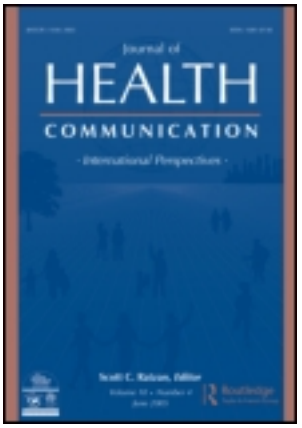

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Capitalizing on the Characteristics of mHealth to Evaluate Its Impact

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Capitalizing on the Characteristics of mHealth to Evaluate Its Impact

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The field of mHealth has made significant advances in a short period of time, demanding a more thorough and scientific approach to understanding and evaluating its progress. A recent review of mHealth literature identified two primary research needs in order for mHealth to strengthen health systems and promote healthy

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behaviors, namely health outcomes and cost-benefits (Mechael et al., 2010). In direct response to the gaps identified in mHealth research, the aim of this paper is to present the study design and highlight key observations and next steps from an evaluation of the mHealth activities within the electronic health (eHealth) architecture implemented by the Millennium Villages Project (MVP) by leveraging data generated through mobile technology itself alongside complementary qualitative research and costing assessments. The study, funded by the International Development and Research Centre (IDRC) as part of the Open Architecture Standards and Information Systems research project (OASIS II) (Sinha, 2009), is being implemented on data generated by 14 MVP sites in 10 Sub-Saharan African countries including more in-depth research in Ghana, Rwanda, Tanzania, and Uganda. Specific components of the study include rigorous quantitative case-control analyses and other epidemiological approaches (such as survival analysis) supplemented by in-depth qualitative interviews spread out over 18 months, as well as a costing study to assess the impact of mHealth on health outcomes, service delivery, and efficiency.

About MVP

MVP is a community-based, comprehensive multi-sectoral approach to achieving the Millennium Development Goals (MDGs) throughout Africa (http://www.millenniumvillages.org). In the health sector, key MVP activities include renovating health facilities and hiring health personnel, including community health workers (CHWs), for early detection and referral for treatment, tracking of pregnant women and newborns, and community-based treatment of HIV/AIDS and TB. The Millennium Villages Global Network (MVG-Net) is a comprehensive open source eHealth architecture and service delivery platform based on OpenMRS that generates data to be used in tracking progress and informing decision-making and management (Kanter et al., 2009). Specifically, MVG-Net enables: (a) facility-based data capture of individual-level information; (b) community-based data capture of individual-level information; (c) data storage of individual patient health records; and (d) Automated aggregation of data and generating reports and feedback to healthcare providers and managers.

MVG-Net currently has two main components: ChildCount+ and OpenMRS. ChildCount+ (http://www.childcount.org) is a point-of-care decision support SMS-based mobile phone system that enables data collection, reporting, and feedback for CHWs to facilitate their predetermined community-based services and enable 'real-time' monitoring. The five goals of ChildCount+ are: (a) register every pregnant women and child under 5 years of age; (b) screen for malnutrition every 90 days; (c) monitor for malaria, diarrhea, and pneumonia; (d) support full child immunization; and (e) record all local births and deaths. OpenMRS is web-based, open source electronic medical record platform that uses a centralized concept dictionary to collect person-level health information from several different technologies including the Childcount+ mobile system. OpenMRS has been implemented in a clinical or research setting in at least 50 countries and is used by MVP as the core of MVG-Net as well as for collecting data directly from facilities within the MVP villages.

Evaluating MVG-Net at Baseline and Beyond

The research is evaluating the impact of MVG-Net and its components (e.g. ChildCount+ and OpenMRS) over approximately an 18-month period. The

evaluation will systematically look at all aspects of the healthcare delivery system including: service coverage; quality of services; early detection, referral, and treatment for danger signs; morbidity and mortality; and management of resources (e.g., human, financial, etc).

Structured analysis of de-identified service delivery data and complementary qualitative in-depth interviews and observations enables tracking of progress of targeted MDG-related indicators and help inform how to position facility and community based e- and mHealth services that are created to benefit the frontline health workers and individuals in the communities (Mechael et al., 2010).

The baseline qualitative assessment conducted in Ghana, Rwanda, Tanzania, and Uganda was completed in January 2011 and documents existing work, information and communication processes and perceptions of technology from the perspective of the health workers and administrators. Included in the baseline assessment was a review of health worker satisfaction, efficiencies gained, cost-savings, and ways in which mHealth systems can be leveraged to support their work (Mechael et al., 2010). In-depth interviews with a targeted sample of MVP health workers and staff in each country, District Health Officers, Regional Health Officers and National eHealth stakeholders were conducted by researchers trained in qualitative methods. This was complemented by direct observation of facility and community-based use of work-related activities and, when introduced, MVG-Net technologies.

A proxy quantitative baseline was conducted of key MDG-related health indicators leveraging the overall MVP baseline, year three, and year five surveys being carried out as part of the MVP. This data will then be compared at target intervals throughout the duration of the evaluation and supplemented with data generated by ChildCount+ and OpenMRS, respectively. Results from this component of the study will be available in 2012. This quantitative piece drew from and built upon the original piloting of ChildCount+.

The original pilot of ChildCount+ illustrated how quantitative data generated by mHealth systems can be leveraged. Taking place in Sauri, Kenya, what was then, ChildCount, electronically registered and routinely monitored key health indicators of over 95% of the children under 5 years of age in the 55,000-person community. Initial findings showed improved coverage of routine health services, such as immunizations and malnutrition screenings, and improvements in related health outcomes (Berg, 2007). Similarly, the evaluation of MVG-Net will track key health indicators and their related health outcomes in Ghana, Rwanda, Tanzania, and Uganda, and will also look to determine the cost-benefit and cost-savings, if any, of the use of data generated by the eHealth tools to address priority health issues (Dick et al., 2009).

Highlights from Baseline

The baseline qualitative information provided insight into the pre-mHealth practices of health workers as they tracked and followed-up with patients, through various forms and registers. CHWs collect information from households by visiting each household in their assigned communities several times a week. Information is currently collected on paper forms. Clinic staff also collect information on their activities by filling in registers at the time of the patient visit: attendance register, consulting register, delivery book, ANC register, post-natal register, report book, Family Planning register, Child Welfare Clinic register, Laboratory Test forms and RDT/Fever register. The information collected in registers is used to fill additional

forms that are sent to the District Health Office once per month. While health workers did not object to the need to collect information and report on their activities, a chief complaint by all health workers and some administrators was regarding the lack of feedback and follow-up based on the paper reports submitted to higher levels of the health system. Many also wanted to have more supervision, progress monitoring, and activity planning based on their reports.

In addition, an assessment of the current educational level and training needs of health workers was conducted at baseline. The primary focus of these levels and needs was in relation to their usage of technology. Across the informants, mobile phones were the most frequent form of technology used. CHWs use the phone primarily for emergency situations, especially obstetric emergencies. Mobile phones are also being used for consultation with colleagues and/or supervisors. CHWs reported asking for guidance from their supervisors on accurate medication and dosages, upon encountering more serious conditions than they feel comfortable addressing, for learning how to treat and approach difficult emergency cases, or to seek advice on how to write reports. On the other hand, computer usage and electronic medical records (EMRs) were less familiar to health workers, indicating the need for additional training and support for the full implementation of MVG-Net.

Next Steps

With the baseline assessment conducted, the next steps are to conduct similar qualitative and quantitative assessments and track key health indicators and costing information as the eHealth architecture and tools are introduced and used across the MVP sites in Ghana, Rwanda, Tanzania, and Uganda. Ultimately, the evaluation should provide evidence of the impact of eHealth on health outcomes, while simultaneously allowing the end-users to monitor real-time data to improve programming to address key health risks, such as child malnutrition, malaria epidemics or HIV prevention. Moreover, by providing evidence across different countries and across different local and governmental contexts, our research seeks to enable the implementation of similar technologies across diverse organizational environments.

In terms of policy, robust costing research can provide policy makers with an important tool to make decisions in allocating financial and human resources for mHealth interventions. Finally, the design and results of this research have the potential to provide other researchers and organizations with a model for future research that can be applied to other e- and mHealth applications, thus supporting a move towards more comparable and standardized approaches in this growing field as makes efforts to improve health outcomes, strengthen health systems, and create efficiencies in service delivery.

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