

# Solution implementing a mobile health information system information technology e...

[Technology](#), [Information Technology](#)



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\n[/toc]\n \n\nIn the developing world, collecting field information is particularly difficult due to costs, logistics and accessibility of remote sites. A lack of up-to-date and accurate patient data creates an environment in which policy makers cannot accurately decide where and how to spend their most times limited resources.[2] Increased use of technology can help reduce health care costs by improving efficiencies in the health care system.[2] Mobile technology has made a recent and rapid appearance into low- and middle-income nations making this technology a reliable tool in the setup of mobile health information system [9]

## **General Background**

Policymakers and health providers need accurate data in order to gauge the effectiveness of existing policies and programs in health care system and shape new ones in their endeavour to make health care in developing Countries accessible and reliable.[2] This can be enhanced by proper data

collection and management, the development, execution and supervision of plans, policies, programs and practices that control, protect, deliver accurate, relevant and up-to-date data in the shortest time [3]. m-Health is a term used for the practice of medicine and public health, supported by mobile devices. m-Health is used in reference to use of mobile communication devices, such as mobile phones , tablet computers and PDAs, for health services, information and data management [4]The m-Health field operates on the premise that technology integration within the health sector has the great potential to promote a better health communication to achieve healthy lifestyles, improve decision-making by health professionals and enhance healthcare quality by improving access to medical and health information and facilitating instantaneous communication.[6]Data collection and management has become an especially important aspect of m-Health. Data collection requires both the collection devices and the software that houses the information [2]. Open Data Kit (ODK) is a free and open-source set of tools which help organizations author, field, and manage mobile data collection solutions. ODK is being used to create decision support for clinicians and for building multimedia-rich nature mapping tools.

## **Objectives**

Testing and Linkage to Care for Injecting Drug Users (TLC-IDU) is a study taking place in Nairobi and coastal Mombasa including Malindi implemented in 4 sites in Nairobi and 6 sites at the Coast to help reduce HIV infection and spread among people who are injecting drug users. The study is implemented by the National AIDS/STD Control Programme (NASCOP) part of

the Ministry of Health Government of Kenya, and New York University based in the United States. TLC-IDU implemented ODK to evaluate its use as an m-Health solution. ODK was used in the collection of eligibility, behavioural and Respondent driven Sampling data for all participants in the study.

## **Methodology**

To implement ODK as an m-health solution, 15 Samsung tablets were programmed to collect eligibility and behavioural data from participating clients from 10 sites in Nairobi and Costal Mombasa. The collected data is send to the remote server over the Internet using available GSM and 3G networks from the available service providers.

## **Technology Description**

To implement the ODK, three components namely ODK Build, Aggregate and Collect have to be setup and deployed. ODK Build is a HTML5 web application form designer with a drag-and-drop user interface the web application enables the designer, the designer adds a new prompt, by dragging the elements from the bottom of the screen onto the blank canvas. For each prompt, the designer can modify its properties on the right portion of the screen, Prompts can also be rearranged through drag and drop. When the form design is finished, the File can be export to XML format for use on a number of web-based applications. The ODK Aggregate Server is a ready-to-deploy server and data repository, The Aggregate Server can be deployed on Google's App Engine, enabling users to quickly get running without facing the complexities of setting up their own scalable web service or be deployed locally on a Tomcat server backed with a MySQL or PostgreSQL database

server to. The ODK Aggregate Server provide blank forms to ODK Collect, accept finalized forms from ODK Collect, manage collected data, visualize the collected data using maps and simple graphs, and export data as CSV files or other spreadsheet format file publish data to external systems ODK Collect renders forms into a sequence of input prompts that apply form logic, entry constraints, and repeating sub-structures. Users work through the prompts and can save the submission at any point. Finalized submissions can be sent to (and new forms downloaded from) a server. Currently, ODK Collect uses the Android platform, supports a wide variety of prompts (text, number, location, multimedia, barcodes), and works well without network connectivity.

## **Developments**

Using the ODK Build, the TLC-IDU programming team designed the study's eligibility and behavioural questionnaires. Skip logics, validation checks and other security checks were also programmed into these data collection tools. The TLC-IDU team also setup an ODK Aggregate Server, the initial setup worked from the Google appspot but the space and time quota quickly ran out. TLC -IDU opted to setup a stand-alone ODK Aggregate Server to have access to unlimited storage space and access time. To setup ODK Collect, SIM Card enabled Samsung tablets running on Android operating system were procured. ODK Collect was installed in all these and the ODK Aggregate Server credentials pre-set to allow downloading of new form and uploading collected data. TLC-IDU has been relying on the GSM networks available for data transmission through an encrypted channel.

## Results

Figure 1 Throughout the baseline phase of the study, the Research Assistants progressively spent less time collecting data as is reflected in the graph below. The research team was also able to progressively analyse study data as the upload data is in CSV file format which when downloaded can be analysed on most statistical software.

## Business Benefits

Collecting field information in the 10 remote sites in Nairobi and Coastal Mombasa was going to be particularly difficult if paper-based, ODK as a m-Health solution has enabled the TLC-IDU research team access accurate and timely data in order to gauge the effectiveness of the study's policies and programs. This increased use of technology has helped reduce costs of data collection, entry and cleaning thus improving efficiencies in the health care system. Turn-around from data collection to analysis has been greatly reduced, this is due to the fact that the inbuilt skip logics, validation checks and other data security features ensure that datasets upload to the server have minimal or no errors. The uploaded data is exportable to a CSV format file, a format compatible with most data analysis software implying that the downloaded dataset can be instantly analysed.

## Conclusions

Use of m-health can improve data quality, data accuracy and enhance efficient use resources. Turnaround time in data analysis and implementation of study findings is greatly reduced.