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Research

A mixed methods approach to prioritizing components of Uganda's eHealth environment

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Abstract

Introduction: Globally the use of information and communication technologies (ICTs) in healthcare, eHealth, is on the increase. This increased use is accompanied with several challenges requiring uniformly understood and accepted regulations. Developing such regulations requires the engagement of all stakeholders. In this manuscript we explored the priorities of various eHealth stakeholders in Uganda to inform the eHealth policy review process. **Methods:** We used a Delphi approach during the initial programmed plenary of a consultative workshop in which participants were asked to identify and post their topmost priority related to eHealth under one of the seven components of the eHealth environment as described in the WHO national eHealth toolkit. We used an additional qualitative analytical method to further group the participant sorted priorities into sub clusters to support additional interpretation using the toolkit. **Results:** The components of the eHealth environment ranked as follows with respect to descending number of postings: information services and applications (36 postings), information and technology standard (31 postings), leadership and governance (22 postings), strategic planning (21 postings), infrastructure(14 postings), financial management (2 postings) and others (6 postings). **Conclusion:** Uganda's eHealth environment is in the developing and building up stage (II). In this environment the policy and implementation strategy should strengthen linkages in core systems, create a foundation for investment, ensure legal certainty and create a strong eHealth enabling environment.

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Introduction

Globally there is an increasing effort to use information and communication technologies (ICTs) to support various aspects of health care like chronic care in high income countries [1], supporting pregnancy in Australia [2], patient safety in Italy [3], HIV/AIDS care in south Africa [4] and reaching rural communities by Short Message Services (SMS) in India [5]. In sub-Saharan Africa examples of use of ICTs in health include the use of various mobile health (mHealth) solutions by multiple sub Saharan African countries [6] and telemedicine in west Africa [7]. All of the above examples of ICTs applications are now conveniently described as Ehealth, a concept that has been used in various ways to describe the enhancement of health care delivery services using ICTs [8]. eHealth policy on the other hand can be defined as "a set of statements, directives, regulations, laws, and judicial interpretations that direct and manage the life cycle of eHealth" [9]. The need for uniform stakeholder's interpretation of the "statements, directives, regulations, laws, and judicial interpretations that direct and manage the life cycle of eHealth" is mentioned in most of the above cited eHealth examples. According to Adler-Milstein et al (2014) one of the challenges of the implementation of the eHealth strategies in four high income countries is that of integration of the various stand alone solutions within various regions of the participating countries, the countries as a block and later across borders [1]. To attain the above mentioned level of integration there is need for standardization of approaches for example to have a common agreed upon set of terminologies across all eHealth platforms [10]. This is currently missing. Of additional importance for sub-Saharan African national health managers are the answers to concerns related to cost [11], access [12], actual uses/users [5, 13] and eventual sustainability with scaling up [1, 6]. Uganda has until recently, been the site of sporadic mushrooming of pilot projects on various aspects of eHealth. As a result of the largely uncoordinated pilot nature of these projects the Government of Uganda imposed a moratorium on new eHealth activities in 2012. The moratorium was made to put in place stronger eHealth stewardship and regulatory frameworks, to ensure that public and donor funds are used for maximum benefit to the general population [14]. The development of an appropriate universally acceptable to stakeholders was identified as one of the key preconditions to lifting the moratorium. In this manuscript we explore the workshop eHealth policy priorities obtained from consulting with different stakeholders in Uganda.

Methods

The policy priorities were generated as part of a policy review consultative stakeholder's workshop organised by the Ministry of Health Uganda Resource Centre that was held in Kampala, the nation's capital in January 2015. For this meeting 315 invitations were made and sent out with regular reminders prior to the end of year (2014) holiday season. These invitations were made to individuals/organisations known to have previously participated in ehealth related activities in the last 5years and in the Ministry of Health Uganda Resource Centres' address book. Additional invitations were made based on the recommendations of some of the above individuals and organisations to individual/organisations not in the Resource centres' address book. Overall 359 individuals representing various organisations and the general public were invited, of these 163 attended. **Table 1** provides a summary of the different types of stakeholders that were represented in the workshop invitation and final attendance lists. Participants were welcomed and informed of the overall objectives of the meeting and the process to be followed as they worked through the program for the day. The objectives of the workshop were to: (1) Inform and collate the views of stakeholders on the draft 0 for eHealth framework. (2) Engage meaningfully with those who will be responsible for implementation and delivery and to secure their interest and ownership of the eHealth framework. (3) Develop a shared vision and collectively set priorities for effective eHealth delivery. (4) Solicit strong cooperate commitment and political will, visionary leadership, and funding. (5) Enlist support from all sections of the health sector and active participation of the general public in the policy formulation process. These were achieved through a series of facilitated small group breakout discussion sessions that were followed by plenary sessions where group representatives presented summaries of the group discussions to the plenary for additional consensus. A team of senior health managers from the ministry of health was invited to facilitate the small group discussions while the authors of this paper facilitated the plenary sessions. One of the initial visioning exercises by all the participants was the identification and posting of their priorities. This was the initial plenary session after the workshop opening remarks delivered by AJR. In this session, a Delphi approach of generating consensus was used to engage participants' in identifying their perceptions of the current eHealth environment. This was done by the facilitators providing a card to each participant and asked all of them to write what they considered to be their top most priority

(what they want to be done) as a result of the workshop. The facilitator for this session, IGM and MES, accorded participants ample time to ask questions to clarify their assignment. From the questions it was also concluded that the priority had to be important enough to have brought them for the workshop. Following the writing of each participant's priority on the card provided they were invited to move and place their priority under one of the seven pre arranged cluster headings pinned on the wall and representing the different building blocks or components of the eHealth environment as described in the "National eHealth context" in World Health Organisations (WHO) National eHealth Strategy toolkit (page 8 of chapter 1) [15]. This being a group activity participants were encouraged to discuss their priorities before posting them, as once posted they were not to be removed.

The posting of priorities by participants was considered complete at the end of the day. The posted priorities were typed verbatim into a word processor within their cluster headings. Thematic qualitative content data analysis was used to further cluster the priorities using the text based open source RQDA package in the R statistical analysis software [16, 17]. The priorities were coded under their respective participant posted building block/component of the national eHealth environment [15]. These building blocks thus provided a framework for the initial sorting of the priorities by the workshop participants. During analysis the blocks were retained as the themes for each cluster of codes generated by the authors during sub analysis of the priorities. Memos and annotations were used to capture additional observations for each item with respect to the researchers' experiences as practicing health professionals. Reading and coding of the priorities was repeated several times until no new codes were identified. The analysis was conducted by two of the researchers independently followed by a consensus meeting to generate agreement. A third researcher was called in to independently resolve any conflicts in coding arising from sub clustering the items in each component through agreement on one of the previously identified codes or generating a new code. The final codes were then selected through dialogue to reach consensus by the three researchers. This was a public stakeholders' consultative meeting no ethical approval was required for this operational workshop. No personal identifier marks were used during the analysis of the participant's priorities. Permission to use the materials from the workshop was obtained from the Ministry of Health Uganda Resource Centre in Kampala, Uganda.

Results

All together there were 132 priority items on various aspects of the eHealth environment in Uganda from the participants. **Table 2** provides a summary of the number and types of priorities for each building block/component of the eHealth environment [15]. It was observed that the building block/component on information services and application had the highest number of priorities with 36 postings. In this most of the priorities concerned various aspects of data management and use. These aspects covered all aspects of data from its production to eventual use in policy. One of the stakeholders went further to suggest the use of personal identification unique numbers that are linked to health data for perpetuity as an important data related issue for the policy to cover.

"All people (clients/patents) who visit health facilities have unique numbers where all the bio-data and health related information are captured for perpetuity."

The second most frequently selected building block/component was information and technology standard with 31 postings. The majority of these were focused on the need to support interoperability between systems with 15 postings. There was an emphasis on the use of "open source systems" by two stakeholders quoted here. In the first quotation emphasis is on open source software which due its free to use and modify may be more affordable compared to proprietary software that usually comes with recurrent annual premiums/licenses.

"The use of open source (platforms with) electronic medical records based on nationally approved HMIS tools"

In the second cited priority; note the description of the system as being "open source" suggesting increased accessibility. This is the thinking behind the various "open data initiatives" whose goal is to increase public access for purposes of accountability, governance and growth of industry as has been done in New York [18]. This is different from software being open source in addition to interoperability as described above.

"Standardization of eHealth systems .Inter-operability of systems for decision making purposes "open source"

Other items coded for in this building block/component included Access which covered items on access to information, integration and centralization of databases and related standards. This had 8 priorities and was followed by the priorities related to building workforce capacity with 5 priorities and lastly the legal issues with regards to alignment of the eHealth policy with other government policies, laws (especially the cyber laws to ensure confidentiality of individuals and their medical records while at the same time regulating eHealth related transactions) and national development programs (3 priorities). The third most frequently selected building block/component was that of leadership and governance with 22 priorities. Most of these priorities focused on the need for proper approvals with respect to managing data and health information managed within the policy and governance frameworks. This code on approvals had priorities regarding ownership of health information i.e., who should be involved in dissemination. The policy was also expected to articulate the approval process for access to and use of health related data.

"All information must be (entrusted to the ministry of health Uganda and remains) owned by Ugandans"

"Accreditation (of both individuals and institutions accessing the system) issue needs to be addressed. Who is using the system? What facility or institution? What are the protocols (for individuals, researchers and institutions)?"

The remaining four building blocks/components in order of ranking were strategic planning (21 priorities), infrastructure (14 priorities), financial management (2 priorities) and others (6 priorities) (**Table 2**). The theme indicated as others focused on two sets of coded priorities that demonstrated the need for linkages across various health related sectors that included the armed forces and actual use of data to guide planning of the health sector.

"And the policy should cater for special programs like prisons, police and army (and other most at risk populations)"

"To coordinate and implement all eHealth programs for effective and efficient health services."

Discussion

We set out to explore the eHealth policy priorities arising from a consultative workshop with various eHealth stakeholders in Uganda. Using the frame work developed by the world health organization we observed that the building block/component corresponding to Information services and applications had the highest number of priorities/postings (**Table 2**). This was followed by other building blocks/components in descending order of prioritization: information and technology standard, leadership and governance, strategic planning, infrastructure, financial management and others. This ranking has two important aspects of the proposed eHealth policy review process in Uganda that will need to be addressed in the final policy documents. The first aspect is drawn from the observation that the ranking is based on participant generated and self sorted priorities under each of the building blocks in the current Ugandan eHealth environment. The priorities in turn are informed by the individual participants' views, impressions, perceptions, experiences and biases towards the various aspects of eHealth environment in which the participants operate. This implies that the sorted priorities provide an indirect assessment of the current state of eHealth environment in Uganda. On looking at the top most codes for each of the building blocks (**Table 2**) we observe the following: under information services and applications most of the coded priorities related to data (31 postings). In the case of information systems and technology standards the most of priorities were codes under interoperability (15 postings). Leadership and governance had the code on approvals (18 postings) while strategic planning had the code on decision making (21 postings) respectively, as the codes with the highest number of priorities. The common feature of the above coded clusters of priorities is that they all need a well regulated enabling environment to be addressed. According to the WHO National eHealth Strategy toolkit this is a core characteristic feature of country where the eHealth environment has reached the stage of developing and building up, stage II (see page chapter 1 page 5-6 in the tool kit) [15]. This is further supported by additional documented observations of ICTs use in the general population like mobile banking [19], increased government interest as shown by the laws establishing a ministry of ICT and later Uganda Communications Commission [20], Use of e-learning [21], and most ICT related activities still being donor driven. Within the health sector there are several vertical health information systems arising from the many vertical programs with increasing demand for integration as shown by the postings above and from literature

[22, 23]. This is all characteristic of a nation with a stage II eHealth environment context. Having recognized where the country is, the second aspect of interest to the eHealth policy review process that can also be drawn from our results, is the identification of what the policy needs to focus on for progress. The definition of progress used in this case being where the country lies with respect to the three different stages of eHealth environments' development as outlined in the WHO toolkit. In brief these stages are: experimentation and early adoption (stage I), developing and building up (stage II) where we have placed Uganda now and Scale up and mainstreaming (stage III) [15]. As has been alluded to above our analysis of the stakeholders priorities suggests that Uganda is currently at the developing and building up stage. For this stage the tool kit recommends: we strengthen and link core systems, create a foundation for investment, ensure legal certainty, and strengthen the eHealth enabling environment [15]. This is supported by some of the comments made by the participants for example under strengthening and linking core systems one of the participants priority was to have a "Unified health system" (**Table 2**: under infrastructure). Some of the features of such a system include electronic health records and use of unique patient identifiers. This in turn creates the need for good legal and regulatory frameworks to protect the right of the patients and ensure the security of the stored data. Eventually this data should be available for use by all stakeholders as highlighted by another participant. Addressing these concerns would prepare the country to transit to the highest stage of the eHealth environments' development which is characterized by a high level of consumer driven and self regulated control.

In addition to the inherent bias associated with the use of the qualitative analytical approach to generate meaning from the posted priorities some of the other limitations of our approach include the potential selection bias due to the numbers of participants that turned up and the allowing of participants to post only one priority each. With regards to the number of and representativeness of participants the workshop organizers made an attempt to cover each of the different types of stakeholders as described in the WHO toolkit [15]. This was partially achieved as demonstrated in **Table 1**. The low turn up may have been due to the timing of the workshop soon after the holiday season. The use of additional workshops to widen the targeted audience and the additional engagements as part of this process should help to further clarify the policy direction for the country using this framework. Our allowing participants to post only one priority forced them to focus, thus select the most pressing aspect of the ehealth environment they wanted to see addressed as a result of the meeting. Whereas this reduced the potential number of priorities, forcing the participants to select one priority gave the study team a clearer view of each stakeholder's perspective of current eHealth environment in the country. When all these perspectives were put together as we did above, then combined with our own experiences and personal observations to provide us with a clearer picture of where we are and ideas for the next steps in the policy development process. This changes the above identified inherent weakness of our approach to a strong point. The use of a frame work to guide this process is an additional strength to the process as recommended by van Dyk (2014) [24]. Whereas other frameworks exist [25] the nature of funding and organization of the policy review process limited us to the application of the WHO framework [15]. Evaluation of the WHO framework has been favorably described elsewhere by Hamilton (2013) [26] and Riaz et al (2014) [27]. Thus, while a detailed re-evaluation is beyond the scope of this manuscript, it is important to note that the framework provides a useful list of context specific success factors for the development of national ehealth policy.

Conclusion

Using the WHO national eHealth toolkit we were able to generate a ranking for the various components of the national eHealth environment. From this ranking we observed that Uganda's eHealth environment is currently in the developing and building up stage (II). This means the future policy review process should focus on Strengthening linkages in core systems, creating a foundation for investment, ensuring legal certainty and creating a strong eHealth enabling environment.

Competing interests

The authors declare no competing interests.

Authors' contributions

MES, LA, and IGM participated in the manuscripts conceptualization. MES, LA IGM, NS and AJR drafted and provided scientific reviews to

the various manuscript drafts. All authors reviewed the final manuscript prior to submission. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the case.

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Tables

Table 1: Summary of workshop participants

Table 2: Summary of the ranking for the components of the eHealth environment

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Table 1: Summary of workshop participants			
Type of stakeholder	**Class of parent Organization**	**Number invited**	**Number attended**
Decision makers	Ehealth steering committee	11	7
Key influencers	Other Government bodies	151	56
	Health regulatory councils	6	2
	Funding and investment organizations	43	15
	Academia	15	6
Engaged stakeholders	Health agency and advocacy groups	25	8
	Health committees and programs	49	31
General public	Press	1	1
	General public	58	37
	Total	359	163

Table 2: Summary of the ranking for the components of the eHealth environment				
Building block/component	**Number**	**Codes**	**Freq**	**Example of priorities**
Information services and applications	36	Data	31	"To capture health data for ease of storage, retrieval, analysis and policy formation"
		Partners	5	"To promote stakeholders co-existence in the eHealth space in Uganda"
Information and technology standard	31	Interoperability	15	"Define standards for inter-operability of health information systems at various levels"
		Access	8	"To receive and access high public and clinical health information in real time for better decision making"
		Workforce	5	"Build a self sustaining information technology workforce that is knowledgeable"
		Legal	3	"Align the various initiatives to the NDP, HSS, IP and other relevant government policies bearing in mind existing technologies"
Leadership and governance	22	Approvals	18	"The policy should be the basis for the establishment of a governance framework that will guide how information technology will enable health service delivery in Uganda"
		M & E	4	"A clear picture on how the eHealth policy will be implemented and evaluated"
Strategic planning	21	Decision making	21	"To contribute to strengthening decision making and networks of professionals, committees and government in receiving quality services and sustained access to all Ugandans."
Infrastructure	14	System	9	"Unified health system"
		Security	3	"Quality data and information that is not easily accessible to the public"
		Training	2	"Building capacity of health workers and application of eHealth"
Financial management	2		2	"Pool financing to government to identify the most important area that requires attention"
Others	6	Linkages	2	"All health services irrespective of who is providing them must be linked to the effective (MIS)"
		Data use	4	"Promote quality health data collection, use, planning and resource collection"