OpenHDS: evidence for improved quality/timeliness and cost in Demographic surveillance systems

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Health and Demographic surveillance systems (HDSS) can provide valuable information in geographic zones where vital registration systems are not present or not running at an acceptable level, and play an essential role supporting health intervention studies in such areas. Setting up and running an HDSS is operationally challenging, and requires a reliable and efficient platform for data collection and management. Recent technological advances, specifically mobile devices used for electronic data collection (EDC), and adoption of data management best practices using OpenHDS software (Figure 1) have the potential to resolve many of the major shortcomings of running a paper data collection (PDC) HDSS. We want to test the hypothesis that the system is superior to previous approaches with regard of quality and timeliness of data and running costs of the system.
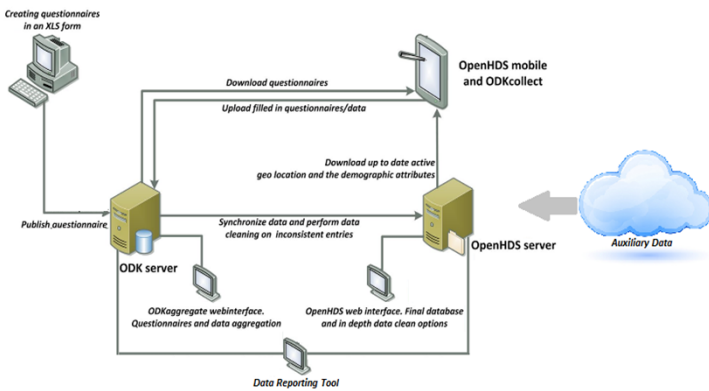

Figure 1: OpenHDS System Architecture

In the Nanoro HDSS site in Burkina Faso (Figure 2) that migrated to OpenHDS from a paper system in June 2015, for one HDSS update round in 4 villages the data was collected at the same time with OpenHDS and with the traditional paper method. After data collection, we assessed the time required for data collection and the completeness and accuracy of the data, as well as the types of errors found with the two methods. We also did a cost comparison between PDC and EDC reviewing historical program data.
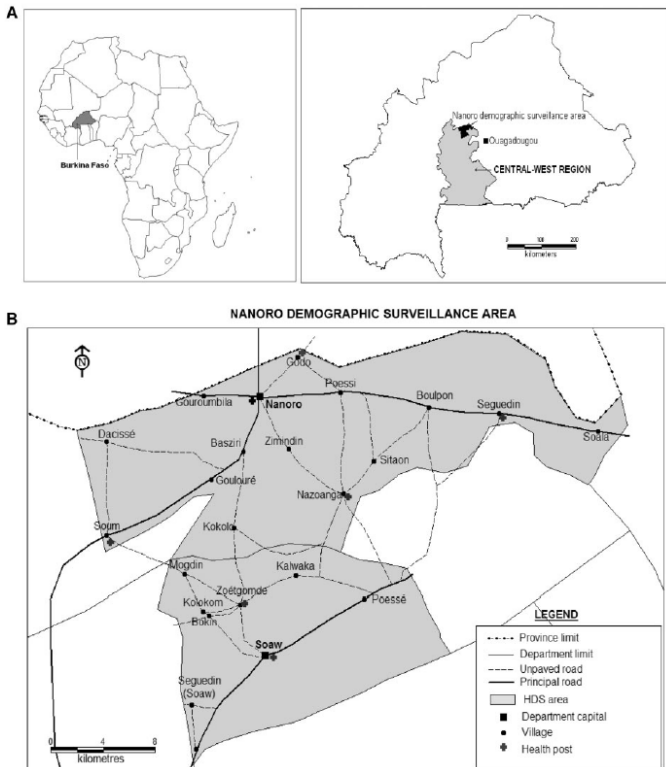

Figure 2: Site maps. (A) Location of Burkina Faso in Africa and the Nanoro site area in Burkina Central West region. (B) Nanoro Demographic Surveillance Area

The almost immediate availability of data in OpenHDS enables fundamentally new ways of implementing quality control processes (Figure 3). Instead of having to wait weeks or months before data collected in the field becomes available, data managers and HDSSs management now can have access to these data points within hours or days. This means they can realize almost immediately if they have to intervene somewhere on the operational routine of the HDSS.

Figure 3 Web-based real-time monitoring of HDSS operations as a key-enabling factor in the quality assurance.

Time to availability of a record is on average reduced by a factor seven with OpenHDS (compared to 4 data clerks working full time for data entry). Fieldworkers take on average 20 minutes less for a visit than with paper forms. Financial and Economic costs with OpenHDS are respectively 13 and 9.5% lower. (Figure 4)

Total cost per major activity

	Paper		OpenHDS	
	Total Financial Cost in 2015 (USD)	Total Economic Cost in 2015 (USD)	Total Financial Cost in 2016 (USD)	Total Economic Cost in 2016 (USD)
Start Up activities	-	694	-	5,563
Governance activities	-	-	-	-
Refresher training & workshops	298	1,207	298	1,207
Program Management	-	-	-	-
Supervision	-	-	-	-
delivery & Analysis	114,899	122,218	101,528	111,007
TOTAL	115,197	124,119	101,826	117,777

Figure 4: cost comparison details.

Demographic rates calculated through the IShare2 software (http://www.indepth-ishare.org/index.php/about) show lower error rate 0.55% vs. 0.75% with the OpenHDS (p < .001) (Figure 5).

Figure 5: Demographic Rates comparison obtained thro ugh IShare2

EDC addresses some problems posed by PDC through validation at data collection time, near real time data to the central database, mostly automated review protocols, reports of data issues emailed to managers allowing near real time review and amended data collection instruments and processes. While there was anecdotal evidence that electronic data capture can improve quality, timeliness, and costs, this is the first study that provides evidence for such benefits resulting from the introduction of EDC.

OpenHDS is currently under active development, with an emphasis of the software development on making the platform still more robust and user-friendly, additional features to exploit the potential of near-time reporting for improving data quality assurance, and tighter integration of the tablet and server components.

For further information
Please contact aurelio.dipasquale@swisstph.ch. More information on this project can be found at https://github.com/SwissTPH