The Role of Individuals and Social Awareness in Adopting Mobile Health Applications in Saudi Arabia:
A Review and Preliminary Findings
"Research in Progress"

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Abstract

M-health applications play significant roles in enhancing the healthcare services being provided to the patients. Applying such a technology within healthcare institutions is challengeable. It requires a lot of effort, resources, and radical changes in any healthcare providers' practices and services, as well as understanding the patients' expectations which will improve the satisfaction about the services provided. However, the adoption and acceptance of such a technology are not as widespread as might be expected in Saudi Arabia. Even though healthcare providers have launched few m-health apps, there is a limited usage of such a technology through Saudi society with no clear evidence of actual causes. Moreover, the role of social awareness and individual attributes has not been involved or examined in the case of adopting and accepting m-health apps in Saudi Arabia. Consequently, the Saudi Arabian society may inadvertently obstruct the healthcare providers' plans. This research aims to provide the current state and knowledge necessary to ensure the successful implementation and utilization of m-health apps in the Saudi Arabia.

Keywords: Mobile, Health, Applications, Adoption

Introduction

The healthcare in Saudi Arabia has gradually shifted towards the use of electronic information systems due to the development in the field of technology. Saudi Arabian health-care services have radically evolved in the past twenty years. In 2000, the Saudi government established an information technology strategic plan for healthcare delivery, applying e-health applications within the country (AlBar & Hoque 2018). In 2016, the Saudi government announced a national transformation plan, called 'Vision 2030'. The ministry of health developed goals to meet the standards of Vision 2030. One of its goals is to enhance the workplace by relying on systems in all sectors (Saudi Vision 2030 2017). To achieve this plan, the government has assigned 6 billion SAR to support the transformation plan of the health sector (Alharbi 2018).

There are three main sectors to serve the population: public hospitals and primary healthcare centers managed by the ministry of health (MOH) which operates 60% of Saudi hospitals, other governmental organizations which manage 20% of Saudi hospitals, and the private sector with a rate of 20% (Alsulame et al. 2016). MOH is the main healthcare provider which manages 274 public hospitals distributed throughout the country (Almiman 2018). The other government organizations which is King Faisal Specialist Hospital and Research Centre, Security forces medical services, Army forces medical services, National Guard health affairs, ARAMCO hospitals, Royal Commission for Jubail and Yanbu health services, and Saudi Red Crescent Society, manage 39 hospitals to provide health services to their employees and dependents, in addition to the Ministry of Education hospitals (Aljuaid et al. 2015). Private hospitals are the main healthcare providers for foreign workers have been developed swiftly

over the past few years and expanded its services (Walston et al. 2008). However, private hospitals can also serve Saudi patients. (Walston et al. 2008). The King Faisal Specialist Hospital and Research Center has successfully linked some MOH hospitals which serves Saudi patients (Alsulame et al. 2016).

Problem Statement

Users' willingness to adopt and use technology is a positive indicator of the success of m-health services (Hussein et al. 2017). Even though Saudi Arabia has a high percentage of mobile phone users, utilizing this advantage by healthcare providers in both public and private sectors have little attention. Despite the influence of recent technologies on improving health, patients' adoption, use, and issues, there is a need to examine the perceptions of patients towards e-health applications (Albar & Hoque 2018). In the case of mobile technologies, based on review of literature, there are no clear models or steps have been used to determine exactly what factors influence, drive, and ultimately support the successful m-health apps adoption process used in Saudi Arabia. Only few studies examine how m-health apps can improve physician in health practices, with the ignorance of main users' roles, which is in this case patients. The research problem rise the following questions:

RQ1: What is the current implementation of m-health practices in Saudi Arabia?
RQ2: What are the current usage and awareness rates of m-health applications in Saudi Arabia?

Aim and Objectives

The aims of this research are:
- To identify the current status of m-health applications in Saudi Arabia.
- To understand and analyze current usage rates of m-health applications by patients in Saudi Arabia.

The objectives of this research are:
- To provide the knowledge necessary to ensure the successful implementation of m-health applications at a higher level.
- To identify the main factors that need to be examined within Saudi patients in the next research stages.

Literature Review

M-Health Applications

Over the past century, there has been a dramatic increase in mobile and wireless technologies, stunning a global health service delivery transformation. The extraordinary spreading of mobile technologies and applications to support health issues, has promoted a new field of electronic health (e-health), known as m-health (Hoque 2016). M-health, as abbreviated from mobile health, involves the use of mobile technologies such as smartphones, tablets, or other portable digital devices to enhance medicine and public health practices (Kariuki & Okanda 2017). The term M-health was invented by Prof. Robert Isteparian, who interpreted it as the use of modern mobile devices and network technologies for healthcare delivery (Kariuki & Okanda 2017). With this new technology, there has been changing in the way patients and healthcare providers interact (Zhao et al. 2018)

M-health services have been applied extensively in developing countries. It can be the best effective and accessible way to solve many challenges in the healthcare sector of the developing world. According to Ahamed et al. (2017), the World Health Organization (WHO) 2011 global survey of 114 countries showed that m-health technologies had been used in many nations but several adoption levels. Besides, the lowest m-health adoption rate was in Africa, while the highest adoption rates were in all of North America, South America, and Southeast Asia. In China, "Health China" plan has been implemented by the Chinese government in 2016 to overcome the issue of difficulty finding available

physicians (Deng et al. 2018). Moreover, healthcare policies have been reshaped in different countries, such as Malaysia, Thailand, Singapore, and India, to persuade healthcare providers to utilize advances in technology that can solve health issues (Hussein et al. 2017). In Indonesia, there are more than 92 million users who use mobile health applications provided by the Social Security Agency for Health (BPJS-K), a governmental agency who provides Indonesian public health insurance (Handayani et al 2018). In India, in 2016, as a part of Digital India Program, the government has established various m-health enterprises globally to improve access, make healthcare services cost dynamic and to make the system sturdier (Ahamed et al. 2017). Due to the recent advances in m-health, various mobile apps have evolved. For instance, "Spring Rain Doctor," the most popular health application in China, with 92 million users in China only, make it the most significant mobile doctor-patient communication platform in the world (Wang et al. 2018).

M-Health Applications of Saudi Healthcare Providers

Governmental healthcare providers started recently to incorporate m-health solutions as part of Saudi Vision 2030 which has been approved by the government to assist in achieving its objectives. The Saudi Ministry of Health (MOH), for instance, introduced two specific apps for patients to perform two services, remote consultation and book appointments. The "Seha" app allow patients to remotely perform face-to-face medical consultations with their doctors or appropriate specialists to be conducted regardless of their locations (Ministry of Health 2017). In addition, this app will serve limited regions the first stage of usage which are Northern Borders, Asir, Tabuk, Jazan, Najran and Al-Jouf Health Affairs followed by other regions in next stages. Another app for scheduling e-appointments named "Mawid" enables patients to book appointments in the primary healthcare providers.

In addition, the King Faisal Specialist Hospital and Research Centre has developed an integrated application named "Sehaty" which enables patient to access their health care records through their smartphones which can help to perform different tasks. Moreover, patients can easily view their list of diagnosis, complaints, medications, Immunization, laboratory tests, and radiology reports and other different services to enhance patient satisfaction of health services (King Faisal Specialist Hospital and Research Centre 2017). The National Guard health affairs also has launched a new application to its patients. Users can use the app to request and cancel appointments, view radiology and lab reports, request medications refill and other services (Ministry of National Guard Health Affairs 2017). Saudi Red Crescent Authority developed a new app "Asefni" or "Save Me," that can allow users to request services in case of emergencies, which has been applied in most regions in Saudi Arabia (Al-Hassan & AlQahtani 2019).

However, The National Digital Transformation Unit is leading the digital transformation process in the Kingdom, and based on its 2019 half-annual report the target, it was predicted that the number of appointments to be booked via "Maud" application in 2019 will be around 20 million appointments, while the actual results was 9 million. In addition, it was predicted to have more than 11 million registered users in the application, while the actual number reached 5.5 million users. For "Seha" application, 23,729 online medical consultation has been requested, 18,767 voice call and 4,962 video calls. Moreover, The King Faisal Specialist Hospital and Research Centre app has 10,381 registered users and 8,821 medications refill requests. Saudi Red Crescent Society app served 6,240 requests in Medina, 2565 requests in Alqasim, and 1,185 request in Hail only. (The National Digital Transformation Unit 2019). These results raised the question of why are there unexpected results and not as was planned for?

Mobile applications interests and awareness in the Saudi society

Saudis have begun to use digital health technologies as important tools to effectively manage their health. According to the Accenture 2016 Consumer Survey on Patient Engagement in Saudi Arabia, about 40% of mobile technologies users use mobile applications, 24% of them use remote consultations and 12 perform remote monitoring for health management. Moreover, 54% use diet/nutrition apps while 46% use fitness apps. In the same study, approximately 81% of consumers believe they will receive better service when their doctors can access their health data in the electronic health records (HER). In addition, most consumers with 65% prefer traditional visits practice over online visits. Such users also believe that online visits may provide benefits such as low costs, scheduling. For sharing health data, 76% of consumers are willing to share their health data obtained from wearable or apps with doctors (Safavi & altuwajiri 2016). Apart from patients, according to the survey by (Al-Ghamdi

2018), the majority of physicians have a strong willingness to have and recommend more medical apps in the future due its benefit in medical practices and availability. They only relay on global and well-recognized medical app such as Medscape, Oxford medical dictionary, Skyscape, UpToDate, Gray's Anatomy, Epocrates, Student BMJ, and Oxford clinical handbooks (Al-Ghamdi 2018). These results indicate that Saudi practitioners believe that m-health app can improves patient care.

Apart from health-related apps, most Saudis nowadays become familiar with mobile applications in general. A study by (AlFawareh & Jusoh 2017) showed that academic staffs has been used smartphones as an alternative to other personal items such as laptops, cameras, watches, and digital storage. Not only that, buying or ordering products via smartphones apps is also preferable. For instance, according to the results in (Alfahil & Houghton 2017) study, mobile commerce applications are not complex to use or hard to learn for Saudi users. A recent study showed that 95% of Saudis have smartphones, making it the most active nations in the Middle East area (Albinahmed & Ahmed 2017). With more than 12 million Facebook users, around 53% twitter users, and other social media applications are excessively used in Saudi Arabia. (Albinahmed & Ahmed 2017). Apart from social media applications, a study by (AlFawareh & Jusoh 2017) showed that academic staffs has been used smartphones as an alternative to other personal items such as laptops, cameras, watches, and digital storage. Further, Most Saudis nowadays become familiar with mobile applications in buying or ordering products via smartphones. For instance, According to the results in (Alfahil & Houghton 2017) study, mobile commerce applications are not complex to use or hard to learn for Saudi users. Even though there are some apps, some people are not fully aware of the services provided by healthcare providers. For instance, a study in (Almutairi & Moussa 2014) showed that 74.8% of the Saudi participants claimed that they were not aware to be fully informed their diagnosis and treatment plans. These results indicate that Saudi practitioners believe that m-health app can improves patient care.

Findings and Initial Recommendations

It can be seen that there is a significant opportunity for Saudi health providers to adopt more m-health services since the government has assign a clear vision with annual fund to enhance the healthcare sector. M-health offers significant solutions to gain patients' satisfaction. However, it is critical to understand individual and society as long as organizations needs before implementing a new technology as Lin (2011) stated that innovative technologies cannot be adopted without the influence of the personality of individuals on their adoption and actual usage. Due to the swift digitization of Saudi society, there is a delay in utilizing this growth by healthcare providers in both public and private sectors. Moreover, the usage percentages of these apps is under estimation based on 2019 half-annual report of the National Digital Transformation Unit who is leading the digital transformation process in the Kingdom. This can conducted the fact that there is no clear methodologies and steps used to determine what factors impact, motivate, and eventually support the successful m-health apps adoption. Further, only few studies examine how m-health apps can improve physician in health practices, with the ignorance of thinking from main users' perspectives in developing systems and applications, which is in this case patients, in addition to society awareness of these apps. There are some recommendation healthcare providers, decision-makers, and system developers need to take into consideration that may raise the adoption rate:

- Create clear models and steps to determine the factors impact m-health apps adoption
- Consider individual attributes and mobile apps usage literacy in developing apps.
- Raise the awareness of m-health apps benefits.
- Improve patients self-confident by applying training sessions physically and virtually to show how users can get advantages.
- The private sector needs to be educated and encouraged about m-health opportunities for their care services and businesses strategies.

Conclusion

This study is persuade by the current absence of actual evidence in the literature regarding measurement of individual awareness, use, and acceptance of m-health applications in Saudi Arabia. Taking into consideration the outcome of this preliminary study, healthcare providers and health decision-makers can reform their policies and practices in order to apply the digitalization plan more efficiently and

overcome the re-mentioned issues. Given the role of thinking from patients' perspectives and the increasing realise and use on mobile technologies in Saudi Arabia, will positively improve healthcare services and increase the acceptance to m-health apps by patients.

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