

Mobile health data collection at primary health care in Ethiopia: a feasible challenge

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Abstract

Objectives: Feasibility assessment of mobile health (mHealth) data collection at primary health care in Ethiopia.

Study Design and Setting: A total of 14 health workers were recruited from 12 primary health care facilities to use smartphones, installed with customized data collection application and electronic maternal health care forms for assessing pregnant women's health for 6 months. Qualitative approaches comprising in-depth interviews and field notes were used to document the users' perception and experience in using the application and forms.

Results: All health workers had never had previous exposure to smartphones and electronic forms, but they got used to them easily. Over 6 months, all health workers completed a total of 952 patient records using the forms on smartphones. Health workers' acceptability and demand for the application and forms were high. In introducing the application, nontechnical challenges were more difficult to solve than technical challenges.

Conclusion: Introducing an mHealth application at primary health care for routine collection of health data relevant to maternal health at a small scale was feasible. Nonetheless, implementing a system of assigning unique and consistent patient identifier, standardization of health services, and improving mobile network coverage would be prerequisites for scaled-up usage of such an application. © 2015 Elsevier Inc. All rights reserved.

Keywords: mHealth; Electronic forms; Community health workers; Maternal health; Primary health care; Mobile technologies

1. Introduction

For years, paper forms have been used for routine collection of patient and epidemiologic data. However, with the recent rapid advancement of high-functionality

smartphones and growth of mobile phone subscriptions across the globe, there is a widespread interest in using mobile health (mHealth) applications for routine collection of health data [1–3]. The fact that smartphones are portable, have Internet access, and can run third party applications makes them a natural fit for data collection and transfer. By exploiting the Internet capabilities of smartphones, near real-time transfer of data collected using electronic forms on smartphones from remote areas to a center can be achieved [3,4]. This might reduce the costs related to data processing, such as duplicating paper forms, carrying and storing paper forms, and data entry.

Systematic reviews showed that virtually all studies related to mHealth have been in the developed world. Many of these studies dealt with the role of short message services (SMS) and voice call reminders for a one-time survey

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What is new?

- Health workers' acceptability and demand for an mHealth application and electronic forms in a low-income setting are high.
- Nontechnical challenges are more difficult to solve than technical challenges when introducing an mHealth application to primary health care in resource-poor settings.
- With the current context of the Ethiopian primary health care, a smartphone-based mHealth application and electronic forms can be used for routine collection of health and epidemiologic data and transfer at a small scale.
- For a successful and sustainable implementation of an mHealth application and electronic forms at primary health care settings in Ethiopia at a larger scale, implementing a system of assigning unique and consistent patient identifier, standardization of health services and workflows, minimizing high turnover of health workers, and improving mobile network coverage would be prerequisites.
- Although trial and cost-effectiveness studies are highly recommended in the mHealth field to provide sound evidence and inform policy makers on scaled-up use of mHealth applications, in practice undertaking such studies could be demanding.

by trained data collectors [4–7]. There is limited evidence on the use of electronic forms on smartphones by primary health care workers for routine health data collection in developing countries [4,7,8]. Thus, introducing such mHealth applications to primary health care might be affected by multifaceted contextual factors and encounter unforeseen challenges [4,7,9,10].

With the aim of understanding the practicality of using electronic forms on smartphones for routine collection of health data relevant to maternal health, we did a feasibility study.

2. Methods

2.1. Study design

In undertaking this feasibility study, we customized an mHealth data collection application named Open DataKit and developed electronic maternal health care forms. The forms include registration, antenatal care (ANC), delivery, and postnatal care (PNC) (Table 1). Details of the technical development and contents of the whole set of the mHealth application, electronic forms/protocols, and workflow

Table 1. List of maternal health care forms used

Forms	Conditions of interest used
Registration ANC	Initial registration of a woman A form for recording antenatal care (first and follow-up) visits of a woman
ANC laboratory test	A form for recording laboratory test results of a woman when she visited health center
Delivery	A form for recording delivery history of a woman and immediate newborn care encounters
PNC	A form for recording postnatal care visits of a woman

Abbreviations: ANC, antenatal care; PNC, postnatal care.

tested in this study are presented in another published article [11]. We followed user-centered approach in customization of the application and development of the forms. Health workers participated in all processes. Qualitative approaches comprising in-depth interviews and field notes were used to document users' perception and experience in using the application and forms.

2.2. Setting and participants

This study was conducted in Tigray region, the northernmost region of Ethiopia. Two rural districts namely Kilte Awelalo and Hintalo Wajerat were selected for the study. In Ethiopia, a district health system mainly comprises health centers (1 per 25,000 people) and their satellite health posts (1 per 5,000 people), which are connected to each other by a referral system [12]. Both health centers and health posts form a primary health care unit with each health center having five satellite health posts. At a health center, midlevel health professionals such as midwives, nurses, and supervisors are placed, whereas each health post is operated by two health extension workers (HEWs). HEWs are community health workers (CHWs) who trained for 1 year before their deployment. They offer basic essential health services to the community under their catchment area at the health post and through house-to-house visits [13].

From the two districts, a total of 10 health posts and 2 health centers were selected for the study. Of the health workers working in these health facilities, a total of 10 HEWs, 2 supervisors, and 2 midwives were recruited for the study in consultation with the respective district health offices.

Pretest of the whole set of the application and training of the selected health workers was conducted over a period of 3 months. Then, for 6 months, the trained health workers used the forms downloaded on HTC Hero phones (New Taipei City, Taiwan), which run Android operating system for interviewing pregnant women (Fig. 1). Once a health worker completed a form, he/she submitted it to a server. For health workers to view their records, performance, and tasks, a mobile-based scorecard was established (Fig. 2). On-site supervision was made every month by the research team. We

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