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Review Article

Utility of mHealth initiatives in the Indian context

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ABSTRACT

India is the second-largest nation in the world, with two-thirds of its population living in rural areas. The demographic and environmental shift of the country is augmenting the already existing high burden of public health concerns. India has improved the prevailing health scenario despite several limitations like vast geographical area, lack of quality transportation facilities, high population density, undernutrition, illiteracy, and poverty in the past decade. These factors continued to be the underlying causes to slow down the pace of achieving an efficient healthcare system. Significant disease burden of communicable and non-communicable diseases, poor health infrastructure, limited human resources at government facilities, accessibility issues related to health care by rural inhabitants increases the existing catastrophes in health care delivery in the country. This paper aims to analyse the utility of mHealth initiatives in the Indian context. For a developing nation like India, mHealth provides access to people, including rural populations located in remote locations with limited access to healthcare facilities. mHealth solutions could cater to different kinds of health needs, depending on the demographic characteristics and type and access to a mobile phone a user may have. It is more beneficial for a country like India. It becomes nearly impossible for the urban population to regularly visit a healthcare facility due to the limited infrastructure and human resources, the condition of healthcare facilities and the pressure on care providers. The use of mobiles for reaching out to many consumers across the country, especially the vast rural population, for information dissemination, education, consultation and monitoring will be the actual use of mHealth.

Keywords: mHealth, Mobile phone, India, Public health, Health service, Health care utilisation

INTRODUCTION

India is the second-largest nation in the world, with two-thirds of its population living in rural areas. The demographic and environmental shift of the country is augmenting the already existing high burden of public health concerns.[1] India has improved the prevailing health scenario despite several limitations like vast geographical area, lack of quality transportation facilities, high population density, undernutrition, illiteracy, and poverty in the past decade.[2] These factors continued to be the underlying causes to slow down the pace of achieving an efficient healthcare system.[2] Significant disease burden of communicable and non-communicable diseases, limited human resources, poor health infrastructure, high absenteeism of health care providers at government facilities, accessibility issues related to health care by rural inhabitants increases the existing catastrophes in health care delivery in the country.[3,4] According to the global burden of disease report, total disability adjusted life years (DALYs) lost are 51.8 million years for the Indian population.[5] The economic costs associated with these illnesses are enormous. Challenges still exist in the health system due to the malfunctioning of the three-tier referral system accessibility and affordability of secondary/ tertiary level health services.[6] Current challenges in health care delivery require an urgent need of enabling health systems with more innovative technology-based solutions.[7] India has an exponential increase in mobile phones, and digital technology has

become one of the effective healthcare delivery tools. The government of India initiated several information communication technology (ICT) based health interventions. As part of ICT implementation, the government decided to use a spectrum of interventions, from telemedicine to mHealth interventions, to provide health services to remote locations and empower healthcare providers working at the grassroots level. Nevertheless, telemedicine facilities are still limited to a few private and prestigious tertiary care public hospitals. Moreover, the cost of teleconsultation is too high to introduce in remote healthcare settings.[8] From the evidence we have, mobile phone technology in the health sector has the unlimited potential to transform the face of global health systems.[9] Mobile phones have reached more people than electricity, road systems, and clean piped water in developing countries like India. Rapid technical advancement in mobile phone technology, declining market prices of the products, expanding network coverage and an unpredictable rise in mobile phone user rates are the positive driving factors enabling the rising opportunity in different aspects of healthcare delivery.[10] The widespread use of mobile technologies and advancements could be helpful in the health system in terms of addressing various health priorities. This has evolved into a new field of electronic health (eHealth) known as mobile health (mHealth). Mobile health offers the potential for enhanced reach by providing individually tailored and customised services, even among traditionally underserved communities, at a relatively low cost.[11,12]

This paper aims to discuss the successful mHealth interventions, their scope in the Indian context, and the challenges to address. This piece attempts to provide an insight into the possible alternate cost-effective interventions in the Indian context and the necessity for further research and investment in mHealth.

WHAT IS MHEALTH?

'mHealth' includes the application of telecommunication and multimedia technologies integrated with mobile and wireless healthcare delivery systems. The WHO's global observatory for eHealth defined mHealth as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices".[11] In developing countries like India, mHealth is in its early stages of development. However, this technological involvement has already started to transform healthcare delivery due to the proven success of mHealth interventions.[10] Devices used in mHealth initiatives include mobile phones, smartphones, laptops, tablets, palmtops, notebooks, etc.[11] Different mobile applications designed for lifestyle monitoring, patient follow-ups, health education, training and mass scale messaging for information are incorporated into mHealth. Studies suggest that mHealth can enhance the efficiency and quality of healthcare and infrastructure and empower a patient for self-care and monitoring.[12]

POSSIBILITIES OF MHEALTH IN INDIA

Telecom regulatory authority of India (TRAI) maintains and publishes data on telephone subscriptions. According to the latest statistics provided by TRAI, India had some 1078 million total wireless subscribers by the end of October 2016.[13] The wireless connections in urban and rural areas are 622 and 456 millions, respectively. In a country of 1.31 billion people, this annual growth of 32 per cent means 35 per cent tele density in rural India.[13] Even though this coverage appears to be low, mobile phones have covered a substantially higher number of rural households. Out of the total wireless subscribers (1,078.42 million), 970.47 million subscribers were active on the date of peak visitor location (PVL) register.[14] Another interesting fact is that mobile phones have already become famous as other mediums of mass communication, such as radio and television, which have been used for spreading health awareness for many decades now. Studies suggest that mobile phones will remain perhaps the most accessible ICT media in the developing world for the next few decades.

MHEALTH AND ITS APPLICATIONS, WHY IS IT IMPORTANT?

For a developing nation like India, mHealth provides access to people, including rural populations located in remote locations with limited access to healthcare facilities [1]. mHealth solutions could cater to different kinds of health needs, depending on the demographic characteristics and type and access to a mobile phone a user may have. It is more beneficial for a country like India. It becomes nearly impossible for the urban population to regularly visit a healthcare facility due to the limited infrastructure and human resources, the condition of healthcare facilities and the pressure on care providers.

Most health programs consist of three important functions. Delivery-involves the healthcare professionals and health workers managing disease conditions and providing medical care, Monitoring and evaluation- to improve the delivery and promotion functions and, promotion-creates awareness among the target audience (population/communities) and helps them adopt target healthy behaviours.

Delivery

Delivery of health services and clinical care is one of the inevitable parts of public health. mHealth can play a vital role in efficient health care delivery. A simple short messaging system (SMS) for disseminating health information, remote consultation using audio and video calls, counselling services, health condition monitoring, and follow-up may be required for remote located rural or

suburban populations. mHealth comprises different tools to continuously monitor vital signs (body temperature, blood sugar, blood pressure, etc.[15] The advantage is that several gadgets and mobile applications (Apps) can continuously capture vital signs at regular intervals to accurately diagnose the patient's condition for all geographies.[16] Some healthcare facilities are located in urban and semi-urban areas where mHealth initiatives already play a significant role. In these facilities, gadgets have been used for clinical and administrative purposes. Mobile phones are one of the primary means of communication among the health team.[15] Appointment confirmation and reminders to the patients are already part of most urban hospitals' information and communication technology (ICT) strategy.

A non-governmental organisation called the foundation for research in health systems (FRHS) could create a list of beneficiaries who did not receive key services in maternal health, family planning, and child health using an electronic database of beneficiaries and services provided to them. This list helped the grassroot level workers and their supervisors reach out to the excluded beneficiaries in an entire district of Patan in Gujarat.[17] Later on, this method of tracking beneficiaries was adopted by the government of Tamil Nadu and implemented the 'pregnancy and infant Cohort monitoring system'' (PICMS). PICMS is an internet-based application to collect social, maternity benefits and health-related data for pregnant mothers and newborns in the state. In 2009, this data was used to determine the eligible families for the maternity benefit scheme.[18] The PICMS and FRHS projects are excellent examples of encouraging India to adopt the beneficiary tracking system.

Monitoring and evaluation

Cost-effective monitoring through mHealth interventions could lead to increased quality and accessibility to a broader spectrum of healthcare services. The well-being of the individual and community is a prerequisite for economic and social development. Using mobile technology to improve health offers developing countries and communities an excellent opportunity to improve healthcare delivery.[17,18] It also helps the health system to utilise limited resources efficiently. mHealth provides immense opportunity to manage the problem of healthcare personnel absenteeism and become an alternative to telemedicine.

The national rural health mission has implemented a country-wide health information system in India. In the Indian context, data from peripheral health facilities are collected and maintained in paper-based formats.[19] research in Malawi in 2007 shows that 14% of paper-based data had been discarded because of unreadable handwriting, missing decimal points, or some outliers in the forms.[20] On the other hand, error rates of 4% for electronic forms, 5% for SMS and less than 1% for telephonic helplines.[21] It is convincing that mobile devices can be gradually used in data collection and reporting for HMIS data. Besides improving data quality, data collection using mobile devices allows faster reporting of services delivery to facilitate supervisor verification.

Promotion

mHealth interventions would efficiently tackle chronic diseases' rising burden, as demonstrated by a few studies. A study conducted to assess whether mobile phone messaging facilitates self-management of long-term illnesses found that increased compliance can be ensured through reminders over the mobile phone and hence can enhance the quality of life of chronic disease patients.[22] Gurol-Iranci concludes in his study that communicating the results of medical investigations via mHealth technology would save much time for the patients.[23]

Treatment adherence to tuberculosis and HIV are becoming important public health issues in the Indian context. Literature evidence supports that mobile phone text messaging for promoting adherence to antiretroviral therapy in patients with HIV infection has been found effective. A study conducted in Delhi demonstrates that mobile technology combined with biometrics prevents drug-resistant tuberculosis. The patient's presence is verified through fingerprint, and through an SMS system, the attendance is synchronised into a central record giving current information about the patient.[24] Similarly, there are pieces of evidence supporting adherence to iron-folic acid supplementation therapy that can be improved by using mHealth technology. Mobile phone-based interventions for improving contraceptive use are another area where we could explore the effectiveness of mHealth.[25] Mobile phones, computers and tablets can enhance healthcare delivery and lower operating costs in India. mHealth reduces readmission rates in chronic patients through better monitoring and higher compliance rates for prescribed care.[26] Regular check-ups can be easily carried out through mobile remote monitoring, interpreted by data analytics at the health clinics. mHealth could be used to replace a portion of the future physical infrastructure of hospitals and clinics through remote diagnosis, monitoring, and care in India.

The European commission's green paper suggests that mHealth could be one of the tools to focus on the prevention and improving the efficiency of the healthcare system. mHealth solutions can play a vital role in the early detection of chronic conditions.[27] These solutions can empower the patients with self-assessment tools and remote diagnosis. Sharing data with the care provider will help with timely intervention.[27] Apart from early detection of the chronic condition through mHealth, infant and maternal mortality may also improve significantly. India is still far away from achieving universal immunisation.[28] Short message service (SMS) texts using the existing maternal and child tracking

system (MCTS) may offer a potential low-cost solution in India. They may accelerate India's drive to vaccinate all children against vaccine-preventable diseases.[29] A sound investment in enhancing immunization coverage through mHealth can also yield good results. The use of tobacco is an important concern from the public health perspective. Evidence of text message-based smoking cessation has been found effective among the young population.[30] It is another vital area where mHealth might be a helpful intervention to spread awareness regarding harmful effects on the health of tobacco use and gain from tobacco use cessation. Reducing the high burden of malnutrition is another area of concern in India. The increasing burden of obesity adds to the already prevailing burden of under-nutrition.[31,32] Through mHealth, citizens became more empowered and informed of their health and well-being. Communication ties and health knowledge between patients and healthcare providers and even amongst healthcare providers would be significantly enhanced.[33]

CONCLUSION

Mobile technology in the present scenario has substantially affected health outcomes in some areas. If there is a provision of scope to excel in supportive regulatory environments with strategic interventions by policymakers and funders, a lot more can be done in the coming years. The capacity to pay for health care in poor and developing countries is higher as the cost of care exceeds the income earned by the individuals/ households. The largely underserved healthcare market combined with high mobile phone penetration and rapidly growing smartphone adoption enables environmental conditions for mHealth adoption in India. mHealth, being user-friendly and cost-effective, would be an exciting initiative in the developing world. Customised applications and sustainable financial models that suit the existing local healthcare delivery networks would yield beneficial outcomes. Interventions such as telephone-based appointment scheduling, SMS prescription refill services, consultation via 3G/4G video or telephone provide quality care just a smartphone away.

Cost-effective monitoring through mHealth interventions could lead to increased quality and accessibility to a broader spectrum of healthcare services. mHealth has a great potential to spread life-saving information even in the most remote and resource-constrained settings in developing countries and can contribute to the prevention and treatment of diseases. Technological innovations can be adopted for behavioural change communication and can be used as strategies for health promotion. The use of mobiles for reaching out to many consumers across the country, especially the vast rural population, for information dissemination, education, consultation and monitoring will be the actual use of mHealth. mHealth has a great potential to deliver life-saving information even in the most remote and resource constrained settings in developing countries and can serve as an access point for national surveillance systems. Healthcare practitioners need to be encouraged and trained to adopt mHealth. The most vital indicators of awareness and use of mHealth services are monthly spending on mobile phone services. However, individuals with lower mobile expenditures believe that mHealth services are easier to use than the current healthcare services. Therefore, mHealth has the potential to fill the gaps in the system by providing expanded access at a lower cost. Along with the strengths of technology-based health promotion interventions, a lack of research and investment still exist.

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