

Role of mHealth in rural health in India and opportunities for collaboration

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Abstract

Rapid adoption of mobile telephony in rural India and absence of other information and communication technology media have prompted the social sector to exploit mobile communication as a dependable and effective ICT media. Intervention studies and projects in low resource settings of developing countries have underlined multiple roles and effectiveness of mobile communications in the health sector. In particular, the delivery function of public health programs can be improved by using prompts and reminders through SMS and voice calls for the health workers. In the state of Orissa in India, for example, mobile videos were instrumental in improving the quality of counseling among the community health workers. These messages have been successfully utilized in assisting the beneficiaries achieve their health behavior goals. Improvement in quality and timeliness of data can help the health system dynamically manage the delivery and promotion functions. Despite these promises, certain technological and programmatic challenges impede the adoption of mHealth in a large scale across the health system. There are many areas of research and development opportunities for organizations to collaborate.

Keywords: Public health, mHealth, India, Orissa

1. Introduction

This paper provides an overview of the key application areas for mobile telephony in health programs, popularly termed as mHealth, especially in primary healthcare in rural India. It also highlights the critical areas that require further research and development in areas where technological and operational challenges systematically impede the health sector taking advantages of mHealth.

Rapid growth of mobile telephony, together with low acceptability of other information and communication technologies (ICTs), have encouraged developing countries to apply mobile telephony in solving certain problems in the health sector which has long established the need for appropriate ICT interventions. In India, Telecom Regulatory Authority of India (TRAI) maintains and publishes data on telephone subscriptions. According to TRAI, India has some 858 million mobile subscribers by the end of July this year, compared to 652 million the previous year. In a country of 1.21 billion people, this annual growth of 32 percent means 35 percent teledensity in rural India. Even though this coverage appears to be low, mobile telephony has covered a substantially higher number of rural households. The mobile phone coverage is already

comparable to that of popular media like radio and television which have been used for spreading health awareness for many decades now. For many years to come, mobile telephony will remain perhaps the most accessible ICT media in rural India.

2. Application areas

Most health programs consist of three generic functions – i) **delivery** that involves the medical practitioners and health workers to conduct diagnosis and provide care, ii) **promotion** to create awareness among the target audience and help them adopt target healthy behaviors and iii) **monitoring and evaluation** to improve the delivery and promotion functions.

Delivery

Delivery quality can be improved by maintaining timeliness, improved coverage and quality of diagnosis and care. Using a computerized database of beneficiaries and services provided to them, the Foundation for Research in Health System (FRHS), a non-governmental organization, was able to generate a list of beneficiaries who did not receive key services in family planning, maternal health and child health. This list helped the health workers and their supervisors to reach out the excluded beneficiaries in an entire district of Patan in Gujarat state in India [1]. This method of tracking individual beneficiaries was subsequently adopted by the state of Tamil Nadu which implemented Pregnancy and Infant Cohort Monitoring System (PICMS), a web-based application to present social, maternity benefit and health data for the pregnant mothers and infants in the state. During 2009, this data was being used to provide the eligible families cash for maternity benefit scheme, though health workers were not using the database for follow-up. The PICMS and FRHS projects encouraged India's national health ministry to adopt the beneficiary tracking system across the country. An effective beneficiary tracking system generates actionable information for the health workers and supervisors on the due dates for delivery. Besides, mobile data collection and reporting tools can enable the health workers to capture and report beneficiary health data during care giving and confirm the same using an authentication mechanism. This process can allow the health system to ensure maximum coverage by the health programs.

Promotion

In health promotion, behavior change communication (BCC) makes the beneficiaries aware of appropriate healthy practices and assists them to steer towards the target behavioral goals. Such communication initiatives have been undertaken for many decades to help smokers quit, increase fruit and vegetable intake, and promote breastfeeding, among others. For a long time, television, radio and print media have dominated the BCC landscape. In developing countries, folk media, songs, drama and theatre (termed as 'mid-media') are also used to promote health awareness. The essence of the message promoted by these media channels remains 'it is good to follow a particular healthy practice'. For example, a television advertisement on polio vaccination conveys 'it is a must to give your child polio vaccine'. Population Council, a Delhi-based research institute, in a recent study found that among those who did not receive the immunization in the state of Uttar Pradesh, some 12 percent of beneficiaries were unaware of the place and 10 percent of the time of immunization [2]. This implies that awareness is necessary but not sufficient to enable the target audience adopt a particular healthy behavior. In particular, some health practices like breastfeeding and chronic healthcare require an improved level of self-efficacy, defined as 'the perception about an individual's ability to perform a promoted behavior effectively'. A number of experimental studies have shown that text messaging through SMS, telephonic calls, and other mobile content are effective in providing the target

audience with appropriate behavioral facilitators - self-efficacy, social support, availability, quality of care, intention and outcome expectation, among several other important factors. In a sense, mHealth can be used along with interpersonal communication that has been an effective method to impart these traits among the beneficiaries.

There are very few examples of field-level implementation of mobile communication in behavior change in India and other developing countries. During 2008, a team of researchers from the University of California Berkeley developed several short mobile videos to assist the community health workers (CHWs) during advice to the pregnant women in rural communities in the state of Orissa in India. These videos conveyed messages that could potentially persuade the pregnant women to adopt better health practices and to motivate the ASHAs, a CHW engaged to provide counseling and facilitate access to health services, to improve their performance. The four-minute videos had animated actors expressing persuasive dialogue or just giving lectures. The spoken message was in Oriya or Kui languages, locally spoken in the study area. Messages focused on various dangers that pregnant women face such as the dangers of anemia preventive actions. This video was prepared using multimedia software available in the market before converting the video to a format suitable to play in an easily available phone in rural India (Nokia 3110c). The experiment with seven health workers and their 52 clients resulted into improvement in quality of counseling and client engagement as seen by response by client to the video, health worker and attention level [3]. The mobile video project in Orissa demonstrates the uses of mobile communication both in BCC and delivery.

Monitoring and evaluation

In the area of program monitoring, the traditional way of using ICT is the data collection and analyses using management information system, known as the Health Management Information System (HMIS). In India, the national rural health program – National Rural Health Mission – has employed the country-wide HMIS, NRHM-HMIS. In NRHM-HMIS, like many other developing countries, data from the rural health facilities is collected and maintained in paper-based formats. In 2007, researchers have found 14 percent paper-based data in Malawi was discarded because of illegible handwriting, missing decimals, or outliers in the forms [4]. On the other hand, Patnaik, Brunskill and Thies reported error rates of four percent for electronic forms, five percent for SMS and less than one percent for telephonic helpline [5]. It is likely that mobile devices will be gradually used in data collection and reporting for HMIS data. Besides improvement in data quality, data collection using mobile devices allows faster reporting of services delivery to facilitate supervisor checking. This method is similar to the implementation of PICMS in Tamil Nadu and BTS in Gujarat, except that these projects do not communicate the relevant information directly to the relevant providers through their mobile phones.

4. Achievements and challenges

Mobile communications like SMS and calls are being used in many public service delivery projects across India by various government departments, as part of their e-Government initiatives. In particular, the states of Gujarat and Chhattisgarh have successfully used SMS to intimate the beneficiaries of the lifting of food supplies by the fair price shops, operating under the Public Distribution System (PDS) [6]. In 2009, Bihar implemented the SMS Based Monitoring System to facilitate government officers to send daily reports through SMS on the key achievements in ten most important government schemes [7]. These initiatives underline that the public officers and beneficiaries at the community level can adopt mobile communications.

Despite these achievements in various social and public sectors, progress in mHealth in India is rather limited. Most mHealth projects in India started their journey around 2008. Despite the promises with data collection using mobile devices, the experiments are yet to conclusively establish the acceptance and feasibility of this method for large scale deployment. In particular, a sizeable number of ASHAs in northern India have shown their limited acceptance of data collection using SMS and mobile forms. This process needs further research and development. Few projects in India have contributed to the development of a fuller understanding of behavior change processes facilitated by mobile communication.

Challenges in the adoption of mHealth are multiple. There are technological challenges in input, display, transfer and processing of data in English and Indic languages (especially for people with different levels of literacy), security and integration with medical devices. Traditional health research institutions lack capacity to develop mHealth interventions that require multidisciplinary approaches of behavioral, medical, business and computer sciences. The public health departments in central and state governments also lack capacity to design and implement mHealth on the ground.

5. Opportunities

- Technological research and development are required in multiple areas, especially in medical devices, network, security, data, language, among other areas. Both open and commercial innovations can add value to the advancement of mHealth. Rural areas will require low cost, rugged and portable medical devices, some of which were successfully tested by the students, professionals, application developers and R&D firms in the developed countries. For example, students in a number of American and European universities have developed mobile phone-based applications to detect malaria [8]. Such devices are highly advantageous for health workers in developing countries to rapidly test the suspected cases of malaria and take preventive action.
- Studies using social science methods are necessary, especially in the areas of health behavior communication, cost-effectiveness of intervention and usability studies. Technologists have expressed the reservations in undertaking pilots. In mHealth areas, however, a pilot can be a method to design the intervention for the target audience.
- Experimentation with business models in various health areas and providers can provide further insights into the sustainability of mHealth initiatives.

6. Conclusion

Intervention studies and projects in developing countries have demonstrated the applications and effectiveness of mHealth in various health areas in resource-poor settings. In India, more such interventions are necessary to design better mHealth programs for the concerned communities. Indigenous research and development in key technology areas, as well as technology transfer from other countries, will help in solving technological shortcomings. Investments in the form of aid, grant and capital can spur research and innovation in this area. mHealth in its current form is exploiting the second generation mobile telephony which will continue to dominate rural health for several years to come. Third generation of mobile telecommunication has been witnessing lukewarm response both in rural and urban areas. As mobile broadband makes its inroad in rural areas, mHealth can add more value to the health sector.

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