

Review

Article

M-health services: Can it be a potential mechanism in improving public health system of India?

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Abstract

Background: The role of mobile in health system is now important for us, to make use of this very fastly growing technology in improving the public health of Indian people.

Objectives: To critically review the role of m-health in public health system of India.

Methods: A systematic review of related studies and literature of last 10 years published in pubmed etc till 31st March 2013 on role of m-Health in public health was done.

Results and discussion: A wide variety of m-health applications are available in mobile phone market, needing proper regulation from health care authorities and with a hope of better future results.

Recommendations: We must use these applications weighing their benefits and utility in public health as well as capitalizing the better prospect of m-health worldwide in the field of public health. This can give a greater access to larger segments of a rural and underserved population in developing countries like India with a hope of improving the capacity of health system to provide quality healthcare to Indian people.

Key words: Internet, Public Health, m- Health e-Health.

Introduction:

In India, due to non-availability of trained manpower and poor healthcare infrastructure, quality care is a demanding issue in rural areas. The maternal and neonatal mortality rate in India are still highest in the world especially in rural areas. The "m-health" has now been shown to have potential in terms of improving the standards of care in rural areas¹. Mobile technologies easy availability can have an important role in health care at the regional, community, and individual levels for both chronic diseases, along with a burden from communicable diseases². m-health now has a crucial role in future healthcare, and the development of m-health actually demands a top-down strategy or a framework to match and encourage bottom-up innovation by doctors. Without such strategy, many valuable advances will not be sustainable and resources will be wasted³. The new 4G mobile internet technologies can make the remote medical monitoring, consulting, and health care more flexible and convenient, provided challenges for successful wireless telemedicine are also well taken care off⁴. The penetration and capability of

mobile phones to make a huge difference to the health of society and individuals all the time and their basic functions like "phone calls" and "SMS" can have a fundamental change in all societies' health and healthcare. That is why authors try to review systematically the related studies of last 10 years published in pubmed till 31st March 2013 for its potential as an alternative mechanism to improve public health delivery system in India.

e-Health and m-Health

M-health infact is not a subset or mobilization of e-health. e-Health is a technology which supports the functions and delivery of healthcare but m-Health provides healthcare access, through information and delivery and can better reach areas, people and/or healthcare practitioners with previously limited exposure to certain aspects of healthcare. E-Health projects can be considered as the backbone of m-Health projects.

Mobile Health ("m-Health")

The term m-Health was coined by Professor Robert Istepanian, he defined it as the use of emerging mobile

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communications and network technologies for healthcare⁵. **Mobile Health ("m-Health")** is a medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices and other wireless devices etc. Mobile communication devices often used in this area are mobile phones, tablet computers and PDAs, for health services, health information and also for affecting emotional states. In **m-Health**, we can use information and communication technology (ICT), like computers, mobile phones, communications satellite, patient monitors, etc for health services and information⁵⁻⁶. m-Health applications are wide in public health like 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 telemedicine⁷.

Future Horizon: 3G Doctor- Emerging mobile video Technologies

One of the best ways to tackle the problems of rising healthcare costs, loss of productivity associated with poor health and lifestyle choices in modern societies is to empower patient and one of the best ways is by delivering high-quality personalized content to their own personal mobile devices. The integration of point-of-care diagnostics with mobile phones can give a real time data monitoring and transfer with instant diagnosis. Mobile video is a video-based 3G doctor service technology. Mobile video can transform health education, motivate individuals to change their behavior and maintain healthier long-term lifestyle choices⁸. Today the top smart phones are powerful enough and more than capable of putting an informed doctor, comprehensive medical library and bio-monitoring device in our pocket. Many positive examples of m- health are found in studies, but there are less solid evaluation of clinical and economic performance, which generate the need for such evaluation².

Successful examples of m-Health services in Public Health:

In India

Mobile phones have now opened opportunities for health intervention tools in many areas of health care such as prevention, diagnosis, data collection, treatment, adherence monitoring and surveillance. m-Health to Improve TB Care is now a new upcoming area with the enormous potential of m-Health to revolutionize the fight against tuberculosis (TB). Mobile phones can provide

TB care with more speed and impact, and initiatives in this area are global and the opportunities have also been recognized but the field of tuberculosis (TB) needs to be explored more from probe of a mobile health (m-health), as several applications have already been explored in human immunodeficiency virus(HIV) care⁹⁻¹⁰. M-health can even change the practice of telemedicine in the military health services from limited fixed-point access to a highly mobile individual with handheld communication devices¹¹. A wide variety of m-health applications in public health system are available for application in India¹².

Other Indian examples are:

Non-emergency help lines(Government)

At this point in time, more than 4 large states in India are looking to set up these helpline for consumers and people who live in rural areas and do not have access to basic health.

Emergency help lines(Private)

1066- A National 24 hour emergency and trauma care helpline by Apollo Hospitals Group.

Apollo - Aircel Mobile Health Care

Aircel customers can call **55106** from their mobile and talk to Health Experts from Apollo for any health related queries and get interim relief for life's little health urgencies - anytime, anywhere for anyone. The Charges for Apollo Mobile Healthcare service on 55106 are @ Rs. 24/min

Apollo M.I.N.D Line- Apollo M.I.N.D. Line is a psychological tele-counselling helpline to support individuals who are dealing with complications faced in everyday life.

Airtel Health doctor By calling 543210@ Rs 6/min all health consultations can be availed

Vodafone Happy to Help- By Calling 111 health advices are available

Dr SMS- Dr SMS is an initiative of Kerala Government for patients who can ask doctors for their health problems.

Global examples of m-Health services in public health

Globally there is increased use of personal mobile devices for health information for not only clinical or medical health but also for public health as well. Nearly 90% of U.S. adults were found to have a mobile phone and more than 50% of these users own a smartphone¹². 15% of smart phone owners in general search for health information from their mobile. The Department of Health and Human Services (HHS) in US has developed several

mobile health programs for public health in last decade, few of them are as given below¹²:

1. **National Library of Medicine (NLM)** has a gallery of mobile apps and mobile-optimized websites to disseminate health information to the public, including "Health Hotlines" and several emergency response apps.
2. **Centers for Disease Control and Prevention's (CDC)** has also created mobile-optimized websites where the public can access health information using mobile devices. <http://m.cdc.gov/>
3. **CDC** partnered with **HHS Office of the Assistant Secretary for Public Affairs (ASPA)** to create an SMS tool kit for emergency responders to have ready access to disaster-related text messages.
4. **National Cancer Institute (NCI)** has developed a suite of programs geared toward smoking cessation efforts like **Smokefree TXT** and **QuitSTART**.
5. **HRSA's Find a Health Center** is a consumer-facing program/app that allows the public to locate federally funded health center that can provide free or income-sensitive medical services.
6. **SAMHSA's Treatment Locator** mobile application also provides the public with location information about mental health and substance abuse centers.

M-health Initiatives in other developing countries:

The biggest opportunity in m-health in developing countries, is where mobile can help patients who do not have access to services via other channels. There are many externally and government-funded m-health pilots/projects and some of these projects have been successful and continue to develop into long-term services which help those in need, but many have fallen down, in the last decade in examples given below¹³:

- **Freedom HIV/AIDS in India:** uses mobile games to promote HIV/AIDS awareness;
- **Learning about Living in Nigeria:** where teenagers can ask sexual health questions by text message;
- **Handhelds for Health in India:** which uses mobile technologies to collect field data on disease or public health;
- **Mobile Telemedicine System in Indonesia:** which allows remote patients to receive a

routine check-up using a mobile phone and many more.

- **Services set up by surgeons in Tanzania to send bus fares to patients via m-money so they can make it to the hospital to have their operation.**

The real power of m-health is to enable patients and providers in these regions to help themselves, the examples in studies are as given below¹³:

Current Status: m Health initiatives and Indian public health system

Mobile Health can reach a 3000 crore market in India by 2017. M-health is ready to take an entry into India's primary health care system, MDG and National Health plans in India. The steering committee on 12th Plan on health said that by 2017, all district hospitals will be linked to leading tertiary care centers through telemedicine, skype, audio visual media and m-health will be used to speed up transmission of data. Over the last decade, tele-health in India has been primarily facilitated and driven by government funding. The government now has a major policy initiative in mobile health. As per a report by Health-Cursor, the tele-density in urban areas in India can be 100 percent while in the rural areas, it can reach 37 percent. The m-health area is changing very rapidly and is increasingly migrating away from the public sector in India into the private sector now. Factors that can be enumerated for rise in m health services in India are:

- i) High population growth"
- ii) High burden of disease prevalence,
- iii) low health care workforce,
- iv) Large numbers of rural inhabitants,
- v) Limited financial resources to support healthcare infrastructure and health information systems.
- vi) Rapid rise in mobile phone penetration in developing countries to large segments of the healthcare workforce, as well as the population of a country as a whole.
- Vii) Greater access to mobile phones to all segments of a country, including rural areas.

Implementation of m- Health services: Problems and Barriers

Existing systematic reviews of m-health interventions, and various published protocols, focus on the application of specific devices like mobile phones or specific functions like text messaging to individual

diseases or healthcare fields e.g. diabetes care or chronic disease management. Human factors in success of m-health are more difficult to overcome, rather than the technological ones like importance of patient privacy. The lack of leadership and knowledge and a failure to appreciate the real risks associated with implementing m-health projects and a need of m-health discussion groups on LinkedIn is real a demanding issue. Similarly launching an app which offers same information as also available on the mobile website, needs regulation and consideration and new areas in m-health in India needs to be explored. In India perspective; we can look at some examples like in Botswana in which, to ensure sustainability, m-health programmes have strategic goals that are aligned with those of the national health and education system, and the initiatives are owned and led by local stakeholders, as found in study in low income country like Botswana¹⁴. Some of the factors that lack in government based implementations are¹³:

1. Issue of Patient satisfaction and patients liking the technology
2. Clinical efficacy in area of how well we can treat the patients remotely rather than face to face
3. Business case and sustainability -to measure the project like decreasing number of transports, reduced rate of hospitalization and increased productivity.
4. technological comfortability with the end users
5. legal framework from misuse of information related to patients

Future concern: exploration of m-health services as a supporting component in public health

M-health—the use of mobile applications for healthcare is a new, young and dynamic field which can improve the well-being of people not only around the world but also in India. The m-Health has grown rapidly in a very short period but it requires a more thorough and scientific approach in its understanding and evaluating its progress¹⁵. Mobile applications can lower costs and improve the quality of healthcare as well as shift behavior to strengthen prevention, all of which can improve health outcomes in the long term. Mobile technology can change the way of health care delivery in rural villages of India. Lack of data on the impact of m-health services, has presented challenges for governments and large-scale funders of global healthcare. Flexibility is critical in m-health in designing policies and regulations to enhance m-health's growth. The m- health may be best served with regulatory strategies and new innovations

that focus on the most urgent needs of public health, which needs to be researched further in studies in future in Indian context.

Few of the suggested area where m-health services can be initiated in Indian settings are:

- Emergency response systems
- Human resources coordination, management, and supervision
- Mobile synchronous (voice) and asynchronous (SMS) telemedicine diagnostic and decision support to remote clinicians
- Clinician-focused, evidence-based formulary, database and decision support information available at the point-of-care
- Pharmaceutical Supply Chain Integrity & Patient Safety Systems
- Clinical care and remote patient monitoring
- Health extension services
- Health services monitoring and reporting
- Health-related m-Learning for the general public
- Training and continuing professional development for health care workers
- Health promotion and community mobilization
- Support of long-term conditions in diabetes self-management.

Therefore, m-Health requires a solid, interdisciplinary scientific approach for the rapid change associated with technological progress¹⁶. Although m-Health is viewed as a promising tool in developing countries with the ability to foster behavior change, more evaluations of current interventions need to be conducted to establish stronger evidence¹⁷.

Summary

M-health can improve the well-being of people not only around the world but also in India. Mobile applications can lower costs and improve the quality of healthcare as well as shift behavior to strengthen prevention, all of which can improve health outcomes in the long term. Mobile technology can change the way of health care delivery in rural villages of India. The m- health may be best served with regulatory strategies and new innovations that focus on the most urgent needs of public health, which needs to be researched further in studies in future in Indian context.

List of Abbreviations used:

- M-health: Mobile Health
- E-health: Electronic Health

- **3G & 4G: 3rd and 4th Generation Internet service**
- **SMS: Short Message Service**
- **GOI: Government of India**
- **MDG: Millennium Development Goals**
- **HHS : Department of Health and Human Services**
- **NLM: National Library of Medicine**
- **CDC: Center for Disease Control**
- **PDA: Personal Data Assistants**
- **e-journals: Electronic Journals**
- **BCC: Behavior change communication**

References:

1. Upadhyay RP, Chinnakali P, Odukoya O, Yadav K, Sinha S, Rizwan SA, Daral S, Chellaiyan VG, Silan V. High neonatal mortality rates in rural India: what options to explore? *ISRN Perinat*. 2012; 968921. doi: 10.5402/2012/968921. Epub 2012 Nov 16.
2. Kahn JG, Yang JS, Kahn JS. 'Mobile' health needs and opportunities in developing countries. *Health Aff (Millwood)*. 2010; 29(2): 252-8. doi: 10.1377/hlthaff.2009.0965.
3. Norris AC, Stockdale RS, Sharma S.A strategic approach to m-health. *Health Informatics J*. 2009; 15(3): 244-53. doi: 10.1177/1460458209337445.
4. Istepanian R, Philip N, Wang XH, Laxminarayan S. Non-telephone healthcare: the role of 4G and emerging mobile systems for future m-health systems. *Stud Health Technol Inform*. 2004; 103: 465-70.
5. Istepanian, Robert; Laxminarayan, Swamy; Pattichis, Constantinos S., eds.. *M-Health: Emerging Mobile Health Systems*. (Book:Springer). 2005: ISBN 978-0-387-26558-2
6. Cipresso, P.; Serino S., Villani D., Repetto C., Selitti L., Albani G., Mauro A., Gaggioli A., Riva G. (2012). "Is your phone so smart to affect your states? An exploratory study based on psychophysiological-measures". *Neurocomputing*84:23, 30 doi:10.1016/j.neucom.2011.12.027.
7. Germanakos P., Mourlas C., & Samaras G. "A Mobile Agent Approach for Ubiquitous and Personalized eHealth Information Systems" *Proceedings of the Workshop on 'Personalization for e-Health' of the 10th International Conference on User Modeling (UM'05)*. Edinburgh, July 29, 2005, pp. 67-70.
8. Pew Internet & American Life Project. As assessed from internet. dated 10/11/2012. www.pewinternet.org
9. M- health to Improve TB Care. Public Health Education and Awareness. [Interactive Research and Development] 2012: May 29. As assessed from Internet. dated <http://en.wikipedia.org/wiki/>

Digital_object_identifier:05/11/2012<http://mobileactive.org/issue-categories/public-health-education-and-awareness>.

10. Denkinger CM, Grenier J, Stratis AK, Akkihal A, Pant-Pai N, Pai M. Mobile health to improve tuberculosis care and control: a call worth making [Review article]. *Int J Tuberc Lung Dis*. 2013 Mar 25. [Epub ahead of print]
11. Poropatich R, Lai E, McVeigh F, Bashshur R. The U.S. Army Telemedicine and m-Health Program: Making a Difference at Home and Abroad. *Telemed J E Health*. 2013 Mar 28. [Epub ahead of print]
12. Vital Wave Consulting. *mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World*. United Nations Foundation, Vodafone Foundation. 2009, Feb: 9. Available from Internet <http://www.vitalwaveconsulting.com/pdf/m-health.pdf>
13. Major policy initiative in mobile health. Accessed from internet. <http://articles.timesofindia.indiatimes.com/2012-03-18/india/31206777>
14. Littman-Quinn R, Mibenge C, Antwi C, Chandra A, Kovarik CL. Implementation of m-health applications in Botswana: telemedicine and education on mobile devices in a low resource setting. *J Telemed Telecare*. 2013; 1. [Epub ahead of print]
15. Michael P, Nemser B, Cosmaciuc R, Cole-Lewis H, Ohemeng-Dapaah S, Dusabe S, Kaonga NN, Namakula P, Shemsanga M, Burbach R, Kanter AS. Capitalizing on the characteristics of mHealth to evaluate its impact. *J Health Commun*. 2012; 17 Suppl 1:62-6. doi: 10.1080/10810730.2012.679847.
16. Nilsen W, Kumar S, Shar A, Varoquiers C, Wiley T, Riley WT, Pavel M, Atienza AA. Advancing the science of mHealth. *J Health Commun*. 2012; 17 Suppl 1:5-10. doi: 10.1080/10810730.2012.677394.
17. Gurnan TA, Robin SE, Roes AA. Effectiveness of m-Health behavior change communication interventions in developing countries: a systematic review of the literature. *J Health Commun*. 2012; 17 Suppl 1:82-104. doi: 10.1080/10810730.2012.679169.

