Chapter 1

Challenges of Mobile Health Applications in Developing Countries

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ABSTRACT

Global health care has become an enormous industry worldwide, where trends such as aging populations, environmental and climate changes, catastrophic events, and the spread and evolution of diseases pose significant challenges. With the rapid growth of information technology (IT), wireless technologies, and mobile services, health care processes are able to increasingly benefit from new technological advances and applications built on top of them. Specifically, the area of "Mobile Health" or mHealth, which leverages mobile phone functionality to provide medical and public health services, has become a very promising trend. Wireless and mobile technologies have great potential in improving patient care, reducing costs, streamlining processes, allowing adherence to regulations, and many other health-related activities. However, the developing world faces numerous challenges in realizing the infrastructure and technical expertise required to adopt mHealth solutions and applications. In this chapter, we focus on these challenges in the developing world and highlight existing problems and risks in realizing mHealth applications and services. This chapter also proposes various solutions to overcome these problems.

INTRODUCTION

Technological advances such as the Internet, mobile and personal communication devices, wireless technologies, and portable sensor devices are continuing to revolutionize the fields of health care and wellness. Today's medical field is very different from just a decade ago as exemplified by the use of medical informatics, modern testing techniques, and novel surgical equipment. The rapid proliferation of the Internet is also altering the traditional relationship between doctors and

their patients. More and more people rely on the Internet to address their health and wellness needs concerns and the Internet is making it possible for patients to assume much greater responsibility for their health care (M. S. Ballas, 2001). For example, according to the Pew Internet and American Life Project, more than 80% of Americans already search online for answers to their health questions with 8 million search queries every day (S. Fox, 2006). Particularly mHealth has the potential to transform the way we obtain and use health and wellness-related information. The area of mHealth is typically considered to be a sub-segment of eHealth and relies on the pervasiveness of mobile devices and mobile communications to provide anytime and anywhere health services and information. Examples include the electronic delivery of health care information to patients, practitioners, and researchers, the real-time monitoring of vital signs, clinical health data collection using mobile devices, and mobile telemedicine.

The mHealth trend has been enabled by the incredible proliferation of cell phones in all parts of the world, thereby facilitating access to various online resources, including health care information and services. During the 2010 Mobile World Congress, the CEO of Google reminded us that half of all Internet connections are from mobile devices and more than half of all online search queries in emerging markets (such as health care) come from mobiles. As an example to illustrate the potential of mobile technology, he further described the experiences of two survivors of the devastating earthquake that hit Haiti in January 2010, one of them using an iPhone application to learn how to treat his own wounds and another buried victim who used her mobile to update her Facebook status to alert rescuers as to her whereabouts.

Such mobile eHealth systems and applications can be particularly beneficial in developing countries, where the health care system faces significant challenges. For example, for various reasons, health care workers struggle to provide satisfactory care for their patients. Such reasons include the cost of communication and transportation, lack of scheduling, recording, and appropriate reminders, and poor technology and infrastructure. These deficiencies have severe consequences, e.g., in Nigeria, 26% of HIV patients fail to continue their treatment, and in sub-Saharan Africa, more than 50% of infants do not complete their vaccine series for diphtheria-tetanus-pertussis. These problems could be addressed with improved Mobile Health technology, e.g., health-care workers would be able to more efficiently visit patients in their homes, while instantly accessing these patients' health records using their mobile applications. However, technology constraints are also a concern in developing countries. While cell phones have become omnipresent, coverage and connectivity remain significant challenges, e.g., only about 60% of Africans are within reach of a signal. While coverage for *voice communication* continues to increase, *data communication* remains unreliable, of poor quality, or even nonexistent. The lack of reliability makes it difficult for health care workers operating in the field to utilize the vast array of emerging health applications. Moreover, the access to even the most basic health information is problematic and without it, the quality of health care remains at unacceptable levels.

This chapter discusses the many challenges faced in the development and deployment of Mobile Health applications. While problematic for Mobile Health systems anywhere, the focus of this chapter is on the current state and future potential of Mobile Health in developing countries. Such challenges include:

- Technological challenges
- Infrastructure requirements
- Socioeconomic challenges
- Security and privacy concerns
- Analytical challenges
- Other barriers such as languages, structural, health literacy, quality, etc.

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