Exchange (OHIE).

In the advent of the corona virus pandemic, the Kenyan Ministry of Health has utilized technologies like television, radio, SMS (Short Messaging Service) and social media platforms like facebook and twitter to inform its population on the dangers of COVID 19, how to stay safe and avoid contracting the virus and also the location of emergency centers country wide thus reducing the spread of the infectious disease [21]. In addition the use of mobile technologies and applications and other electronic interventions have enabled contact reporting and tracing while adhering to COVID 19 regulations.

The Kenyan Ministry of Health opines that information and communication technologies have also improved communication and data collection in the health sector [7].This is in concurrence with Mlaki who observed that leveraging on telemedicine and tele-consultation, patients in rural areas are able to access quality care from remotely available health specialist largely located in urban centers [8]. Consequently, these technologies have reinforced the capability to monitor different cases of threats to public health as well as incidences of disease outbreaks including in remote areas. Further, the technologies have facilitated a public conversation and discourse around pertinent threats in the public health sphere. [8, 22]

In the Kenyan case, ICT have streamlined the patient referral systems with referring facilities utilizing electronic systems to reserve and refer patients to larger specialized facilities. The Kenya Health Sector Referral Implementation Guidelines of 2014 [23] envisages the use of electronic systems to improve on client referral and management during referral movement. Figure 3
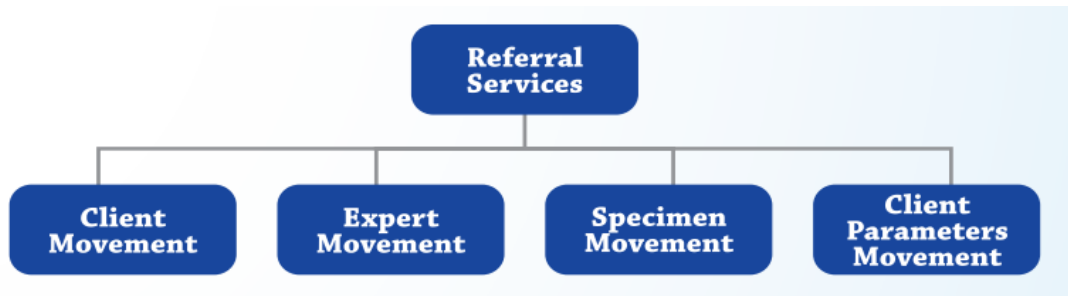
Figure 3: Client Referral Management Framework. Source [23]

The effects of electronic systems and especially mobile based systems have been extensively applied in community health services. Home-based Testing Services for HIV, Tuberculosis and Hypertension in Kenya for instance have greatly benefitted from mobile phone based services. The same benefits have been extended to Chronic Disease management [13]. Further, patients in need of pediatric and maternity services have benefit from e-programs creating awareness and thus reducing both maternal death and infant mortalities [24]

VI. Challenges and Risks

The heath care sector has seen emergence of new challenges and risks to the sector as a result of introduction of information and communication technology in to the sector. For instance, whereas ICT based solutions for health care should be able to easily exchange data and communicate with each other – interoperable [13], most LMICs like Kenya have been faced with the problem where health institutions are deploying solutions without observance of the laid out guidelines and standards [7]. The net effect is siloed systems that cannot communicate with each other. Similarly, with interoperability emanates the question of how to uniquely identify patients across several systems that have different databases. There thus exists the need to employ various patient matching techniques to facilitate accurate patient identification [22].

One of the key benefits of ICT for development in health is to expand accessibility to care. However a major challenge in most developing countries is the divide between those who have access to digital infrastructure and those who do not. Chesser et al observes that populations experience the divide based on several factors; geographical location, rural versus urban settings, age, skills, general health literacy, education level, culture as well as income levels [25]. Unless addressed, this digital divide remains one of the biggest threats to accessibility of ICT based interventions in health care.

VII. Policies and Strategies for ICT4D in Health

To fully reap the benefits of ICT for development in the health sector, the Kenyan government has formulated several policies to streamline the process as well as developing strategies to further benefit from digital solution. These policies and strategies have focused on accessibility, interoperability and usability as well as standardization, security and confidentiality, patient centrality, scalability, integrations and other critical factors affecting application of information and communication technologies in health. Kenya aims to utilize ICT in order to move towards the achievement of the highest standards of health as guided by the Kenya National e-Health Policy 2016-2030 [18].

Further the Kenya Privacy and Data Protection Policy of 2018 [26], classifies health data as personal data and provide a policy around its usage, access and storage thus helping boost confidence and deepen the uptake of information and related technologies in the health sector.

VIII. Conclusion

Information and communication technologies are not an end by themselves but tools to augment existing work, support existing systems and attain broader health and development goals. Studies have revealed that the adoption of ICT in the health sector comes with a share of challenges including fragmented data as well as disparate and unfriendly systems. By recognizing interoperability and usability as key factors that has and still affects the depth of benefits reaped by the health sector through adoption of ICT for development, Kenya's Ministry of Health is undertaking measures to ensure that interoperability and usability are enforced and achieved by all electronic health systems in the sector to reap from the investments.

Notably, Kenya has undertaken steps in realizing development in the health sector by utilizing technology with policies and strategies being developed and implemented to this course. However, while the policies addresses critical challenges facing adoption of ICT in the Health sector, there is need to further entrench adherence to these regulations by all stakeholders in the sector in order for the country to enjoy quality care that is accessible to the majority of its citizenry and achieve its health objectives.

It is therefore evident that ICT for development in health ensures that the use of technological tools benefits healthcare systems, health practitioners, patients and that the population's health improves.

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