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Key challenges for mobile health in India

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Abstract
In last few decade, the healthcare system in India has progressed by applying methods, implementing policy, running strategic programme, focused programme and technologies used in healthcare delivery and mobile health (mHealth) is one of the emerging application to improve access to health services in India. Though mHealth has high potential but its implementation has numerous challenges involved. The paper has identified some of the most important challenges in its implementation in India.

Keywords: challenges to mHealth in India, m-Health challenges, m-health implementation, mHealth use

Introduction

Since the creation of the Millennium Development Goals there have been historic achievements in reducing child mortality, improving maternal health and fighting HIV/AIDS, Malaria and other diseases. Since 1990, there has been an over 50 percent decline in preventable child deaths globally. Maternal mortality also fell by 45 percent worldwide. New HIV/AIDS infections fell by 30 percent between 2000 and 2013, and over 6.2 million lives were saved from Malaria. Despite this incredible progress, more than 6 million children still die before their fifth birthday every year. 16,000 children die each day from preventable diseases such as measles and tuberculosis. Every day hundreds of women die during pregnancy or from child-birth related complications, and, in developing regions, only 56% of births in rural areas are attended by skilled professionals [1].

"mHealth (also written as m-health) is an abbreviation for mobile health, a term used for the practice of medicine and public health supported by mobile devices. The term is most commonly used in reference to using mobile communication devices, such as mobile phones, tablet computers and PDAs, and wearable devices such as smart watches, for health services, information, and data collection. The mHealth field has emerged as a sub-segment of eHealth, the use of information and communication technology (ICT), such as computers, mobile phones, communications satellite, patient monitors, etc., for health services and information. mHealth applications include the use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care (via mobile telemedicine)[2].

mHealth offers significant benefits to society, addressing some of the major health challenges in all economies, from the most developed to the least (though perhaps most of all in economies where income, urbanisation, infrastructure and the systems for delivering healthcare are changing very fast). For example:

Fig 1

In low-income economies, mHealth can improve access to services in areas that are hard to reach through conventional means of health delivery; disseminate information on medical advances and public health to professionals and the public; facilitate data gathering from remote areas during disease outbreaks, enabling better research and response planning; help secure the supply chain for drugs; and increase the effectiveness of treatments by supporting adherence to medication regimes.

Existing Applications of mHealth

Many of the applications of mHealth already in use around the world today are technically simple (making use of voice and SMS rather than advanced features), meet an immediate need, and offer benefits that directly incentive the owner of the mobile phone to use the application. Many of them extend existing eHealth applications to mobile networks, and have gained acceptance on the basis of a common-sense view of utility and risk. This Chapter looks in particular at:
Mobile-Enhanced Appointment Booking Systems. Using the convenience of mobile voice and SMS to help make appointments with doctors and specialists. Such systems are

[1] http://www.in.undp.org/content/india/en/home/post-2015/sdg-overview/goal-3.html accessed on 02.02.2018.
[2] https://en.wikipedia.org/wiki/MHealth#cite_note-mobileagents-4 accessed on 02.02.2018.

widely applicable, and indeed have been widely deployed; they deliver utility and reduced costs for the healthcare provider, and ease-of-use benefits for the user.

Drug Authentication and Tracking. Addressing counterfeiting and piracy by tracking drugs from the point of manufacture to the point of consumption, and authenticating provenance before use.

Mobile networks allow tracking to be extended into remote regions, both to the point of sale and the point of use, and bring savings and brand benefits to manufacturers.

Remote Diagnosis. mHealth applications can help a patient get a diagnosis without having to travel to a centre, using downloaded decision-support applications, remote access to decision-support databases and systems, or communication with a specialist, via voice, messaging or video. They may connect a healthcare worker with a specialist, or connect the patient directly with a healthcare worker.

Well-being Applications. Many mHealth applications that have emerged in the last few years have been developed as simple, lightweight apps for smartphones, aimed at increasing individuals' well-being. Some are based simply on the provision of information (either within the app, or entered by the user), while others make use of the more advanced functionality of the devices they are intended to run on, such as GPS positioning and accelerometers.

Such applications have shown that the use of a mobile network and connected device can help to extend cost-effective healthcare provision, particularly by allowing diagnosis to be performed closer to the patient without the need for travel to specialist centres (thus also reducing the risk of spreading epidemic disease). Moreover, data collected in this way, subject to appropriate consent and privacy regimes, can be of great value in research into disease transmission.

Study Techniques

A detailed survey questionnaires was used to collect data. Data was collected on various data variables such as Mobile Health uses, missed does and prescription, key challenges, solutions and Geographic Location. Data collection was done using automated data capture software on smart phone through an online software CommCare. The survey tool was uploaded on software and downloaded on phone. Data was sent to the online database server by cellular, Wi Fi, or cable internet connection from the mobile device.

Data Collection

Data was collected on Coolpad Android using CommCare mobile application software, which facilitates online data collection.

Why mobile based data collection adopted

- It saved lot of time.

Data Cleaning

Once data is received, I have download the data to a computer and done data entry analyst after an initial quality check at my end. The data entry analyst has been done exported into excel, to compile into a large dataset using sorting features to determine whether there is missing information or redundant entries or any other logical errors. Few times, follow-up has been made with for missing information (this happened on those cases where the respondents either not reachable through phone or denied to give info over phone). The un-cleaned data, will be replaced by newly cleaned, finalized dataset.

Study Limitations

There are few limitations of the survey and should be considered at the time of interpretation of results:

- Non-Response Bias: Survey findings are based on available data.
- Interview Bias: Respondents self-reported actions related to smart phone, Patient load experience, which were not confirmed by further document review.

Identification respondent and Method followed

- To employ methods which are widely used and accepted worldwide for data collection i.e. "Canvasser Method"
- Methodology : This will involve following two phases:
- First Day Line listing: This was systematically listing and numbering of all the possible respondent and their locations. Basic information about geographical location, GPS coordinates, category. This will facilitate drawing up a framework of the next steps. Many times the appointment for next possible dates was finalized preferably for next day
- Next day- On the basis of unique number has been assigned previous day data has been collected through phone using CommCare tool capturing survey details

Key Challenges during data collection

- The physical in-convenience of transport
- The doctors or Chemist most of the time were apprehensive in sharing the information
- Due to non- availability and prior commitment, needed to conducts many revisits.
- Many times the respondent denied for conducting the interview.
- Since there was no Doctors or Chemist census being conducted by Government hence I could not get a structured data base of doctors or Chemist. That is why I have used the Canvasser Method where I have visited few wards to have maximum coverage which of course a attracted lots of challenges including local language, mobility and local people rude behavior.
- Many time the respondent was not present at the location and I have wait for him until he comes because he or she was being the important stakeholders.
- Even sometimes the interview with them things was not smooth. In the beginning, the respondents did not co-operate properly and created problem. But we managed to established close rapport with the respondents and eventually succeeded in knowing their views and attitudes in depth.
- The interview schedule was the main tool used for collecting primary data, supplemented by field notes based on observation. Although some structured questions were included to get specific background data. The quantitative data collected through interviews was supplemented and cross-checked by qualitative data obtained though observation. Contacting the respondents and visiting their households posed serious problems.

Setting up Field

Gujarat A Western Indian state covering 75,685 sq mi and its population is 60 million. The State encompasses of 33 districts and the State is doing well in Health parameters. A

comparative study indicate that the State has 12th ranking [2] on health indicator performance and lagging behind from many states including Kerala, Goa, Himachal, Punjab, Tamil Nadu, Maharashtra and Haryana.

The State Missions (NRHM and NHM) has laid down their vision to improve the State Health Indicators through different interventions and specific innovations and targeted both communicable and non-communicable disease areas.

It is evident that technology can become the enablers to healthcare goals which can be designed, developed and implementing technology solutions to improve and strengthen public health delivery systems in India and globally. Hence Survey method was planned to understand technology solution implementation, capacity development, monitoring and evaluation, Healthcare improvement, etc. in healthcare space and one of the district named Rajkot was selected.

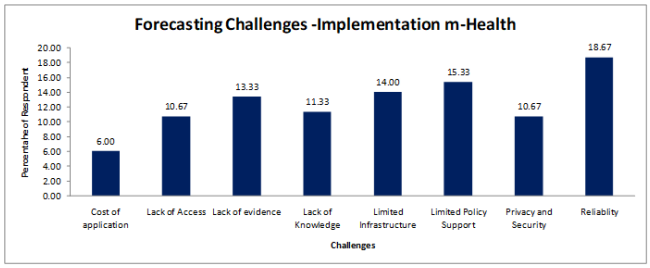
Rajkot city is selected for the study. The Rajkot comes in Gujarat state. According to 2011 census data 1,286,678 is the population of the district; where male and female are 674,355 and 612,323 correspondingly. The literacy rate is 87.80% of which male and female literacy was 91.46% and 83.81% respectively. The sex ratio is 908 per 1000 males. Child sex ratio of girls is 836 per 1000 boys. Rajkot district has been surveyed intensely for the period of eight months. Taking into account the constraints of time and available resources a sample of 34 respondents including 30 doctors and 4 Payers (Insurance Professionals) has been taken.

Key Challenges Public Health in India

The major challenges for the Government of India are to provide affordable primary health care in an equitable manner to the vast rural and increasing urban population. The government has to improve the health conditions of medically underserved people and to the increasing masses of the urban poor, such as infant mortality rates and maternal mortality rates, reduction of burden of diseases. India has 130,000 community health centers and 25,000 primary health centers. The infrastructure and resources available at CHCs and PHCs has been specified as part of the NRHM guidelines. However, the situation on the ground is less than the ideal. There may shortage of specific drugs at the local level, or there might be regular absenteeism of the staff at certain centers. If a service availability map were available, the distrm-Health authorities could monitor the local conditions on a day-to-day basis. Unfortunately, an important requirement for improving existing health services and provisioning new services is the availability of high quality data. While the Government carries out periodic health surveys (NFHS-I, II, III), it takes many years between data collection and final dissemination of the results which can lead to outdated premises.

This is a major challenge because allocation of resources for provisioning of services is a contentious process involving vested political interests. The processes for data collection need to be more transparent, accountable and verifiable. Further, surveying the remotest of rural areas and the migrant populations is a difficult task. This is where mobile technology can play a critical role in field data collection. The pervasive cell phone and the cellular communication infrastructure can provide the reach and scalability that pen and paper based surveying systems cannot. Costly pen and paper based systems for data collections have several problems. Data collected on paper-based forms results in duplication of efforts as the same data are required to be filled into several forms and registers. An inaccuracy in data collection at the source itself makes double data entry. It also led to non-detection and delay in detection of diseases and response times for medical intervention. Inefficiencies and constraints in paper based field data collection result in inadequate follow-up for long term population cohort studies. Mobility of migrant groups makes it an impossible to track them for follow-up in longitudinal studies. Mobile communication devices which can deploy screen based questions can be used by health care workers to enter data accurately and send it up the chain for consolidation and analysis. This screen based format enables the health care community to encapsulate medical expertise into the program so that minimally trained primary health care workers can be deployed for accurate data collection. This can significantly improve the productivity of the primary health-care worker, the reduction of transaction cost, the scalability of surveillance, and also provide more accurate information to the medical experts.

The other major challenge is that there is no health record of any individual in the system. This results in severe disconnect between the various visits that an individual might make to the healthcare provider for treatment. No treatment history can result in duplication of investigations, inadequate and error-prone treatment, and high costs. Once again, technology can come to the rescue if a universal Electronic Health Record (EHR) could be designed and maintained for the life-time of each individual. With the imminent availability of the unique identity system, an electronic health record will become an enabler in reducing costs of health-care. There are several areas in which technology and tools can play a critical role in providing process improvements such as Service Availability Mapping (SAM), business processes in public health, Electronic Health Records (EHR), identity management for public health, integrated disease surveillance, emergency and disaster management, cancer registry, clinical decision support systems, and simulation and modeling of complex public health systems.



***Source*:** field work

Fig 2

The World Health Organization (WHO) defines Service Availability Mapping (SAM) [3] as a tool to collect and present basic information on health services such as health infrastructure, human resources and the services offered to citizens. SAM uses surveys to collect field data and then maps it on a GIS application to present a visual view of the services available at various points on the map. It is ideal for use at the distrm-Health level, where distrm-Health health

[3] Service Availability Mapping: http://www.unfpa.org/webdav/site/global/shared/documents/publications/2010/srh_guide/tools_service availability.html

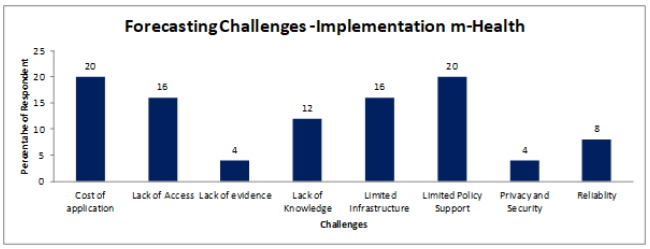
management teams can use the results of the SAM to map and monitor local health services, and identify the gaps for possible intervention. SAM provides a tool in the hands of the service providers and independent monitors, such as NGOs, who can verify whether the resources that are supposed to be available at a local centre are actually available at any point of time or not.

Challenges highlighted by Doctors About 19% doctors mentioned that reliability of the m- health application would be the key challenges for implantation of the application in India.6% of doctors mentioned that cost of the m-health application would be the key challenge. There could be few solutions to mitigate the key challenges that include Awareness Camps. Setting up Infrastructure to take Internet connectivity to Deep pockets of country, Chemist should install the application, Data Security, Free of cost application, Government Policy, Mandatory for all Doctors to prescribe.

Challenges highlighted by Payers

Although data and information pouring in is varying but at the same time the challenges were also listed by the payers in the M-Health Implementation. The challenges listed were cost of application, lack of access, lack of evidence, lack of knowledge, limited infrastructure, limited policy support, privacy and security, reliability. 20 percent of the payers mentioned cost of application and limited policy support as main challenge. Lack of access and limited infrastructure was given by 16 percent payers. Only 4 percent of the payers mentioned lack of evidence and privacy and security as a challenge.

The solution to these challenges will be many like awareness campus, chemist should install the application, Data security, Free of cost application, Government Policy, Mandatory for all doctors to prescribe, setting up infrastructure, to take internet connectivity to deep pockets of country. Organizing awareness camp was mentioned by 20 percent payers which can minimize the implementation challenges.



***Source*:** field work

Fig 3

Conclusion

m-Health is a prominent requirement of India to achieve better health for all. The current studies indicate a large gap in need and implementation challenges regarding mHealth. Also, according to our results, we must take into consideration long-term goals for the country to make India a Healthy Nation.

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