Short Message Service (SMS) Applications for Disease Prevention and Awareness in Palestine

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Abstract

Prevention is better than cure. Yet technology can provide tools to promote healthcare awareness, especially in the developing countries (e.g., Palestine), where the mobile communications have recently witnessed an evolving growth and reachability to almost everyone. Mobile devices do not carry drugs or doctors between different places, but rather they can process and transmit information in many forms (e.g., SMS form) [1]. In consequence, m-health (mobile health) can be defined as the use of mobile applications for health care [1, 2]. M-health aims at improving the quality of and the accessibility to the health awareness and care. Moreover, it can facilitate patient and disease tracking especially in underserved communities including the children, women and elderly.

In this paper, two proposed models of applying m-health in Palestine using mobile technologies, particularly using SMS has been presented. In other words, this study aims at investigating the potential of applying m-health technology in preventing diseases, enhancing the healthcare awareness and promoting the public health using the Palestinian mobile services (i.e., SMS mobile subscription).

Keywords: *m-health, SMS services, Healthcare, Promotion, awareness.*

1. Introduction

Early on, m-health was defined as the wireless telemedicine including the use of mobile telecommunications and multimedia in cooperation with the mobile health delivery services [3]. However, this definition has been extended these days to span any use of mobile technology to address any healthcare challenges (e.g., quality, accessibility). M-health has transformed the health care delivery from being a pure public service into an absorb-consume service. In other words, the patient has been directed to be a service consumer. Mobile communications can achieve quicker, cheaper and more efficient healthcare services delivery. Figure 1 shows a brief use of m-health technology depending on mobile services. The increased enhancements in data rates, wireless coverage, and mobile technologies and availability, particularly in Palestine, will create and accelerate the deployment of m-health systems and services within the next few years. One can roughly list the main aspects of m-health and namely: a) Lower costs. b) Improvements of the healthcare service quality. c) Disease prevention. d) Healthy lifestyle promotion.

Despite of the growing popularity of m-health term in e-health (electronic health) realm, there is still lack of researches and studies conducted there. In consequence and in this paper

we are exploring the potential of applying our m-health study (i.e., model) in the Palestinian health sector. To show the importance applying this study in Palestine, particularly in the healthcare and service delivery, consider the following case: Palestine is witnessing these days the threats of H1N1 virus known as "Swine flu". So far, 14 deaths and 411 cases have been reported [4]. Under such cases, it is not only necessary but obligatory to deliver the important awareness, the virus symptoms, the suitable cure and other substantial directions to all people exposed to catch the virus in different forms and through different media.

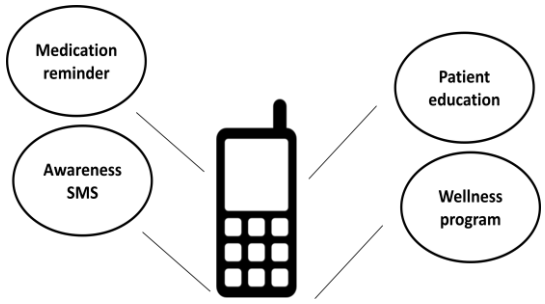

Figure 1. A brief description of M-health use

Recently, the healthcare promotion and awareness delivery services have been using the new technologies to transmit their messages and directions, such as: social networks, E-mails and their own websites (e.g., the official ministry of health website). However, our first studies have shown that people, including patients prefer receiving the health promotion and awareness via their mobiles, social networks and E-mails in order and as shown in Figure 2.

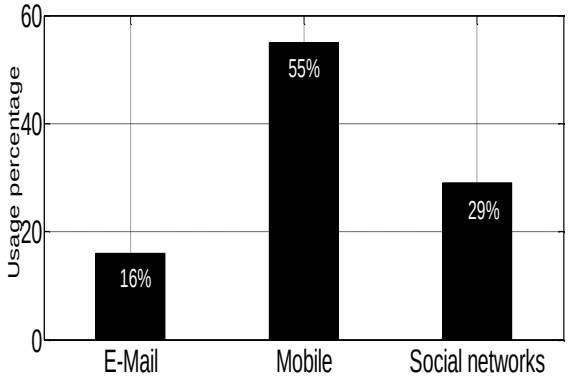

Figure 2. Preferred e-health promotion media

The emerging growth of mobile subscribers in Palestine which reached more than 2.56 million subscribers [5] (i.e., exceeds the half of population, reported in 2012) justifies the statistics shown in Figure 2. Therefore, our proposed model was inspired from the popularity of using mobile services and particularly SMS, in receiving the promotion.

In this paper, we conduct a review over the current healthcare status in different developing countries, including Palestine. Furthermore, we propose an m-health efficient, low cost model to overcome the barriers and challenges that face the healthcare delivery and awareness.

2. Background

This part of the study aims at reviewing various current studies on the public health services and awareness quality in different regions. Moreover, it shows the advantages and the disadvantages of using the Internet in health promotion. Furthermore, our review is expected to help us enhance the healthcare services and awareness while attempting to apply the m-health technologies in Palestine.

- Bitar, and Narrainen's study [reference number]

This study investigates the challenges and barriers faced by Palestinian maternal health-care providers in terms of the service quality. This research has studied a case in one of the governmental Palestinian hospitals. Their Findings revealed that the quality of care provided for women and infants at this Palestinian hospital is substandard. The maternal Palestinian maternal health-care providers work within a difficult and resource-constrained environment (i.e., high workload, poor compensation, humiliation in the workplace). This in turn leads to suboptimal super-vision and absence of professional support and guidance. Hence, the pregnant women highly need to have extra guidance and awareness to save their children and them self's life.

- Khowaja, et al.'s study (2010)

This study explores perceptions of healthcare stakeholders' about health promoting hospitals, potential benefits and need in Pakistan. Results show that participants with public health background were better able to relate their perceptions to a more holistic view of health promotion; than those without public health background. Participants largely revealed health promoting hospitals to benefit not only patients, but also community, hospital staff and hospitals at large. health promoting hospitals transition was also perceived as 'opportunistic step' for controlling triple burden of diseases, curtailing morbidity and mortality toll, and 'sole answer' to promote population health, and wellbeing. Given the view, health promoting hospitals was strongly recommended as "Need of the hour" for Pakistan.

- Chamroonsawasdi, et al.'s study (2010)

The aim of this study is to study factors influencing health promoting behaviors of the elderly under the universal coverage program. Findings reveal that the majority of the elderly (53%) had health promoting behaviors at moderate level and 30.2% had HPB at high level. Factors significantly predicting health promoting behaviors among the elderly were having occupation, knowledge score on health promoting .

behaviors, having current illness for one month, experience obtaining knowledge or information on health promoting behaviors from health personnel, and social support from family. These factors were able to predict health promoting behaviors of the elderly correctly 42.1%.

- Nooijer, et al.'s study (2008)

This study examines the opinions of adolescents regarding an Internet-based health monitoring instrument and its individually tailored electronic feedback. Results show that all the respondents preferred the electronic monitoring questionnaire to a paper and pencil questionnaire and the individually tailored feedback was appraised rather favorably.

However, 28% of the respondents claimed that the information was not new to them and 39% indicated that the information failed to provide them with additional insight into their behavior.

- Evers' study (2006)

The purpose of his study is to explore the use of the Internet for health promotion. Results show a pessimistic view of the current potential for the adoption of the Internet for health promotion programs and for the retention of current users. The

cons of using the Internet for health behavior change showed no significant decrease as individuals adopted Internet use, 53% indicating that even once individuals start using these programs, the drawbacks of using them are still high. The next generation of e-health promotion research needs to accept this challenge rather than simply examine the efficacy of Internet-based programs with select samples that represent relatively small percentages of at-risk populations. Until the field solves the overarching problem of helping significant percentages of a population progress toward using e-health promotion programs, they will not be able to realize their potential to be the lowest cost modality for delivering tailored.

It is obvious from the previous studies that there is a semi consensus among the researchers about the necessity of evaluating e-health & m-health promotion effectiveness in spite of these studies taking place in many different countries.

3. Results

3.1 Proposed m-health one-way model

SMS messaging campaigns can be categorized as a) one-way alert scheme. b) interactive scheme. In the first scheme, on which our model has been built, the person may subscribe to receive, for example, daily awareness messages, health care centres locations or even medications reminders and various healthcare deliveries. Figure 3 illustrates the main components of our model which supposes the following:

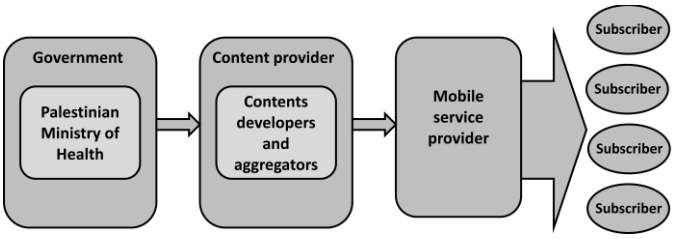

Figure 3. The proposed model main components

- The mobile service provider (e.g., Jawwal company), announces for the m-health service through free SMSs sent to all users. In consequence, the interested users subscribe to the new m-health service.

- For m-health to deliver, the content providers (i.e., developers), should consult with the medical Informaticians at the ministry of health to realize the information flow involved in the healthcare processes.

• On the other hand, the m-health application developers should also consult with the mobile service provider to control the information flow, the time flow, and some security concerns

SMS can offer a low cost, efficient and scalable method for delivering outreach services for a wide spectrum of health services. In this suggested model, various categories of messages can be sent. Figure 4 illustrates them as a use-case form for simplicity.

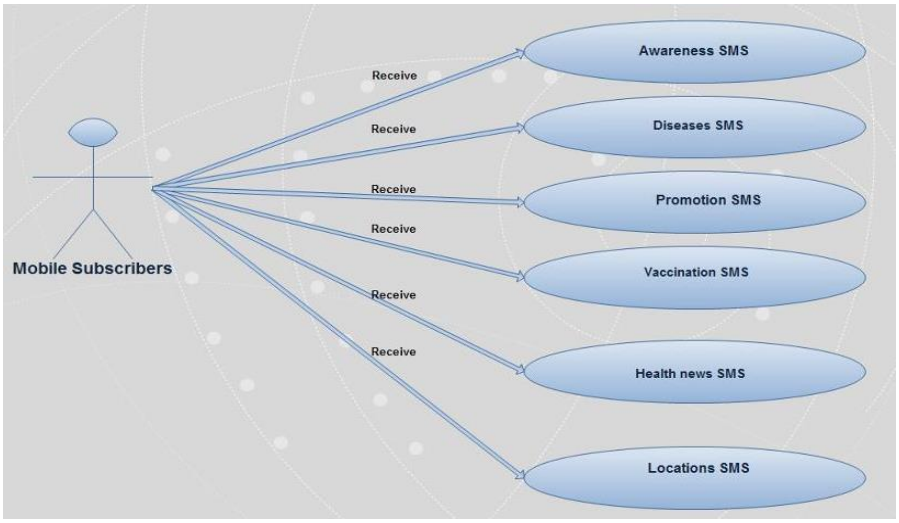

Figure 4. The SMS categories

The awareness SMS can be described as a daily, weekly, monthly or even annually sent messages. The main goal of them is to provide the subscriber with some conscious about dieses and their suitable diagnosis. Example 1 and 2 in Listing 1, 2 respectively tackle the cancer awareness SMS category. Based on our study and as shown in Figure 5, it has been found that the cancer is the most widespread disease in Palestine. Consequently, the content aggregator/provider should

When should a doctor check your breasts?

Check your age:
Are you 20-39? Get checked every 3 years.

Listing 1. The Cancer awareness SMS (For women)

An X-ray of the breast. It can find a
change before you can feel it

Listing 2. The Cancer awareness SMS (For women)

The promotion SMS can be found in the healthcare and lifestyle domain. The main goal of them is to improve health outcomes and tackle key risk factors, such as: smoking and obesity related issues. On the other hand, the Location SMS messages attempt to share with the subscribers the locations (i.e., addresses) of hospitals, health centers and clinics. In addition, the health news SMS messages are expected to provide the subscribers with the latest health news; medications updates; new medical technologies; vaccination time and location. Finally, the disease SMS can describe the characteristics, the symptoms, and the cure of a specific widely spread disease in a country (e.g., Cancer disease in Palestine). Our study has shown that most widely spread cancer types in Palestine are as follows and in order: 1) Lung cancer. 2) Anus caner 3) Breast cancer. 4) Stomach cancer. Intuitively, the content providers should study these statistics with the ministry of health in an attempt to minimize the mortality rate by the good prevention. Our study claims that the prevention could be efficiently and effectively achieved by deploying our model in the m-health technology.

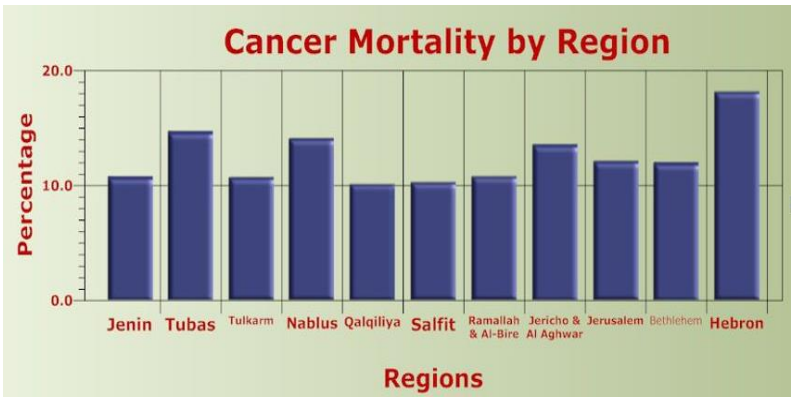

Figure 5. The cancer mortality in different regions in Palestine

3.2 Proposed m-health two-way model (interactive)

Figure 6 presents a more complex service delivery using a two-way (interactive) m-health application. The model is still cost effective and easy to apply on any mobile type. This model suggests that the subscriber may not be interested in all healthcare awareness, news, or diseases. Thus, the proposed model can be described as follows

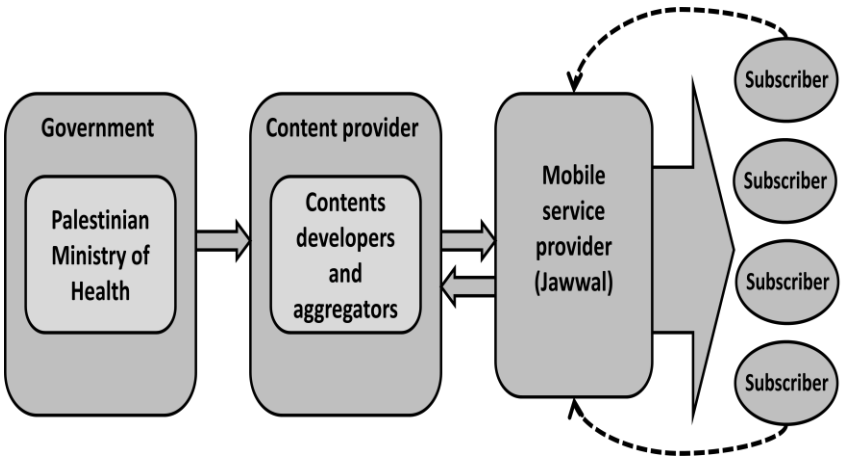

Figure 6. The proposed interactive model main components

- The mobile service provider (e.g., Jawwal company), announces for the m-health service through free SMSs sent to all users. In consequence, the interested users subscribe to the new m-health service.
- The mobile service provider gives a second stage free message as shown in Listing 3 to all subscribers for more customized m-health delivery services based on sex, age and interests. We suppose here that the mobile service provider may not know all the details of the subscribers. For example, the female subscribers may be more interested in receiving messages about breast cancer, pregnancy healthcare, or healthy lifestyle more than male subscribers. Thus, customizing for the sex, for example, is expected to give the technology an attractive aspect.
- The subscriber may respond to the customization message by writing some details in brief. In consequence, the mobile service provider asks the content provider for this specific customization to be arranged for that subscriber.
- For m-health to deliver, the content providers (i.e., developers), should consult with the medical Informaticians at the ministry of health to realize the information flow involved in the healthcare processes.
- On the other hand, the m-health application developers should also consult with the mobile service provider to control the information flow, the time flow, and some security concerns.

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Please indicate your sex by sending either F or M to the service number.
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Listing 3. The form of customization message

This model is not expected to add to the overall cost of use because the customization message would be an optional case for the subscribers to filter their health services delivery. Moreover, the mobile service provider may offer this message as a free of charge

service and hence the cost remains the same as the first model. Furthermore, the number of exchanged messages will be less than the first model. This in turn, minimize the message traffic between the mobile service provider and the subscribers.

5. Conclusions and future works

Mobile health applications can help stop the spread of diseases by expanding treatment outreach, helping patients comply with medical regimens, raising awareness of epidemics, and promoting behaviors that limit contagion.

References

[1] Eason, B. Noble, and I. N. Sneddon, “On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April (1955).

[2] Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon,(1892).

[3] I. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, (1963),

[4] R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.(1999)

[5] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, (1982).

[6] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, (1989).