



Opportunities in the Establishment of Mobile Healthcare System for HIV and TB Patients in Zanzibar

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ABSTRACT

The purpose of this paper is to discuss the opportunities in establishment of mobile healthcare system for HIV and TB patients in Zanzibar. In the current era, use of mobile devices such as mobile phones to healthcare has increasing rapidly. The paper has begun to review the various studies of mobile health technology conducted in different countries around the world. Sixteen participants including patients and health care professionals in department of infectious disease at MnaziMmoja Hospital in Zanzibar were interviewed in groups and individually. It found that the use of mobile phones to healthcare has benefit potentials to help the patient and healthcare provider during the treatment process. Particularly in the countries which have poor infrastructures and lack of health workers such as Zanzibar. It is hoped that the establishment of the mobile healthcare could support patients to follow the medication regulations as prescribed by receiving health reminder messages and sequentially, they can be cured at right time.

Keywords: *opportunities, mobile healthcare system, HIV and TB.*

I. INTRODUCTION

Mobile communication technology can be defined as technology that is portable. It is the fastest growing sector of communications industry in low income countries. Mobile technology has been used to easy accessing and providing daily social services [1]. The use of mobile technology within the healthcare sector has the potential to improve the quality and access to care, while making its delivery more cost-effective [2][3].

In the end of 2012, mobile phones reached almost six billion subscribers in the world. Of that, majority of mobile users were from developing countries [4]. Zanzibar is an autonomous part of the United Republic of Tanzania is the one of the developing nations. The use of mobile phones are spread in every corner of the country and people use their phone for providing daily social services such as news, weather forecasting, sports, and etc.

Zanzibar is located in the Indian Ocean about 30km of the east coast of Africa, between latitude 5 and 7 degrees south of the equator. It consists of two main islands namely Unguja and Pemba, and several other smaller islands. The country has an area of 2,654sqkm. According to 2012 sensor, Zanzibar has population of 1.303,569 [5].

There is only one referral hospital called MnaziMmoja Hospital which is located at stone town in Unguja Island. It is the centre of department of infectious disease and others different diseases. In recently year's number of people who infected Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) are increased rapidly. In the years of 2011 and 2012 there were almost 546 and 537 respectively new infected people [6].

Majority of patients failure to follow the medication procedures as prescribed by healthcare professionals, as a result the disease takes longer to be cured and the medication became no longer be successful. The most commonly reported reasons for missed medication are forgetting, family commitments, poor health and competing employment. To reduce missed medication, the

department is on the way to initiative the reminder systems via mobile phones.

It is hoped that the establishment of the mobile reminder technologies could help patient to follow the medication regulations properly as recommended by healthcare professionals. The objectives of this paper are to: (a) discuss the opportunities in the establishment of mobile healthcare system to support treatment of the people who suffering by HIV and TB; (b) to show the penetration of mobile communication technology in Zanzibar.

II. RELATED WORKS

A. Mobile Healthcare System

Mobile health is the system of the use of mobile devices, such as phones, to support the practice of medicine and public health. It is a rapidly growing field with potential applications for frequent use of mobile phones for healthcare services [3].

The growing field of mobile health in low-income regions has seen an increasing number of projects targeting patients, such as those with HIV and TB. Various studies have been conducted in this area and those studies depict how the use of mobile phones to healthcare services can be helpful to the patients in their treatments [7][8].

There are positive potentials in the use of mobile phone to healthcare as indicated by research of Okuboyeyo et al [9] and Lester et al [10]. In research of Kaplan [2] found that the uses of cell phone in the healthcare applications are more effective to help patients in their medications.

The cell phones can be used in to different health contexts including, reminding the patient to take his or her medication on time, to remind patient on attending the clinic for consultations and etc. Moreover, Akhter et al [11] and Barclay [12] stated that mobile phone in medical applications are more effective to help patients at reducing missed medication and missed clinic appointment than manual medical systems.

B. Mobile Phone Interventions

There are two mobile interventions are mostly used in the medical context as reminder technology. These are Short Message Service (SMS) and telephone call or voice call. These interventions shown to be more effective reduce patients missed medication and at increasing attendance rates [13].

SMS text message is more effective to be used as reminder technology particularly in the developing nations where mobile network connections are not stable. Compare to the voice call which require good network connections. This is because telephone call is made in “real-time” communication. A study conducted by Chen et al [14] indicated that during their study the majority of reminder calls were not delivered, due to the unavailability of the recipients’ phones this caused by the problem of mobile network. It also the implementations of voice call require high cost as addressed by Prasad and Anand [15].

SMS text messaging used “store and forward” communication technique. It is more preferable in the areas where network connections are unstable [16]. The “store and forward” helps to store the messages if the recipient cell phone is not available and forward it as soon as the phone becomes reachable [17]. Text message service are appealing because of the wide penetration of the mobile phones in many countries [7] as well as the directness, convenience, cost effective, immediacy and confidentiality of messaging. Over the past years, there have been a number of studies that evaluate the effectiveness of SMS reminders. In this paper, we examine the effectiveness of SMS reminders as technology to be used in helping HIV and TB patients in their treatment process. At increasing attendance rates and reduce missed medications.

III. METHODOLOGY

The case studies and the interviews were used as data collection techniques. As illustrated Kothari [18] case study may use as a starting point and it gives direction and structure to set of questions the researchers asked. Interview can be defined as a conversation with a purpose. According to [19], interview is the best way to have an accurate and thorough communication of ideas between interviewer and the person from whom you are gathering information. It also interviewer has control of the question order, and has to make sure that all the questions will be answered.

The sixteen people were interviewed in this study. Participants were random selected who were patients and healthcare professionals from different health sections in the department of infectious disease at MnaziMmoja Hospital in Zanzibar. The interviewed conducted between June and July, 2013.

In total of six interview sessions were conducted including three groups and three one-by-one sessions. Each interview session lasted between 15-30 minutes. The interview’s questions were prepared and reviewed by team before used in the interviews. The semi-structured open ended interview questions were devised so that they captured opinions of the participants regarding the opportunities based on the establishment of the mobile healthcare system.

The questions were divided into three sections. First part asked to the respondent demographic information. Second part asked on the awareness of the use mobile phone to healthcare services and the third part of questions asked on the opportunities of establishing the mobile healthcare services.

During the evaluation, the findings from fifteen interviewees were analysed, one individual interviewee’s results not considered due to the incomplete the interview session. These due to the interviewee ended the conversation before ending the interview questions.

IV. RESULTS AND DISCUSSIONS

The finding results from respondents were analysed and represented in the form of graphic and tables. The following sub-sections described the results of findings which were collected during data collection period.

A. Characteristics of participants

Table 1 below shows the characteristics of respondents obtained during data collections period. The result shows that there were eight males and seven females who interviewed. Of whom were categorized into three age groups. Aged below 30, aged between 30 to 39 and aged above 39. All the interviewed participants were patients and health workers from different health sections such as healthcare provider, health officer, pharmacist, data manager and TB/HIV coordinator as shown in the Table 1 below.

Table 1: Characteristics of Participants

Age group	Gender		Total	Professionals						Total	
	Male	Female	No of respondents	Patients	Health providers	Health Officer	Pharmacist	Data Managers	TB/HIV Coordinator	No of respondents	Percentage (%)
<=30	2	2	4	2	2	0	0	0	0	4	26.6
30-39	2	2	4	1	2	1	0	0	0	4	26.6
>=40	4	3	7	1	2	0	1	2	1	7	46.7
Total	8	7	15	4	6	1	1	2	1	15	100

B. Awareness of Uses Mobile Phone to Healthcare

It found that fourteen interviewed participants which were equal to 93.3% had mobile phone. This proves that the majority

of target users have mobile phone that could support them for accessing the healthcare services. It also found that all participants agreed the establishment of mobile healthcare system could support and encourage them during their treatments as indicated in figure 1 below.

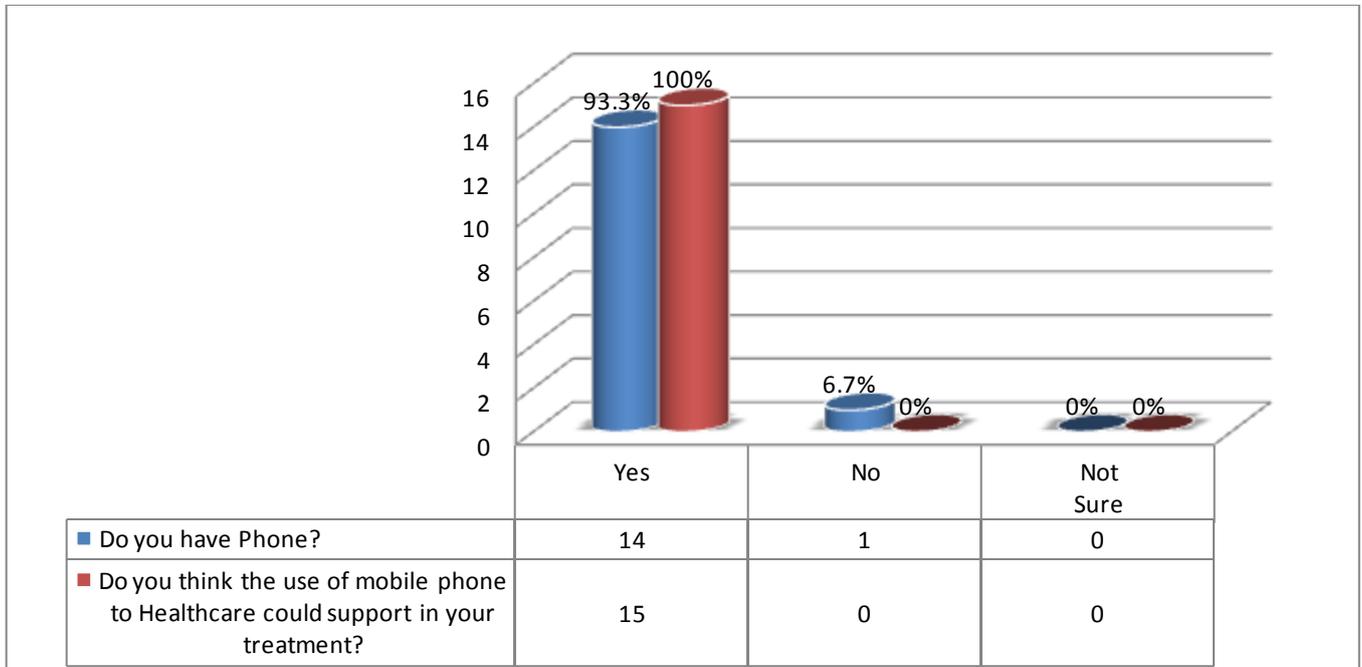


Figure 1: Awareness of uses mobile phone to healthcare

C. Zanzibar Mobile Phone Penetration

Zanzibar is well served by four strong mobile phone providers namely Zantel, Tigo, Airtel and Vodacom. The Zanzibar telecommunication company limited (Zantel) as a part of Etisalat¹ is the first mobile company operated in Zanzibar since 1993 with the majority numbers of subscribers as shown in the figure 2 below. Mobile phone is widely spread in every corner of the country. Zantel has more than 650, 000 customers based on Zanzibar islands. And other people are connected with others mobile providers (Tigo, Airtel and Vodacom) as shown in figure 2. Zantel has its own international gateway and was the first to reduce rates on international calls by 60%. It provides cheaper communication services including SMS and voice calls compared to others mobile companies operated in Tanzania. It also was the first to introduce wireless internet in Tanzania. Zantel offers internet and high speed data network in Dar es Salaam and Zanzibar [20]. Thus, the Zantel is suggested as the mobile phone provider to be used in the mobile healthcare system which will be connected between users and hospital server. The server is that the responsible to generate

the automated health reminder messages and to be forwarded to the patients cell phone.

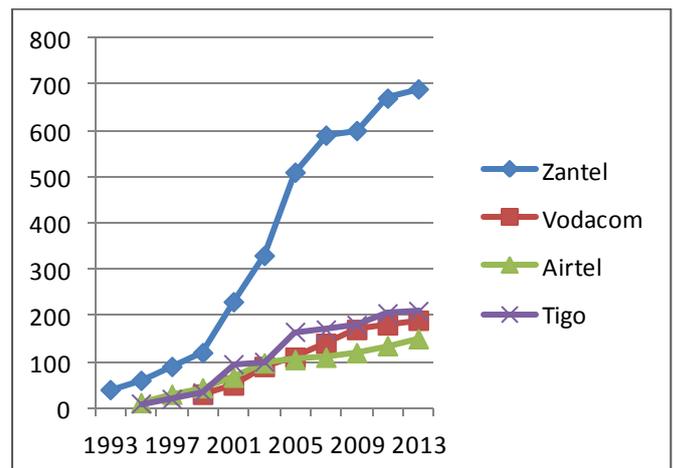


Figure 2: Zanzibar mobile phone subscribers by '000 (source [20][21])

On the other hand, as we described in the introduction section, Zanzibar is an autonomous part of the United Republic of Tanzania with population of 1.303,569, while Tanzania has population of 44,928,923 [5]. Vodacom mobile company is leading in Tanzania to have majority of subscribers compared to other mobile companies as shown in figure 3 below.

¹ Etisalat is the United Arab Emirates based telecommunications services provider, currently operating in 18 countries across Asia, the Middle East and Africa. As of February 2012, Etisalat is the 15th largest mobile network operator in the world, with a total customer base of more than 135 million

According to Tanzania Communication Regulatory Authority the number of Tanzania phone subscribers has reached more than 28 million out of 44 million of populations in 2013. Beyond, the four strongest mobile providers leading in Tanzania (Zantel, Tigo, Airtel and Vodacom), there are other three mobile companies namely TTCL, Beason and Sasatel, together they share less than 1% of all subscribers in Tanzania.

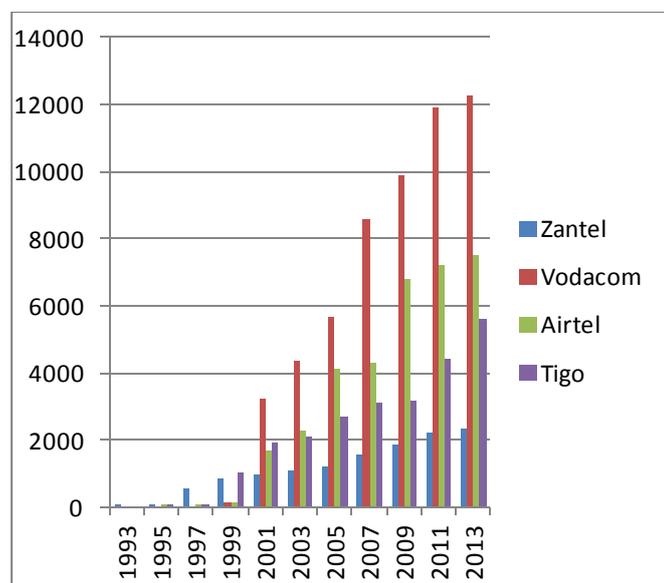


Figure 3: Tanzania mobile phone subscribers by '000 (source [21])

D. The opportunity in establishment of the mobile healthcare System

All interviewed participants supported that the use of mobile phone as reminder technology could help to encourage and motivate them to follow the treatments procedures effectively. A study also found as it found in the literatures that patients forget to take their medication on time. At the results, the disease takes longer and medication no longer to be successful and sometimes a death may happen.

The HIV and TB patients mostly they require careful medical attention. The challenge behind is that majority of patients live far away from the clinic and most of them do not afford the transportation cost. Though, it found that the establishment of mobile healthcare technology has opportunity to able patients on the receiving the reminder messages through their phones at any time and everywhere.

Various reminder messages will be generated including educational messages which educate the patient regarding the disease care and treatment regulations. Medical messages which be reminded the patients to take their medication at right time. And other messages will remind patient to attend the clinic for collecting his weekly or monthly tablets.

Furthermore, the healthcare providers also supported that the use of mobile phone will help them to easy provide the patient treatments. The department of infectious disease currently are facing by poor of infrastructure and lack of staffs. The numbers of patients are increasing eventually whist the number of staffs

are remain the same. Though, the use of mobile phone has advantage to provide the m-consultations. A group of patients will receive the m-consultations via their phones in the same time compared to the manual consultation which requires enough staffs and time. It also patients do not need to travel in long distance instead they could receive the health messages through their phone at anyplace and everywhere they are.

In spite of the opportunities and benefits of mobile health technology, there are some challenges are facing in the implementation of mobile healthcare system. These includes:-

Initial cost: The establishment of mobile healthcare system require enough funds that support the implementation of that system including maintenance cost.

Literacy skill: Text message faced by literacy skill, the application will be build using Swahili language, however, all Zanzibar people and Tanzania in general are spoke Swahili language but not all of them can able to read text. It means that they are some people are non-literacy. Therefore, these people will be forced to have person (such as family members or friends) who will help them in reading the text message and telling them what the reminder message meant.

V. CONCLUSION

The mobile healthcare system is in the process to be established in Zanzibar. In this paper we discussed the opportunities in the establishment of that system for HIV and TB patients. The paper has begun to review the several literatures in that area conducted in different part of the world. The data were analysed in the form of tables and graphs. The findings show that there are many opportunities and demands for the establishment of mobile technology to healthcare system among infectious patients in Zanzibar. The paper also outlined the challenges in the mobile healthcare technology which facing in Zanzibar as one among the developing nations. Finally, it is clear that the use of mobile phone to healthcare system have potential benefits to both healthcare providers and patients in the treatment process. We hope that the finding of that research will help the Zanzibar Ministry of Health and other developing countries in their process of establishing the mobile healthcare system and before the implementation begun the addressed challenges should be considered.

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