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Exploratory review towards the adaptation of trending mobile phones based health information dissemination in Nigeria

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This paper identifies the need to make Health Information more accessible to a greater number of Nigerians, irrespective of location dependent considerations, such as urban or rural residents. The paper identifies the mobile phone, working in tandem with other information and communications devices as facilitators to achieve our purpose. The choice of mobile phones is motivated by the ubiquitous status which they are rapidly assuming in Nigeria, where ownership is spread across every strata of the society. The methodology adopted in the paper is to explore the relevant literature for documents detailing various levels of implementations of mobile phones applications in health information dissemination. The review is highly revealing. And based on the expositions, this paper proffers recommendations on mHealth activities, which are trending in other climes that should be developed for Nigerians to benefit from. If the recommendations are adopted, it is our position that it will improve access to health services in low-income and under-serviced populations, especially in rural areas of Nigeria.

Key words: Telemedicine, mobile phones, health information dissemination, mobile health, electronic health, Nigeria.

INTRODUCTION

Wikipedia [1] provides a list of the wide variety of services that modern mobile phones could support, including: making and receiving telephone calls, text messaging, MMS, email, internet access, short-range wireless communications (infrared and bluetooth), business applications, gaming, photography, among others. These support services coupled with affordable prices have contributed to the rapid spread of mobile phones usage in many countries. In Nigeria, for instance, the annual subscriber base was put at 866,782 phone lines in 2001 when the Global System for Mobile (GSM) communications was introduced in Nigeria [2,3]. This subscriber base represented less than one (1%) per cent of Nigeria's then population of about 126,635,600 people [4]. In 2013, the number of active phone lines is put at 114,760,406, representing about 68 percent of the country, which is put at 170 million [2,5]. These statistics indicate a rapid growth rate in awareness, acquisition and ownership of the support services that could be provided by mobile phones in Nigeria.

However, even in the midst of this rapid growth rate of actively using mobile phones by Nigerians, research indicates a paucity of health related information dissemination to the end users (Pyramid Research [6]. The Pyramid Research study shows that the most common mobile phones related health information activity is "to make calls in emergency situations by either reaching out to friends or family or by calling emergency services". The study further reveals a small and insignificant percentage of respondents who receive health monitoring assistance or public health alerts on their mobile phones, with a further segregation between the rural and urban dwellers. This situation falls short of trending mobile health information delivery activities in many identifiable countries, where they are being used as tools for "encouraging physical activity and healthy diets,

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for symptom monitoring in asthma and heart disease, for sending patients reminders about upcoming appointments, for supporting smoking cessation, and for a range of other health problems", among others [7]. It is therefore, a disservice to Nigerians that they are not getting sufficient health related information dissemination through their mobile phones.

The resaerchers are therefore, motivated to do this paper, by the revelations on health information benefits, which people in other climes are getting through their mobile phones. The resaerchers' methodology is to conduct an exploratory review of the literature on existing documents, applications, policies, etc. of what obtains in selected countries. The objective of this paper therefore, is to identify as much as possible the trending mobile phones based health information dissemination services, for the purpose of recommending them to the appropriate authorities for adaptation. This will improve awareness of health issues, and by implication bring about healthier living among Nigerians.

Scope of the Study

The study is restricted to the practice of medical and public health care services supported by mobile devices, which has been identified with the acronyms "mHealth", eHealth or Telemedicine. The Royal Tropical Institute [8] defines mHealth as the provision of health-related services using mobile communications technology. It emerges as a sub-segment of eHealth (Electronic Health) or telemedicine, which is defined as the use of information and communication technology (ICT) in the health sector [9]. The referred researchers further indicate that eHealth involves the use of technologies such as computers, mobile phones or satellite communication aimed at treating patients, pursuing research, educating students, tracking diseases or monitoring public health. For mobile phones to be effectively used in information dissemination, all these devices would have been involved in generating and/or transmission. Consequently, this paper will use these terminologies interchangeably, since the above definitions do not clearly provide a significant difference.

METHODOLOGY

Data was abstracted from various sources such as books, studies and the internet, conducted in different parts of the world with the intention of identifying the different usage of mobile phones in health information management, some of which are presented below. The aim is to identify those that can be used in Nigeria

Mobile Phones Interventions in Healthcare Systems

Mobile technology is poised to alter how health care is delivered, the quality of the patient experience, and the cost of health care. Mobile technology is helping with chronic disease management, empowering the elderly and expectant mothers, reminding people to take medication at the proper time, extending service to underserved areas, and improving health outcomes and medical system efficiency [10]. mHealth activities around the world has been on the increase. A 2011 global survey of 114 nations undertaken by the World Health Organisation found that mHealth initiatives have been established in many countries, but there are variations in adoption levels. The most common activity was the creation of health call centres, which respond to patients' inquiries. This was followed by using SMS for appointment reminders, using telemedicine, accessing patient records, measuring treatment compliance, raising health awareness, monitoring patient, and physical decision support [11]

It is now possible to use remote monitoring devices at home that record different health indicators such as glucose level and instantaneously send them to the appropriate health care providers. Patients are using "Mobile Phones" that monitor and transmit such health information to care-givers while also reminding patients when they need to undertake tests. This puts people in charge of their own test-taking and monitoring, and keeps them out of doctors' offices until they need care that is more detailed. Over 11 million Americans use home monitors for their glucose level health issues. Health authorities believe there are over 24million diabetics in the United States, and the disease is the seventh leading cause of death [10]. In any case, the rate cannot be said to be the same in Nigeria. However, it is believed that with the proliferations of mobile phones and devices it would be here sooner than imagined.

Mobile phones can support health care systems by transmitting critical data to the right people when needed, such as connecting a remote health worker with an urban specialist or enabling a patients to call in advance to ensure they can receive appropriate medical attention at a clinic where they plans to attend.

In the context of chronic disease management, Kollmann *et al*. [12] developed a java-based mobile-phone application called Diab-Memory to enable diabetic patients to self-monitor blood glucose levels, insulin use, intake of carbohydrates, and physical activity. The phone application synchronizes with a website where users can chart their data in different ways to better understand how various factors affect their blood glucose levels. Similarly, an intervention by Walters *et al.* [13] uses Wellness Diary to help patients who are undergoing cardiac rehabilitation to monitor their physical activity, diet, and risk behaviors, such as smoking and alcohol use. The data can be charted on the phone and on the companion website, Wellness Diary Connected, to which it is automatically synchronized.

Studies suggest that self-monitoring applications can

have positive effects on users' health. Kollmann *et al.*'s [12] three-month feasibility trial of Diab-Memory with ten diabetes mellitus type 1 patients showed that the system helped the participants achieve a statistically significant improvement in HbA1c levels (from 7.9% ± 1.1% to 7.5% ± 0.9%, p=.02), as well as a slight-albeit not significant-decrease in blood glucose levels.

An example for such mobile phone guided health information diffusion is taking photos and sending to the experts who will guide the health professionals/workers in the remote areas on what to do. They also used mobile phones for mapping hotspots or areas known to have disease outbreaks of a particular kind. This enables the deployment of personnel to these areas. SMS's are used as reminder for people involved in the program for taking medicine in time, vaccinations alerts, alerts about epidemic outbreaks, first aid etc. Mobile phones are also used for sharing community practices formed from interventions across various groups. Patients no longer need to visit doctors' offices to be reminded to take their medicines; they can get personal reminders via e-mail, automated phone calls, or text messages. Text4Baby is a mobile application for pregnant women. It sends text messages in English and Spanish on how to handle various stages of pregnancy and problems that come up [10]. In South Africa, a physician could be worried that his patients did not always take the prescribed rifafol medicine for their tuberculosis. The physician knew that for the drug to be effective, people had to take the pill on a consistent basis. Otherwise, it would have little effect of his patients. Consequently, he sends them a daily SMS in English, afrikaans, or xhosa. And over the six- month course of treatment, his service would send the message at a pre-determined time each day reminding them to take Rifafol [10].

India has a vast population at the lower strata of the society like Nigeria. They remain unaware of the modern technology and development in the health care industry, thus resulting in causalities which could be avoided if proper health information and facilities are available [14]. Studies have revealed that the five diseases-pneumonia, diarrhea, malaria, measles and AIDS- together account for half of all death of children below the age of 5 years. Majority of these deaths are due to the lack of knowledge in handling critical situation, for the illiterate. Currently the only source of information is probably going to be the people around them, who are also, in many cases, illiterate. The lack of knowledge remains the root cause of such causalities. Health education has to be one of the most effective ways to reduce maternal and child mortality [14].

The researchers need to deliver vital messages and information for people at lower strata of the society to use in changing behavior and practices, which can save, protect the lives of children, and help them grow and develop to their full potential. With the continuous rapid growth in population and shrinking budgets, government are finding it increasingly difficult and expensive, to effectively manage programs and efforts that involve training and educating their large numbers of department and staff. This is leaving health workers, and by extension, families and communities ignorant of the basic knowledge that could help prevent diseases and improve the quality of health of their families and communities. It is in this context that health phone' is significant. Mobile phones have made it possible for India to reach population in remote areas, something that was truly unthinking until very recently. With a population of 1,7billion and a wireless user base of about 700 million (as of Oct, 2010), and growing at the rate of 15 to 20 million a month, cell phone penetration will reach 97% of the population by 2014 [14]. This can be replicated in Nigeria.

Recommended Trending Mobile Health Technologies for Nigeria

While mHealth has matured in industrialised nations, the field is still evolving in Nigeria. A number of factors have hampered the rapid growth of Nigeria's healthcare system, ranging from inadequate facilities/infrastructure, shortage of personnel, Information system, inadequate training and high illiteracy rate among the people, power (electricity) and bandwidth. However, Mobile health can be used to overcome these challenges. It is at the convergence of health and technology that mHealth initiatives evolved, creating an unprecedented opportunity to improve access to services and innovations. This approach is particularly important due to the rapid growth rate in the number of users of mobile phones in Nigeria. When the mHealth trend is adopted in Nigeria, it will then be easier for medical personnel to interact with the mobile phones for the purpose of providing health services, obtaining health information to aid their researches, and also making it easier for them to provide the right medical solutions to health challenges in remote locations. It further affords the medical personnel the ease of monitoring their patients, regardless of their location. With the aid of smartphone-based applications, it is now possible to consult: simple but life-saving diagnostic and treatment manuals, tools to calculate pulse, respiratory rate, and proper drug dosages.

The adaptation of such inexpensive technology to healthcare needs is recommended for Nigeria. A good example of one mHealth tool is the latest Apple iPhone which has an in-built device that can monitor a patient's heartbeat. The phone now carries the epitaph, the mobile stethoscope. With that kind of information, a patient can monitor his heart rate and send the information to his doctor who makes use of the information to prescribe the right medication, without necessarily seeing the patient, face-to-face. iPads are showing up in private hospitals to access patients' records, to review medical images, to administer bedside care. More so, healthcare

organisations are fast realising that mobile applications provide opportunities to reach new customers, improve the customer experience, and offer competitive differentiators to improve internal workflow, even in the healthcare industry.

DISCUSSION

The recent rise in mobile phone coverage in developing countries, have demonstrated the power of communication as an agent for social change. Mobile phone can benefit people in rural areas by making it easier to disseminate information on disease. The increase in telecommunications has improved access to information and it is playing important role in emergency healthcare services. When there is enhanced access to emergency services, this will ultimately lead to fewer fatalities and will give efficient management of health facilities that will help to ensure relevant structures and systems are put in place and functioning at its peak. This is vital for good care. Within health services, health professionals can improve their capacity to monitor patients remotely, and are able to mobilize support for patients when they are not physically present in the facility. They can also consult other physicians for more specialized information in complicated cases. Healthcare depends on taking decisions at the right time and place, according to available patient data and applicable knowledge and skills acquired over time [15] so that statement like oh sorry we lost him or it's too late can be minimised. Communication is of most relevance in today's healthcare settings, as health related activities such as delivery of treatment, research, enhanced family communication; well-being and informed society are of great importance.

The widespread and increasing mobile phone coverage in the developing world is a plus for healthcare and can strengthen health systems. More Nigerians now live in areas with mobile phone coverage. This makes mobile phones feasible for use to relay health information directly to the populace and relay back any problem such as outbreak of disease back to the authorities' computer systems, allowing rapid interventions such as distribution of medication and educational programs for those at risk.

Possible Outcome

There has been very little real-time disease surveillance and monitoring data in Nigeria. Researchers have relied on a few sentinel sites and modeling estimates to track the spread and prevalence rates of diseases. This is extremely frustrating. It is clear that one of the biggest obstacles to improving the lives of the world's poorest people is the ability to accurately measure in real time, the burden of ill-health. Because if one can't measure it, how can we do anything about it? Mobile phones can be deployed to gather good quality data that can tell us who is dying and from what, who is sick, and where clusters of diseases are occurring. By removing the guesswork, this information has huge potential to inform global and national health strategies. They can also be deployed in obtaining accurate headcount. Before now many infants are born and die without ever officially existing records, thereby allowing governments to more accurately plan interventions, such as vaccination schedules.

Mobile phones will also helping in improving vaccine supply chains. By allowing real-time data of stock levels in remote facilities to filter back up the chain, it is possible to prevent unnecessary stock-outs and ensure that vaccines are available when infants and children are brought in to be immunized. Consequently, health-care workers in the field will then be able to access health records and can schedule appointments using their phones. They can even issue automated text reminders to parents about when vaccine clinics are being held. These are simple measures, yet very effective.

Conclusion

Amongst the many information and communication technology options available for improving the efficiency and effectiveness of health delivery process now, mobile and wireless technology offer better opportunities for a low cost, high reach service. There is evidence that mobile technology could be used in addressing slow response rates of request for health service as can be seen from the selected cases above. It can help in reducing poor access to health services in low-income and underserviced population especially in rural areas of Nigeria. It is the researchers belief that if properly implemented in Nigeria these benefits will help to bring down mortality rates in Nigeria, which is one of the highest in the world.

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