Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 78 (2014) 143 – 148

Procedia Engineering

www.elsevier.com/locate/procedia

Humanitarian Technology: Science, Systems and Global Impact 2014, HumTech2014

Utilizing mobile health technology at the bottom of the pyramid

Sarah E. Oerther[a]*, Phalakshi Manjrekar[b], Daniel B. Oerther[c]

a Missouri EDGE, LLC, 1401 North Pine Street, Rolla, MO 65409
b PD Hinduja National Hospital and Medical Research Centre, Mahim West, Mumbai, India, 400016
c Missouri University of Science and Technology, 1401 North Pine Street, Rolla, MO 65409

Abstract

Among the Millennium Development Goals, MDG 5 Maternal Health has as its dual objectives: (a) reduce by three quarters the maternal mortality ratio; and (b) achieve universal access to reproductive health. Existing maternal health survey instruments were evaluated, modified, adapted, and used to assess perceptions and practices by mothers in villages located in the state of Gujarat in western India as well as women residing in urban Mumbai (formerly Bombay). Women who had recently given birth were asked a series of questions regarding maternal attitudes and behaviors before, during, and shortly after pregnancy including basic health data (i.e., height and weight), basic health care data (i.e., antenatal, delivery, and postnatal visits by health care professionals), and basic reproductive health practices (i.e., the knowledge of, use, and availability of birth control methods). The results from the surveys will ultimately be used to assess the efficacy of an IT- based intervention wherein pregnant moms will register with an SMS text message thereafter receiving reminders about health, simple questions, and follow-up to improve health outcomes during and immediately following pregnancy.

Selection and peer-review under responsibility of the Organizing Committee of HumTech2014
Keywords: maternal health; antenatal health; empowering women; text messaging

1. Introduction

Electronic health (eHealth) is defined as the convergence of wide-reaching technologies like the Internet, computer telephony/interactive voice response, wireless communications, and direct access to healthcare providers, care management, education, and wellness. It is also defined as the use of Information and Communication

* Corresponding author. Tel.: +1-573-458-5207.
E-mail address: sarah.oerther@missouriedge.com

Selection and peer-review under responsibility of the Organizing Committee of HumTech2014
doi:10.1016/j.proeng.2014.07.050

technology (ICTs) to provide and support health care independent of the physical location of involved parties. Mobile health (mHealth) is defined as a subset of eHealth that uses mobile devices to deliver health services [1]. mHealth typically refers to the use of portable devices with the capability to create, store, retrieve, and transmit data in real time between end users for the purpose of improving patient safety and quality of care. Examples of approaches in mHealth include the use of wireless technologies to transmit and enable data content easily accessible to health workers using netbooks, smart phones, and other hand held devices.

However, as previously defined this approach is limited because health care providers are viewed as the end users of mHealth technologies. One of the advantages of mHealth technologies is the ability to interact directly with patients, and to encourage peer-to-peer sharing as well as coaching on the part of health care providers through online communities of patients and providers. mHealth serves are being used by patients and providers in demonstration projects around the world including mobile telemedicine services in India (i.e., Health Management and Research Institute), in Mexico (i.e., Medical Home) and Bangladesh (i.e., Healthline).

While mHealth is rapidly advancing with the advent of more powerful mobile phones (i.e., the iPhone), one of the phone's most basic functions – text messaging (also known as SMS) – has been the most widely used and studied. The exchange of information via SMS has been demonstrated to be a potentially powerful tool in effecting behavior change. Recent examples of such prevention and health promotion interventions include smoking cessation, weight loss, depression and sexual health. In the past, relatively few studies have been conducted to test the efficacy of mHealth programs as a channel for full-fledged health promotion programs, with most mobile programs focusing on reminder systems or similar limited behavioral cues to action. However, this situation has begun to change, one sign of which is heightened interest in mHealth theory and development of behavior change models that incorporate the unique features of the mobile channel [2].

Limited access to health services is linked to low antenatal care and maternal and perinatal mortality. mHealth could be a useful strategy to improve antenatal care at the bottom of the pyramid (i.e., approximately two billion people living on less than two dollars USD per day). The benefits of uni-directional text messaging have been suggested through the success of limited programs implemented in Zanzibar (i.e., Wired Mothers) [3], the USA (i.e., Text4Baby), and Serbia (i.e., Beba Dolazi, which means 'the baby is coming'). In each of these programs, gestational period specific text messages are sent to subscribed women to provide educational material. However, the impact of these uni-directional, education-focused programs is still in evaluation [4].

The objective of this study was to perform field interviews with women in rural and urban settings within the state of Gujarat, India as well as Mumbai (formerly Bombay), India, respectively, to determine perceptions and behaviors as well as to explore the use of SMS services to educate and empower women in antenatal and postnatal settings.

2. Methods

Data from India's 2011 Census shows 59% of the country's households have a mobile phone. Recognizing the opportunities available through mHealth, the Government of India (GoI) has recently launched the "E-Mamta: Online Mother and Child Tracking System" to reduce the current maternal and infant mortality rates. The pilot program uses an online tracking system to monitor the health of pregnant females and infants with instantaneous capabilities to document adverse health events. It is envisioned that future implementations of the program will enable health authorities to initiate preventive action rapidly and avoid unnecessary maternal and infant mortality. Currently, E-Mamta is being implemented in the state of Gujarat. As one of the most industrialized states, Gujarat enjoys one of the highest per capita incomes throughout India. Unfortunately, Gujarat also has one of the highest MMR of 172 per 100,000 live births. A stated goal of E-Mamta is reducing the MMR below 100 to contribute towards the achievement of MDG5b.

In December, 2009 two nurses from Hinduja Hospital, Mumbai accompanied a team of study abroad students from the USA to conduct home health interviews as well as to measure the height and weight of children in three villages in rural Gujarat. In December, 2012 a follow-up visit to rural Gujarat was conducted as part of a second study abroad trip with students from the USA. During the December, 2012 visit, a pilot study was completed to evaluate maternal health and antenatal care. A cross section of twenty women were selected by convenience and interviewed in the villages of Jol, Lingda, and Bamroli within rural Gujarat. To compare results of rural and urban