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Visual Communication

MOBILISING HEALTHCARE THROUGH MOBILE PHONES A SYSTEMATIC REVIEW OF THE M HEALTH PROJECTS IN INDIA

Mrs. E. Indira	Assistant Professor, Department of Visual Communication, Avinashilingam University for Women, Coimbatore. India
Dr. P.E.Thomas	Professor and Head, Department of Communication and Media Studies, Bharathiar University, Coimbatore, India.
Dr. M.Sri Hari	Assistant Professor, Department of Communication and Media Studies, Bharathiar University, Coimbatore, India

ABSTRACT With a vast and diversified population whose healthcare needs to be gratified, the Indian Healthcare system is faced with challenges of dearth in availability of qualified medical personnel and minimum infra structural facilities. Use of technology for delivery of quality and quicker healthcare will improve the health care system in India. A deeper analysis of the m Health projects carried out across Indian scenario provides better understanding of factors that affects the use of mobile phones for healthcare. This paper assesses the m health projects in India using the four key constructs of UTAUT theory – Performance Expectancy, Effort Expectancy, Social Influence and Facilitating conditions. The outcome of the assessment brings out the various factors that need to be addressed to, for successful deployment of mobile phones in the Indian healthcare system.

KEYWORDS : m Health, UTAUT, mobile phones, India

Introduction

Access to modern Information and Communication Technologies (ICTs) are now satisfying the information and communication needs of the rural people in the developing countries. The people who were lacking access to proper roads, clean drinking water, basic health services, electricity and any media like television and newspapers are now experiencing a technological upsurge with the availability of cheaper mobile phone handsets and better network facilities. The need for less or no technical skills to operate the mobile phones in comparison to other ICTs has made mobile telephony a feasible solution for delivering timely, cost effective and quality healthcare in the rural areas of the developing countries.

Around 70% of the total Indian population is found in the rural areas, according to the Indian Census report of 2011. They have been facing several developmental lacunae including low literacy, poor healthcare facilities, low per capita income, a high degree of poverty and poor infrastructure. The penetration of mobile telephony into rural India more than any other technology can be attributed to their deep desire of the rural people to communicate better with their institutions and social circles. They are also used for various purposes including agriculture, commerce and several other informal forums and are seen as the harbinger of hope and development. This quality of mobile phones as the solution for social welfare issues will break the barriers of poverty, reach the poor and downtrodden and greatly empower rural India.

India is the second largest mobile phones user with over 900 million users and nearly 142 million cellular subscriptions were added in 2011 alone. The low pricing of both the mobile handsets and the tariffs associated with it has shown a glorious increase in the geographic coverage of mobile phone networks in India. These factors have resulted in a scenario where the rural people in India now have access to mobile phones and its myriad capabilities.

Looking into the scenario of healthcare in India, we come to realize that around 66% of the people living in Indian villages have no availability of critical medicines, need to travel more than 30 kms to get access to a proper healthcare facility. The health infrastructure in rural India also is sick with shortage of doctors, trained medical personnel, lab technicians and pharmaceuticals.

With a vision to make improvements in the availability of and access to quality healthcare for rural communities, especially for the poor, women, and children, the Government of India launched a program called the National Rural Health Mission. The Mission aims to reduce infant, child, and maternal mortality through promoting newborn care, immunization, antenatal care, institutional delivery, and post-natal care, advertently leading to the achievement of the 4th and 5th Millenium Development Goals 2015. With a strong network of 875 million mobile phone users, 1.55 lakh post offices, 2.38 lakh gram panchayats, 8 lakh chemists and 2.2 million SHGs spread across the nation India has the best opportunity. A developing nation like India will be able to provide a cost effective and quality primary health care system for its rural areas by utilizing these networks and training them with point of care diagnostics connected to mobile devices for diagnosis and treatment.

Technological advancements, self sufficiency in software development, network infrastructure and provision of services in the Indian ICT sector provide us the platform for making quality healthcare affordable to the rural areas. It is even more beneficial if the technology can be incorporated into the already existing health infrastructure of the country ().

Though there has been a considerable amount of investment towards developing mHealth in India, this is not sufficient enough for the diversified demographic settings found in the country.

Moreover, the deployment of m Health services in India has been concentrated towards medical transcription, health awareness through portals, telemedicine, and hospital management system and customer service using the internet only.

Need for m Health in India

In the recent past, there has been considerable interest in utilizing the mobile phones to provide health care services to the billions of people across the world. Mobile phones are a great leveler and have democratized the access to health care. Increasing mobile penetration especially in the rural areas means that even the poorest of the poor can potentially benefit from m Health. The need for use of mobile technology in health care transcends across geographies and income levels. It is a myth that mobile health or telemedicine is a need for emerging markets where the health infrastructure is poor. mHealth is equally important in developed nations which are struggling with rising health care costs.

Mobile phones have certain features which makes it the most applicable, adaptable and available technology of all the Information and Communication Technologies. Mobile phones are portable and always carried by the individuals. This makes mobile phones the second physique of any individual and makes it ubiquitous. The technologies and the networks intertwined with the mobile phones, like the 2G, 3G, 4G, have penetrated in most of the developing countries as much as any developed country. This facilitates remote monitoring and diagnosis a reality for the long deprived rural community. Low cost of handsets and lower tariffs allows for higher penetration of mobile phones among the rural people who need the access of quality healthcare.

mHealth Initiatives by the Indian Government

m Health 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. At the same time Government of India, the most influential and biggest stakeholder in the deployment of m Health in India with its many efforts has the vision of revolutionizing rural healthcare.

To improve the infrastructure and facilitate the rural development initiatives the Government of India has recently approved a project for the National Optical Fiber Network in 2011 for providing Broadband connectivity to all 2.5 lakhs Gram Panchayat. This network will provide a highway for transmission of voice services, data and video in rural areas [32]. As a part of this, there are plans to provide connectivity also to the Primary Health Centres (PHCs) in rural areas.

In a recent press release of the Ministry of Health and Family Welfare we find encouraging signs for mHealth through the announcements of scaling up the project KilKari, an audio based mobile service that delivers audio messages on pregnancy, child birth and child care to pregnant women and infant's mother registered under Mother and Child Tracking System(MCTS). The weekly messages would be relevant to the stage of pregnancy or age of the infant, starting from 4th month of pregnancy until the child is one year old. Developed in English, Hindi and Odiya, this service will reach the states of Jharkhand, Odisha, Uttar Pradesh, Uttarakhand and HPDs of Himachal Pradesh and Rajasthan.

Another initiative is Mobile Academy, a mobile based application, which aims to train 90,00,000 ASHAs(Accredited Social) through a 120 minute course via mobile phones. At the completion of the course, the ASHA will receive a certificate from the Government and more importantly will enhance the knowledge and interpersonal skills of the ASHAs. M cessation is a counseling programme through a mobile helpline that would help tobacco users to quit tobacco registered through a missed call. Other m Health initiatives planned are development of MoSQuIT, a mobile based diseases surveillance system for Malaria to be deployed in Assam and Mobile Edutainment for TB prevention.

M Health in India

A clear assessment of rural end-user perceptions and experiences with the technology will provide a better framework for healthcare delivery via mobile phones to the 70% of the country's population residing in rural India.

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed to present an integrated view of user acceptance and usage of new technology. This theoretical base is used to analyze the extent to which the people of rural India have accepted the novel healthcare delivery through m Health.

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. For the sake of our analysis, we include increase in productivity; timeliness, improvements in job performance, quality of output, and effectiveness of the projects.

Increase in productivity in our case will show an increase in the number of beneficiaries or the expected output of the m Health projects. ASHAs in Uttarakhand were able to handle patients at the same time also was able to attend to another patient through mobile phones (Chib, 2012). A steady increase in the number of visits to ANC care and accessing institutional delivery by the pregnant women was found after the Comm Care programme(). Health workers in Thiruappathur block, Tamil Nadu were able to submit more number of health records each day through mobile phones than the paper based system (Ganesan, 2011). In rural Madhya Pradesh, an automated SMS tracking system for tracking new born showed an increase in the percentage of infants receiving number of single visits and number of multiple visits.(Chatfield, 2015).

Improvements in the performance of the health workers or the beneficiaries imply a greater strength in the delivery of healthcare to the rural populace. Significant increase in the knowledge or awareness level on the maternal and child health practices was experienced by the pregnant women of selected villages in Vellore district, Tamil Nadu after receiving health messages through SMS (Datta, 2014). The ASHAs in Orissa found an increase in the knowledge of the health practices and there was an upsurge in the motivation level for them to make their field visits, when they used mobile phones with audio visual materials for counseling. It also made the pregnant women engage in counseling more eagerly(Ramachandran,2010). As the midwifes in Thane District, Maharastra, could view the previous records of the pregnant women in the mobile phones, their interaction with the pregnant women was more clear and specific, thereby improving their interaction(Bondale, 2013). The ASHAs who were previously just assisting the doctors could perform village based CVD screening with the help of mobiles, which improved their capability and motivation in CDSS (Praveen, 2014). A study in Uttarakhand stands as a proof of improved communication flow within health infrastructure and there was a definite enhancement in the reinforcement of health messages through this communication flow (Chib, 2012).

Good communication flow was found to be facilitated by mobile phones with the high institutions and the amongst themselves by the midwives in rural Indonesia (Lee, 2011). An SMS tracking system in rural Madhya Pradesh enabled tracking of the infants and their visits and enabled reduction in the mortality rate of the infants (). In Punjab, the people were informed about their impending checkups and vaccinations through text messages (Mehta, 2013). Client engagement and participation in counseling sessions was found to be more with the use of multimedia in Comm Care platforms. They also could experience knowledge retention of at least 3 to 5 danger signs across all health issues (Chatfield, 2015). The rates of breast feeding practices improved due to Comm Care applications. In rural Andhra Pradesh, m Health tracking of mothers and child healthcare details facilitated continuous and effective monitoring and follow up of the patients (HM & FW Department, 2013); e Mahtari in Chattisgarh was designed to improve maternal and child care in rural areas and it enabled access to timely data and take appropriate action. This also led to compliance to checkups, immunizations and better delivery of care for the women and children (Mahapatra, 2015).

Timeliness is a very basic and influencing factor for the success of any health care project revealing an efficient time management in the execution of the projects. The ASHAs in Uttarkhand felt that the waiting time and the travelling time of the patients were minimized time due to prior confirmation over mobile phones (Chib, 2012). The mobile phone data submission was possible on real time basis (Ganesan, 2011), thereby saving time and reducing the workload of the health workers in Thirupathur block of TamilNadu; Mobile phones facilitated timely communication between ASHAs and FHWs about delivery and birth notification (Murthy, 2012); Immediate SMS alerts to doctors for help was sent using mobile phones in rural Andhra Pradesh (HM & FW Department, 2013); There was a sufficient reduction in the time taken for reporting data through mobile phones in Chhattisgarh (Mahapatra, 2015); Through mobile phone consultation with the doctors in Bihar, there was significant savings in time as well as money (Mehta, 2013)

Quality of Care and services is always a distant reality for the rural poor. Delivery of healthcare through mobile phones enables to bring in certain elements of quality in healthcare. Accuracy of knowledge of the midwives of rural Indonesia was high due to interaction with higher institutions using mobile phones(Lee, 2011); Data collection through mobile phones resulted in completeness, improvement in submission time in comparison to paper based system through Comm Care application in rural Central India(Medhi, 2012); Reporting errors lowered due to proper validation of mobile data entry in e Mahthari project in Chattisgarh(Mahapatra, 2015).In a field implementation study in the PHCs of the Thirupathur block, Tamil Nadu, the health workers could enter the data without loss of data while capturing patient data using mobile phones(Ganesan, 2011).

Effectiveness of the services implies a definite effective result due to the deployment of the m Health projects. Accessibility to institutions, doctors and other healthcare workers is indeed the most influential factor for the quality healthcare in rural areas which was experienced in various m Health initiatives. The ASHAs in Uttarakhand were able to get connected to the doctor for consultation immediately. They felt that the patients could get access to medical facilities by making calls via mobile phones thereby transcending geographic boundaries. (Chib, 2012). Accessibility to the doctors for CDSS at their own convenient time and at their homes was made possible for the

patients(Praveen, 2014).The midwifes in Thane district, Maharastra felt mobile phones have made their job simpler and easier due to reduced paper work and time spent per visit. Also they could get instant response from the doctors for their health queries (Bondale, 2013); In a study in rural Mysore, Karnataka, Female Health workers experience a reduced workload and the patients felt they could contact the FHWs all the time(Murthy, 2012).In the project e Mahtari in Chattisgarh, mobile phones were used for communication, coordination and information management simplify their jobs (Mahapatra, 2015). Professional advice from doctors through mobile consultation resulted in easier and better access to medical care for people in Bihar (Mehta, 2013)

Effort Expectancy is defined as the degree of ease associated with the use of system. The concept of using mobile phones for accessing healthcare is new to the whole world, more so with the rural people. They have been dealing with traditional customs and midwifes for their health needs. The ease of use in m Health alone will allow for more acceptability and penetration into the rural societies. The data collectors involved in collecting syndromic surveillance data in Madhya Pradesh felt that they were able to get trained in the smart phones quickly and easily (Diwan, 2015).The mobile phones enabled entry of data on mother and the child in rural Andhra Pradesh more easier (HM & FW Department, 2013). Even low literate and new users were able to operate the Comm Care mobile application in rural Central India (Medhi, 2012).

Social Influence is defined as the degree to which an individual perceives that important others believe he or she should use the system. In a society bound by so many and intricate social structures, India, especially rural areas need social acceptance of any innovations and that applies to mHealth too. The usage of mobile phones for their job has earned the ASHAs of Uttarakhand a high level of respect of empowerment (Chib, 2012). The regular presence and ready availability of the health workers earned them a high level of respect and empowerment in the society by ASHAs in Uttarakand(Chib, 2012) rural Central India(Medhi, 2012); Social and emotional support was experienced through mobile interaction amongst peers and also resulted in higher confidence for midwives in rural Indonesia(Lee, 2011);The health administrators had raised confidence on the ANMs and the data they collected through mobile phones in e Mahtari project(Mahapatra, 2015).

Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system. In a resource poor setting, lack of infrastructure, poverty, illiteracy, low per capita income, any project will be accepted only if there are some facilitating conditions. It was found that the technical infrastructure for collecting syndromic surveillance data in rural areas worked sufficiently well facilitating mobile phones to be used for healthcare purposes (Diwan, 2015). The technical compatability the users feel with the system draws a big line of difference in the success of any innovation. The m health application for data entry and counseling worked on any java enabled mobile phones with low memory capacity (Ganesan, 2011, 2012).The efficacy of the intervention was improved through tailor made messages based on literacy level, gender and employment status of the mobile phone users in rural Bangalore. They felt SMS to be less intrusive in their daily schedule as they could access the messages at their own convenience (De Souza, 2014). The cost for collecting data through mobile phones was comparatively cheaper as found by the health workers (Ganesan,2011,2012) which are a welcoming factor for resource poor settings.

Behavioural Intention to use m Health is directly determined by Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. The analysis of these constructs show a positive scenario both on the demand and the supply side of m Health in India. The studies mentioned above have been done on an experimental basis and with limited number of beneficiaries and geographical coverage. This cannot be generalized to the full length of Indian society given its diversity and complex social structures. However lessons learnt from these studies will definitely be a good groundwork for scaling up the projects for whole of India.

Considerations for the future of m Health in India

To elevate the m Health projects from its piloti- tis, the stake holders need to bring their attention to few of the shortcomings revealed through these projects.

Text messages, the most cost effective feature of mobile phones used primarily for various information and communication projects face the hurdles of illiteracy, absence of native fonts in most of the handsets, limit on character count which constrains the content of the message, risk of desensitizing, or confusing the public, and the risk of ignoring by the beneficiaries.

Data management through m Health faces issues regarding quality, security, back up of data sent over mobile networks.(Chib,2012; Bergstrom, 2015) Given the scenario, the mobile networks are reigned by private providers excepting for BSNL, the only public provider, the security of the data sent is always questionable. Serious regulations and laws needs to be laid down in this case. Loss of data means a great loss in terms of time, manpower and also. With poor networks and connectivity especially in rural areas back up of data definitely is appoint of concern. The data collection and management is done primarily by the Health workers who have limited literacy level and training (Chib,2012; Majumdhar, 2015) to use ICTs for this purpose. In such case, the integrity of the data collected needs to be questioned. Health data so collected will not reveal the actual status of the rural health care and henceforth policies or projects cannot be implemented based on this.

Supervisory (Chib,2012; Majumdhar, 2015) and management systems are in fact nonexistent in most of the mHealth projects, as most of them are in their early experiment stage or pilot stage. This brings in a question of answerability for the bad effects occurring if any.

Internet connectivity is still considered a luxury by the rural people. Poor networks, especially in rural areas have always been a great obstacle for any development projects and it happens so for m Health projects too. Like transport, electricity, even mobile networks and connectivity in rural areas have been a secondary importance to most of the mobile operators. This may be attributed to several reasons, one, there is very little demand in rural areas for high level bandwidth, second, the cost of investing and the returns foreseen doesn't make it a viable option for them.

A need for public-private partnership is essential for a successful scaling up of m Health projects. Private players will be hesitant to involve in these effort for two main reasons, one is the billing for the services provided and lot of regulatory issues which deters them to work with a free hand.

A dearth in the availability of mHealth experts having indepth knowledge and skills to maintain and manage the infrastructure (Chib,2012; Mahapatra, 2015) is a great obstacle for the policy makers to take big steps and scale up m Health projects throughout India.

The major users and delivery agents of the m Health projects, the health workers face considerable difficulties which hamper effective management of the projects. The government does not give any subsidy for the purchase of handsets or the monthly recharge amount, they lack knowledge and training on medical issues, they have been asked to communicate to the rural public, and the institutional hierarchies make it difficult for them to communicate to their superiors at all times.

Availability of mobile phones may not equal to the existence of similar operating softwares. This necessitates the development of application to work across various platforms and that is a tough task. Diversity of language and culture (Chib,2012; Mahapatra, 2015) across various states of India, has to be addressed through tailor made m Health efforts and that is a major hurdle in this area.Absence of any proper evaluative efforts to talk about the impact of m Health initiatives impedes the implementation of appropriate interventions (Chib,2012; Mahapatra, 2015).

Conclusion

The United Nations Millennium Development Goals (MDG) 2015, have targeted 3 of its 8 goals in the area of healthcare. True development occurs if the healthcare system in the country is sufficiently successful. The developing countries and the under developed countries have started realizing the need of integrating technology into the delivery of healthcare for a faster and effective realization of their healthcare needs. It is now time for them to indulge

in the deployment of cost effective m Health projects to make their healthcare visions a reality.

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