

A Qualitative Study to Examine Approaches used to Manage Data about Health Facilities and their Challenges: A Case of Uganda

Jonathan Mpango, MS¹, Josephine Nabukenya, PhD²

¹ School of Public Health, Makerere University, Kampala, Uganda; ² School of Computing and Informatics Technology, Makerere University, Kampala, Uganda

Abstract

Availability of an accurate and complete health facility list is fundamental in producing quality and timely data that is sufficient to aid evidence-based decision, resource allocation and planning within the healthcare ecosystem. This study aimed at examining the approaches used in Uganda to manage data about health facilities and the challenges they are facing. We conducted a qualitative study involving 32 interviews with participants from Ministry of Health, government regulatory organizations, district local government, general public, academia, implementing partners and healthcare providers. Our analysis identified four divergent approaches that had five common challenges, namely; lack of a health facility unique identifier, non-standardized, incomplete, inaccurate data, difficulty accessing and using data. Establishing a national central health facility registry to manage the national health facility list would improve patient referrals, facility look-ups, health information exchange, data curation and access and health information system integration.

Keywords: Health Facilities, Health Information Exchange, Master Facility List, eHealth, Uganda

Introduction

Availability of accurate and timely information on the quality and supply of healthcare services is essential for monitoring and evaluating health systems (1). Having quality and complete information enables countries to track the progress and performance of their health information systems (HIS). However, few countries have accurate and up-to-date information on the state of their health facilities (HFs), covering the public, private-for-profit and private-not-for-profit sectors. This poses a challenge in producing quality and timely data that is sufficient to aid evidence-based decisions and resource allocation (2). One innovative approach that low and middle-income countries (LMICs) have undertaken is embracing Information and Communication Technology (ICT) to develop and implement electronic HIS (eHIS) within the healthcare system to manage data about HFs (3).

Despite the huge investment in implementing eHIS in Uganda, it is still challenged by divergent levels of data standards that hinder data exchange, poor coordination and communication, limited skilled human resource, fragmented data collection processes, inadequate infrastructure and isolated HIS (4–6). According to World Health Organization (WHO), most of the LMICs have multiple sets of HF lists which may contain contradicting data on HFs and they lack a common HF unique identification number (7). Maintaining such multiple HF lists is costly and in case they contradict each other, it may be difficult to identify the correct one. To address this challenge, WHO recommends that countries should establish one comprehensive Master Facility List (MFL) that should house complete, accurate and up-to-date data on all HFs that exist in a given geographical location (7,8). This recommendation is also mentioned in the Uganda eHealth Policy (9).

In recent years, progress has been made globally by different countries to develop tools that support them to collect and manage data about HFs (7,8,10–12). Several studies have mentioned the benefits that have been attained by countries that have established a comprehensive and up-to-date MFL including; supporting emergency response operations, efficient allocation and distribution of resources related to HFs, improved disease surveillance and improved HF identification (7,8,10–12). The government of Uganda through its in-line Ministry of Health (MoH) in collaboration with its stakeholders has made progress in establishing a national MFL, which was yet to be officially launched by the time this study was conducted. Over time, the status of HFs in a given location change due to establishment of new ones, others get upgraded or downgraded whilst some are closed. This requires the MFL to be continuously updated whenever such changes occur, which are not an easy task.

In-order to address this challenge, WHO recommends that countries can establish a national Health Facility Registry (HFR) to manage its MFL (8). The HFR is a software application that acts as the central authority to collect, store and distribute accurate, complete and standardized data on HFs (7,8,11). There are numerous benefits that are attained by countries that have established a national HFR that are documented in the existing literature. Implementing an HFR fosters better monitoring and evaluation by supporting the harmonization of facility linked datasets, improves referrals and facility look-ups, facilitates health information exchange (HIE), and facilitates data curation (7,13–15). Notwithstanding such benefits, there is no national HFR yet developed to manage Uganda's MFL although some steps have been taken through the national eHealth strategy.

At the time this study was conducted, there was no evidence published in existing literature about the approaches used within the healthcare sector to manage and/or access data about HFs. Thus, we aimed to use the study findings to improve on the current approaches by establishing optimal requirements and features a HFR should have to better manage data about HFs in Uganda’s healthcare system.

Methods

Study settings: The study was conducted in Uganda, a landlocked country in the eastern region of Africa. Its estimated population is 42.86 million by the end of 2017, with an annual growth of three percent (16). Uganda healthcare system is decentralized composed of public and private sectors (17,18). The public sector is decentralized at district and sub-district levels ranging from national referral hospitals (NRHs), regional referral hospitals, general hospitals, health centers, to village health teams whilst the private is divided into private not for profit organizations (PHFPs) and private for profit organizations (PFPs).

Study design: A qualitative exploration approach was used in this study. An exploration approach is research approach used to investigate a problem that has not been studied more clearly which is the case with this study (19). The purpose was to examine the approaches that were being used to manage and/or access data about HFs within the Uganda healthcare sector.

Participant selection: Purposive sampling was used to identify the study participants from organizations that utilize data about HFs during their decision making process. This method of sampling helps to create a homogenous sample of participants that have experience with the phenomenon (20). Participants selected from the sampled organizations were required to atleast have used data about HFs in their day-to-day operations. The category of participants selected included policy makers, monitoring and evaluation officers, technical officers, program officers, district health officers, district biostatisticians, academic researcher, healthcare providers, data officers and patients. In this study, participants were no longer recruited once saturation had been reached, in which no new information was provided to aid the understanding of the phenomenon (21). Participants were contacted face to face on appointment with a cover letter and consent form explaining their rights as participants.

Data collection: The first author, who completed data collection, bracketed biases before beginning data collection to assure data accuracy. A semi-structured interview protocol was developed and reviewed by both authors, and edited based on feedback. The interview questions were generated from the literature review around the phenomenon under study. These questions were reviewed and modified by consensus between the authors who have vast knowledge on HIS and the healthcare system of Uganda. Each interview was treated as an individual case, and all interviews were audio-recorded and de-identified. Throughout the process of the interviews, probes and follow-up questions were added as needed to encourage amplification and elucidate responses. Specific questions were added as the interview process proceeded. Data collection was completed over a period of 2 months and ended upon saturation.

Table 1. Semi-structured interview protocol

<p>What approach do you use to manage data about health facilities at your organization or national level?</p> <p>Probe: What other approaches are you aware of in the sector?; Currently, how do you access data about health facilities in the approaches you have mentioned?</p>
<p>What issues affect the mentioned approaches for managing data about health facilities?</p>
<p>What are your recommendations to address the mentioned challenges?</p>

Data analysis: At the end of the interview process, the audio recordings were transcribed verbatim by the first author and validated independently by the co-authors who re-listened to the audio recordings to ensure they were accurately transcribed. Observations from the co-authors were shared with the first author who incorporated them into the final interview script. We engaged in a reflexive dialogue to conduct an open inductive analysis (22,23). After familiarization with the raw data a coding scheme was developed in a multi-level process. Statements that mentioned approaches, challenges and recommendations were identified and categorized into codes. Any discrepancies were discussed and new codes or code definitions were created. Trustworthiness of findings was enhanced through frequent discussion between the authors to ensure that the codes, sub-themes and themes adequately described and encompassed data collected.

Study period: Data collection was done in August and September 2018 and analysis was done in October and November 2018.

Ethical considerations: The Higher Degrees, Research and Ethical Committee (HDREC) of Makerere University School of Public Health approved this study. All participants gave written consent and their privacy and confidentiality was ensured during the study.

Results

A total of 32 individuals involved in using data on health facilities consented to participate in our qualitative study, where 32 one-on-one key informant interviews were conducted with participants. Participants included 2 policy makers, 5 monitoring and evaluation officers, 7 technical officers, 3 program officers, 2 district health officers, 3 district biostatisticians, 1 academic researcher, 2 healthcare providers, 2 data officers, and 5 patients (Table 2).

Table 2. Study participants

Organization	Participant category	Number of participants per category
Ministry of Health	Policy makers	2
	Monitoring and evaluation officers	3
Government Regulatory Organizations	Technical officer	1
	Program officer	1
District Local Government	District Health Officers	2
	District biostatisticians	3
Academia	Academic researcher	1
Development Partner	Technical officers	3
	Program officers	2
Implementing Partner	Monitoring and evaluation officers	2
	Technical officers	3
Health Facility	Healthcare providers	2
	Data officer	2
General Public	Patients	5
Total		32

The study examined the approaches used to manage and/or access data on HFs and their challenges in Uganda. We present our findings grouped in two major themes that were identified during data analysis. These include: (i) approaches used to manage and/or access data about HFs, and (ii) the challenges faced by the identified approaches.

Theme 1: Approaches used to manage and/or access data about health facilities

Based on the data analysis, four approaches for managing and/or accessing data about HFs in Uganda healthcare sector were identified, namely; the draft 2018 Ministry of Health Master facility list, the national electronic health information system, the institutional-based facility list and the paper-based approach.

The 2018 Draft Ministry of Health Master Facility List: About 9% (3/32) of the study participants alluded to the 2018 draft MoH MFL as an approach used to manage data about HFs in the country. The 2018 draft MoH MFL is a Microsoft excel-based file that houses data about HFs (public and private) that has been compiled and managed by MoH in collaboration with its stakeholders. By the time this study was conducted, the MFL was yet to be released for public use. Some of the study respondents view it as the primary source of truth for data on HFs in the healthcare sector. The data attributes captured about a HF in this approach include, HF name, level, type, administrative location, ownership, operating status, contact address, geographic coordinates and services offered.

One of the comment from a study participant:

“The MoH has just compiled a national MFL that contains information on all health facilities in the country. The list has been validated and I look at it as the primary source of accurate and complete data on health facilities in our healthcare sector.” -- Participant 07, Monitoring and evaluation officer

The National Electronic Health Information System: The national eHIS is a web-based application based on the open source District Health Information System (DHIS2) which is used to collect, store, and disseminate aggregated healthcare data to support data-driven decision making (4). HFs that are expected to report on the aggregated healthcare data are registered into the eHIS. Thus, the eHIS was mentioned as an approach used to manage and/or access data about HFs within the healthcare sector by 53% (17/32) of the study participants. The data attributes captured about a HF in the eHIS include: HF name, level, ownership and geographic coordinates.

Some of the comments from the study participants:

“All health facilities are expected to report data into the national eHIS, we consider the health facility list in the eHIS when planning for activities that involve health facilities ...” -- Participant 04, Program officer

“... we often use the facility list we downloaded from the national DHIS2 when seeking for information about any specific health facility. We trust the information in the system because it is managed by the Ministry of Health...” -- Participant 08, Technical officer

The Institutional-based Facility List: The results show that 12% (4/32) of the study participants referenced to their own institutional-based facility lists for data about HFs. Several non-government and faith-based organization exist in Uganda healthcare sector and these support the MoH in strengthening healthcare service delivery especially at HF level. These organizations have established and maintained their own HF lists that they reference to during planning for activities that involve HFs. These institutional-based facility lists are managed using Microsoft office applications and access to them requires authorization from the managing institution. Majority of the institutional-based facility list observed during this study had varying data attributes collected to define a HF.

Some of the comments from the study participants:

“We have our own facility list that we routinely update with data on health facilities based on information we get when we physically visit these health facilities for on-site supervision and training activities.” -- Participant 02, Monitoring and evaluation officer

“... at the district, we have our own health facility list with all health facilities in our district that we manage.” -- Participant 10, District biostatistician

The paper-based approach: Some of the study respondents especially the patients in the general public mentioned referencing to data about a given HF that they manually wrote on a piece of paper. The piece of paper was alluded to by 6% (2/32) of the study participants as an approach they use to manage and access data about HFs within the healthcare sector.

To quote a representation of these sentiments:

“I don't have a system I refer to for information about a health facility. After getting a recommendation from a friend who received a service from a particular facility, I always write down the facility name, address and doctor's name on a piece of paper which I refer to later before seeking healthcare.” -- Participant 13, Patient

Theme 2: Challenges faced by the identified approaches

Based on the results obtained, each of the identified approach used to manage and/or access data about HFs in the country had notable challenges that were mentioned by the study participants. These included: (i) lack of standardized HF unique identification number, (ii) non-standardized data attributes, (iii) incomplete HF listing, (iv) inaccurate data about HFs, (v) lack of policies and legislation that govern the facility listing, (vi) difficulty in accessing and using data about HFs.

Lack of standardized health facility identification number: 94% (30/32) of the study participants were of the general view that there was no standardized and approved HF unique identification number (UIN) that uniquely identified a HF from the rest within the healthcare sector. The 2018 MoH MFL had two UINs that were assigned to a HF (Table 3). The MoH did not yet approve both UINs by the time this study was conducted. 15% (17/32) of the study participants who mentioned the HF listing in the national eHIS were not sure if it had a HF UIN. Although one of the study respondent mentioned that the eHIS automatically generated and assigned a 128-bit system based globally unique identification number (GUID) whenever a new HF record is added into the system. The GUID is neither recognized nationally as an approved HF UIN. None of the study participants that mentioned the institutional-based facility list and the paper-based acknowledged that they had a HF UIN.

Some of the comments from the study participants:

“... the National Health Provider Identification (NHPI) code is an 8-digit code that is permanently assigned to a health facility and the code didn't have any meaning attached to the health facility whilst the Health Service Taxonomy Code (HSDTC) was generated and assigned to a health facility based on its geographic location ... when a health facility location changes, a new HSDTC is generated and reassigned to that health facility.” -- Participant 10, Technical officer

“... the task of generating and updating the two codes was complex ... and the codes that were assigned to the health facilities were too long to be remembered and used. We cannot use them at the district ...” Participant 14, District Health Officer

“The facility list does not have a unique identification code for the health facilities” -- Participant 02, Monitoring and evaluation officer

“No, I don't include a unique identifier for a health facility... the health facility name and level is all I need to identify a health facility” -- Participant 13, Patient

Table 3: The proposed structure of the health facility unique identification number in the 2018 draft MoH MFL

Administrative Location	NHPI Format	HSDTC Format
National (A)	UG	UG-256
Regional (B)	RG-XXXX	A/NNN
District (C)	DT-XXXX	A/B/NNN
County (D)	CN-XXXX	B/C/NNN
Sub-county (E)	SC-XXXX	C/D/NNN
Parish (F)	PA-XXXX	D/E/NNN
Health Facility (G)	HF-XXXX	E/F/NNN
X – 3-digit random alphanumeric code N – 3-digit incremental numeric number C – Numeric check code		

Non-standardized HF data attributes: According to the data analyzed each approach had different set of data attributes that were collected to define a HF. The draft 2018 MoH MFL captured the HF name, unique identification number, level, type, ownership, administrative location (national, region, district, health sub district, county, sub county and parish), geographic coordinates, list of services offered, contact address, operational status and date when the data was collected as the HF data attributes. In the paper-based mechanism, patients mainly capture the facility name, physical address, contact of the healthcare doctor whilst the institutional-based facility lists had varying data attributes. The eHIS captured the HF name, level, ownership and geographic coordinates.

Some of the comments from the study participants:

“The MFL has data on health facility UIN, facility name, level, ownership, type, location, geographic coordinates, services offered, contact address, operation status and record date.” -- Participant 07, Monitoring and evaluation officer

“The list contains the facility name, level, ownership, type, administrative location and in-charge contact address” -- Participant 10, District biostatistician

“The national eHIS contains the health facility name, type, level, ownership and geographic coordinates as attributes collected on a health facility...” -- Participant 04, Program officer

Incomplete HF listing: The completeness of the HF listing in the identified approaches varied across the study participants. Some felt that the national eHIS lacked data on majority of the private HFs in the healthcare sector. The institutional-based facility list mostly contained information about HFs that exist in the locality where that particular institution/organization operate leaving out the rest of the HFs. According to some of the study participants, the 2018 draft MoH MFL had complete listing of all HFs (private and public) that existed in the

healthcare sector since the list underwent several validations with different stakeholders. The paper-based approach contained only data about HFs that are of concern to a particular individual/patient.

To quote a representation of these sentiments:

“the eHIS facility listing does not include all health facilities in the health sector; most of the private health facilities are not included since they are not obligated to report through the reporting system” -- Participant 17, Healthcare provider

Inaccurate data about HFs: Respondents reported that some of the attributes captured on a HF in the national eHIS were not accurate whilst those who use the institution-based facility list mentioned that they routinely update the data about HFs based on information they receive from the district health officer and the information they get when they physically visit the HFs during on-site supervision and training activities. The respondents didn't not mention about the accuracy of data in the individual paper-based approach, however, majority of data about HFs is obtained through recommendations from a friend, workmates or relative.

For example, some of the study participants mentioned:

“... the geographic coordinates in the national eHIS for some of the health facilities are not accurate and we cannot rely on them during visualization of health facilities using the system GIS application” -- Participant 11, Monitoring and evaluation officer

“... after getting a recommendation from a friend...”-- Participant 13, Patient

Lack of policies and legislation that govern the facility listing: Majority of the respondents interviewed were very categorical on the need to establish some form of policy and legislation to guide on the process of managing and maintaining the data on HFs because they were missing.

To quote a representation of these sentiments:

“... district health team should be legally bound to maintain the national health facility list up-to-date with accurate information ...” -- Participant 14, District health officer

“... financing of districts by MoH should be based on the total number of health facilities in a particular district that are accurately maintained in the national health facility list..” -- Participant 05, Academic researcher

Difficulty in accessing and using data about HFs: With a few exceptions, the general consensus among the respondents was that accessing data about HFs across the different identified approaches was difficult. To access data about HFs in the eHIS and the institutional-based approaches require authorization and authentication from MoH and the institution managing the facility list and MoH respectively. The 2018 draft MoH MFL was yet to be launched, therefore the data was not yet available for public use at the time this study was conducted.

To quote a representation of these sentiments:

“I lost my cousin because we were in a location that we weren't familiar with and we couldn't tell which health facility was nearby with a particular specialization to save life. If the country had a comprehensive health facility list with all details on facility location, facility contact and services offered at a particular health facility that we can freely access, then a life could have been saved.” -- Participant 05, Academic researcher

“... before implementing any activity regarding health facilities in a specific district, we first inquire from the district health team who then share with us their district specific health facility list stored in Microsoft excel ...” -- Participant 09, Monitoring and evaluation officer

Discussion

This study provided an insight into the current approaches used in Uganda to manage and/or access data about HFs and the challenges they are facing from the perspective of the study participants. The key findings revealed that multiple approaches for managing and/or accessing data about HFs existed and they had notable challenges. A country having multiple approaches for managing data about HF is not new in existing literature (12,24); The approaches established by this study included the 2018 draft MoH MFL, the national eHIS, institutional-based facility list and the paper-based mechanism. The national eHealth policy mentions of a need to merge all data from all the existing approaches and establish one national MFL that is centrally managed by MoH and accessed by all stakeholders in Uganda healthcare sector (9). This recommendation is in line with the desired recommendation given by the study participants.

This study also revealed that all the identified approaches had notable challenges. These included, lack of standardized HF unique identification number, non-standardized HF attributes, incomplete HF listing, inaccurate data about HFs, lack of policies and legislation that govern the facility listing, and difficulty in accessing and

using data about HFs. In the next sections of the paper, we discuss the challenges identified with the approaches currently used to manage and/or access data about HFs. We further present the electronic Health Facility Registry (HFR) for managing the MFL as a potential intervention for addressing the challenges observed and improving the efficiency of the HF listing efforts in the country.

All the identified approaches lacked a standardized and approved UIN that uniquely identified a HF in the healthcare sector. This is attributed to the fact that the central governing body (MoH) has not yet established a standard one to uniquely identify HFs within the healthcare sector. This has led to the establishment of an enterprise-wide system of non-standardized identification numbers that are generated and assigned to HFs by different entities. Establishing a common standard UIN for HFs has numerous benefits as observed in literature. These include: improved efficiency in HF identification, management and resource distribution (8,10,25); creates opportunities for HIS interoperability (25); improves healthcare referrals (26–28); and facilitates exchange of data on health facilities (29,30). Nigeria has implemented a HFR and the HF UIN has meaning associated with the current government area and state of location of the HF (25). When a HF moves to a new government area or state, the existing UIN is nullified and a new one is generated. As a result, the HF UIN becomes burdensome to use for various stakeholders (doctors, district planners, program officers, among others) when identifying a HF. Our recommendation from the study participants is a HF UIN that is short, clear, precise and not associated with its current geographical location.

The data attributes collected on each health facility record were different across the identified approaches. This hinders achieving data exchange and system integration (8,10,25). According to WHO guidelines for establishing a national MFL, a MFL should contain the HF unique identifier, facility name, facility type, ownership, administrative location, geographic coordinates, operational status, facility contact address, date data collection, services offered, available human resource and available inpatient and maternity beds as the minimum dataset collected on a HF record (7,8). According to Rose-wood *et al.*, having an accurate and complete MFL within a healthcare sector is fundamental for effective planning, coordination and delivery of health services (12). By the time this study was conducted, none of the identified approaches was nationally recognized to house accurate and complete data about HFs within the healthcare sector. The situation of having multiple HIS in LMICs and none serves as a national repository for accurate, up-to-date and complete listing of health facilities is not new in literature (8,12,31). There is need to establish a national MFL that has accurate, up-to-date, complete, and standardized data about HFs that exist within the healthcare sector.

Existing literature reveals that unavailability of standard policies and legislations to govern access and usage of data about HFs, deficiencies in skilled human resource to manage the data about HFs, and inadequate implementation of the recommended practices for data management are some of the reasons that can be attributed to the discrepancies in data about HFs (25,32). This study has revealed that there were no policies that defined how data about HFs should be established, updated, deleted and archived. To maintain the data about HFs accurate, up-to-date and complete, there is a need to establish and enforce proper legislation aimed at ensuring that data is regularly updated (8,25). Additionally, a data governance framework is needed to manage data issues such as security, sharing and access associated with the MFL (10,12).

Accessibility and availability of data about HFs housed in the MFL is a fundamental factor to improved health service delivery and effective distribution and planning of resources within a healthcare sector (4,33,34). The study finding revealed that majority of the approaches required authorization to access and use the data about HFs. This could have led to the establishment of multiple approaches for managing and/or accessing data about HFs in the sector. WHO recommends that the data about HFs should be easily accessible to all stakeholders at any given period of time to aid data use for data-driven decision making, monitoring of HF distribution and resource allocation, HF identification and patient referrals (8).

To address the challenge of maintaining and managing the MFL with accurate, complete and up-to-date data, a HFR has to be implemented (25,35,36). The HFR can be used to manage and/or access data about HFs in Uganda to aid evidence-based decision making at all strategic levels within the healthcare sector. With the HFR established, other information systems and/or stakeholders can easily access its data. Future research could focus on establishing requirements for establishing a functional HFR in Uganda.

Conclusion

Our study has provided evidence on existence of various approaches used for managing and accessing data on health facilities in Uganda. The study has also revealed some important challenges that hinder effective use of these approaches including lack of a health facility unique identification number, management of data on health facilities, health information exchange and interoperability because each mechanism had different data elements captured, and data access and use to aid evidence-based decision making. As such, we suggest that in order to improve the task of managing and maintaining data on health facilities accurate, complete and up-to-date, there is need to establish a national HFR as it was alluded to by the national eHealth policy (9). The government of Uganda

through its line Ministry of Health should improve on its in-house coordination and governance including establishment and implementation of policies that should focus on eliminating duplicated approaches established by various health institutions and promote the establishment of a central HFR that can be accessed and used by all stakeholders in the healthcare system.

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Statement on conflicts of interest

There is no conflict of interest that the authors need to declare.

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