# Implementing a Web-based Routine Health Information System in Kenya: Factors Affecting Acceptance and Use

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open-source, web-based District Health Information Software (DHIS2) in 2010. Subsequently DHIS2 was adopted and its deployment in all of the countries 8 provinces (now the 47 counties in the devolved system of government) was completed by December 2011 [4]. The DHIS2 system has been in active use throughout the country for about three years, and it has significantly improved the process for reporting of routine health data. This is a major milestone; however DHIS2 in Kenya has not yet fully

can ultimately contribute toward sustainable public health development and improved health outcomes especially in developing countries [6], [7].

In the past, management of health information in developing countries has been plagued by major challenges. These range from the low levels of ICT knowledge among health workers, inadequate investment in health information systems, and presence of donor-supported parallel reporting

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sub-systems [8–10]. Though there are several sources of health information in developing countries, one major source is the routine health information system (RHIS) which mostly collects, collates and analyzes data from all health facilities. The importance of strengthening RHIS is recognized as one approach that will support public health reform initiatives and improve delivery of health-care services in developing countries. The demand for credible health information is also intensified following the performance based resource allocation adopted by donors

technology is influenced not only by technological factors but also by factors related to behavioral, social, organizational and cultural aspects. Thus while acknowledging that DHIS2 is based on a sound and proven technology for managing health information, it is also important to seek to understand how the implementation is faring from the perspective of key stakeholders in the health sector [5], [14], [15]. What these stakeholders perceive to be barriers or enabling factors in scaling up use of DHIS2 needs to be taken into consideration as it may provide the key to

this system faces in view of the ongoing implementation of the devolved system of government in the country.

• To make recommendations on how barriers and threats can be addressed to hasten acceptance and scale-up the use of DHIS2 in Kenya.

Health Technology acceptance and adoption research suggest that success in adoption of health information

assisted qualitative data analysis software (CAQDAS). NVivo assisted in the qualitative analysis process by enabling easier data management, storage of the interview transcripts, and help in coding the text. Finally the researchers identified patterns across categorized data and used them to draw conclusions and recommendations on factors that need to be addressed in order to enhance user acceptance and use of DHIS2 in the country.

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## 5. Results

All interviewees recognized the great opportunity that DHIS2 has presented for Kenya to streamline its national health information. One key system characteristic that was appreciated is the fact that is operated in open-access mode, enabling unrestricted access to DHIS2 reports via the public login option. This has greatly eased dissemination and access to public health information. Also recognized was that the DHIS2 system enables undertaking of simple, customized

*"Younger generation are very positive because they are I.T. compliant, but the older generation are challenged because they take too long to learn"* - Int019

### 5.2 Attitude, Information Ownership, and Behavior Change

The common thread linking this theme was identified as attitude. It emerged that despite the presence of other challenges such as unreliable infrastructure and inadequate training, most of the informants consider the user attitude to be main determinant of whether the DHIS2 system will be successful or not. And this starts right from the top with most of the health managers having the false notion that use of

such users are getting disillusioned by the slow rate of responding to such support requests. Though a lot of health workers were trained on use of DHIS2 nationwide, some of informants were of the opinion that the quality of this training could be improved. As one informant put it:

*"We also get challenges with the people providing support... [There is need for] highly qualified people who are able to fix up that system. .... who are able to support that system at that*

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*high technical level. But one of the biggest bottle necks we have is the capacity of IT support within MOH to manage this system... They should be a cadre that is highly qualified to that level. The challenge for the Ministry is to motivate such highly qualified people to work for the ministry" - Int018*

### 5.4 Championship, Leadership and Management

The general consensus under this sub-theme was that for the DHIS2 scale up to be a success, health managers, right from

### 5.6 Social Influence and Behavior Change

The theme of social influence and behavior change was found to be closely interlinked with the other theme on the need for a Champion and Leadership on data ownership and use. The bottom line is that health workers will in most cases adapt their behavior in accordance to what they perceive to be the expectations of their immediate supervisors. At the same time peer influence on health worker behavior is significant, and hence the need to provide more opportunities

need for some training and sensitization on these skills before they take the plunge. In the words of one informant:

*"Some people are BBT, born before technology, so when you put things in a system and they don't have those capacities, they may not use it. Particularly our health workers who were trained a long time ago and they have not made some efforts to go for computer training , so it becomes a challenge..." - Int007*

collection forms. There was however concern that for first time users, the system can be quite daunting because the user interface is not intuitive and can be confusing. Some criticized the current need to undertake some of the data analysis outside of the system such as using Excel Pivot tables. It seems a short orientation on how to navigate through the system would go along way if presented to all the targeted users.

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*"One of the things we really focus on is to make –to avoid a steep learning curve because for some people who are not technically skilled it's really a big step to go from the safe old paper form. And one of the things we do to ensure that is we try to copy the form as exactly as possible to the system so that they feel comfortable at once..." - Int014*

### 5.9 Funding, Infrastructure and Other Resource Requirements

any part of the world as soon as it had been entered at the district and health facility levels. This despite the reality that some of the data keyed in is erroneous and has not been validated by the data owners. Some interviewees however informed the researchers that the ministry was in the process of setting up a web-portal that will only contain the validated version of DHIS2 data. In the meantime it was noted that some researchers were already using the available data and misrepresenting the Kenya health situation at international conferences. In the words of one informant:

*would expect them to do in DHIS." - Int001*

### 5.11 Assuring the Information Security

The informants expressed concern about whether Kenya has put in adequate measures to ensure security of the data collected and processed through DHIS2. In particular informants were concerned by the fact that this data is available through open access to any interested party from

that the system adds real value to the country's health data management scene, especially when compared with previous HIS systems. The range of values includes the ease of access to the health information and the timeliness with which that information is available. It also has to do with the ease of report generation especially for the standard charts and reports that are already inbuilt in the system. The added fact that the system is for the most part friendly and easy to use is like an added bonus. Despite the fact that the system was

initially only targeted to report on routine service delivery data from the HFs, DHIS2 has since been used innovatively to report on malaria commodities. This has led to such improved reporting rates that quantification of malaria medicines can now be done based on consumption data. Subsequently, one of the stakeholders affiliated with the malaria program made this comment:

*"I would recommend this [DHIS2] for other commodities management as well because the data is in a timely version,*

*happening in the country , .. if we have a health bill which is emphasizing on health information and reporting, that will bail us out, because as for now even if you go tell private hospitals you are supposed to report ,there is no bill ,you cannot quote any .." - Int003*

### 5.15 Sensitization and Advocacy at Management Level

The key selling point for DHIS2 is not just the fact that it is capable of collating and aggregating reports from all service delivery points in a speedy manner, but more so the fact that health care workers at all levels can be able to access and use this information for appropriate decision making. Yet according this research's informants, very few healthcare managers were sensitized on this aspect of DHIS2, with most viewing it as a tool for the HRIOs and the program M&E capacity. Finally some informants were uncomfortable with some aspects of the manner in which the MoH and its implementing partners are collaborating, calling for more openness and clarity of roles. To quote two comments on this subject:

*"..as DHIS grows everyone is seeing the potential, we are even moving commodities management into DHIS. The national level probably needs to rethink on how they are*

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*managing DHIS. I think currently we haven't thought about who manages DHIS in the sense that the HIS team expects health programs to be looking at their data [to detect data entry errors]; but even as HIS what are they doing in terms of managing DHIS data quality? Do they have an internal system in place to say so-and-so is in charge of commodity data and so should make sure they know what is happening, and to prompt program or prompt facility when they notice data errors..." - Int001*

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| | • Enabling facilities, sub-counties and counties to make decisions on need for commodities based on prior consumption and patient load as recorded in the system |
| **Effort Expectancy -** defined as the degree of ease of use associated with the use of DHIS2 | DHIS2 is easy to use and this should encourage easier adoption of the system. There is however need to ease the web navigation process especially for new users |
| **Computer Anxiety** | Intensity of this anxiety was found to be |

| which an individual believes that using DHIS2 will enable him or her to attain gains in job performance | value-add items identified include:<br>• Use for mandatory data entry and reporting<br>• Facilitation of decision making based on service delivery data in the system e.g. a health facility could review its workload as reported in DHIS2 to inform its decision on hiring of additional health workers; |
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adequacy and computer anxiety may be more salient in Kenya and other developing countries' context because of the prevalent challenges of lagging behind in computerizing of health systems in these countries. Perhaps as recommended by some of the informants, it would be better that training on basic computing skills is integrated into all pre-service training curriculums for healthcare workers.

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While identifying the potential for value-addition to be derived from use of DHIS2, respondents were of the opinion that the system is currently being used sub-optimally, mostly for mandatory reporting. There is therefore need for targeted users to be sensitized and trained on data demand and information use (DDIU) aspects, and for advocacy efforts to be made to cause a change in behavior of health workers in this aspect.

The role played by immediate supervisor or regional for decision making. Instigating a culture change that will cause health managers throughout the system start to use the DHIS2 data directly for informed decision making, rather than assuming the system belongs to the Health Records officers is long overdue.

The other challenges that call for urgent attention include the inadequate infrastructure especially at the health facility level, generally low computer proficiency among some health workers, inadequate health facility staffing levels, as

Implementation of DHIS2 in Kenya has presented an opportunity for the country to move from the era of unreliable and fragmented HIS systems to the more ideal situation of availability and use of quality health information for decision making. This potential can only be realized if the identified challenges are addressed, starting with the need for the health managers in the country to take up proactive leadership in demand for and use of DHIS2 data

shared their opinion on the subject matter. Without them it would have been impossible to accomplish this work. In addition we acknowledge support for our work received from the Ministry of Health's Division of Health Informatics and M&E and from USAID AfyaInfo project, the key stakeholders in implementing and institutionalizing the DHIS2 in Kenya.

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