

Mobile Health for the prevention and control of Non-Communicable Diseases in Developing countries.

Abstract

Mobile phones are the most rapidly adopted technology in the world. For all of us who work in global health practitioners the question remains: how can we leverage the power of mobile phones to advance global health goals? This question becomes even more pertinent when we look at the potential use of mobile technology to prevent and control Non-Communicable Diseases (NCDs). With the high penetration of mobile phones, this represents an enormous opportunity to develop and test specific projects for the prevention and control of NCDs. As more than half of the disease burden is preventable through focused behavioral change programs and increased health literacy, mobile phones can become a central tool in NCDs prevention. This article will discuss how mobile solutions can be considered to prevent, treat and manage NCDs in developing countries to minimize their growing disease burdens.



Abbreviations

NCD: Non Communicable diseases
LMIC: Low and middle income country
IGO: Intergovernmental Organizations
ITU: International telecommunication Union
UN: United Nations

Key words: Non-Communicable diseases, Mobile technology, Cameroon, Developing countries

Background

The term mobile health or m-Health, describes the use of mobile telecommunication and multimedia technologies as they are integrated within increasingly mobile and wireless health care delivery systems. Mobile phone ownership and use is experiencing its greatest growth in Africa, where HIV, Tuberculosis and malaria remains rife¹. This has led to the recent rise in research efforts regarding the use of mobile phones to enhance HIV care.

On the African continent recent reports suggest that mobile phone text messages can be used to improve outcomes in people living with HIV². Similarly, mobile phone technologies can help improve the life of people affected by non-communicable diseases (NCDs). It is indisputable that these disease are responsible for many deaths in sub-Saharan Africa, yet, many other chronic non-communicable diseases (NCDs) still cause significant mortality and morbidity, owing in part to their long lasting nature and debilitating consequences.

One critical characteristic of the NCDs is that they usually require long term and life-long medication. For this reason there is an increased likelihood for poor adherence to medication and care plans. Secondly, NCDs affect a considerably large proportion of the general population and thus merit concern as a public health problem. The third factor is that NCDs usually have a strong behavioral component with regards to preventive strategies and behavioral modifications are often required in order to reduce the risk of further complications.

For health specialists, the question is how to leverage the power of mobile phones to advance global health goals as far as prevention and control of NCDs is concerned. This question becomes even more important as there is growing interest in using mobile applications to improve health outcomes. This article will describe how mobile solutions can be considered to prevent, treat and manage NCDs in developing countries to minimize their growing disease burdens.

Why is m-Health a great opportunity for NCDs prevention and control?

Tackling the growing burden of NCDs requires a multi-sectoral approach, with m-Health comprising only a small piece of the larger strategy. A comprehensive NCD strategy would include building political will and donor support, increasing access to medicines and interventions already developed, and strengthening health systems to address chronic diseases. In concert with these approaches, m-Health can play a role in overcoming specific barriers to addressing NCDs in Cameroon and many other developing countries:

- 1- **High cost:** Not only do health systems have constrained budgets, but patients usually have difficulties accessing health. m-Health, by reducing the need for services will lower direct and overall cost of care.
- 2- **Lack of monitoring capability:** Many medications used to treat NCDs require frequent clinical monitoring and diagnostic testing, especially during initiation and dose escalation. Barriers to access of care in developing countries create the need for treatments that have minimal requirements in testing and the lowest risk of harmful outcomes. An investigation carried out in Cameroon showed that mobile monitoring using guardians of pediatric patients with Burkitt's lymphoma can be used to improve on the treatment received by sick children³.
- 3 - **Lack of healthcare professionals:** Most developing countries suffer a huge shortage of healthcare professionals, especially in remote and rural areas. New products can facilitate task shifting to less skilled health workers or to automated processes, and can also enable non-physician healthcare workers to expand their roles as was experienced in the Millennium Villages Project⁴.
- 4- **Problems with infrastructure: Low and Middle Income Countries (LMICs)** usually lack the basic infrastructure needed to provide healthcare (e.g., roads, power grids). Evidence suggests that only 24 percent and 35 percent of health facilities in Uganda and Tanzania have regular electricity, and only 31 percent and 34 percent have a regular water supply respectively⁵. This situation creates a need for new products that are adapted to these local field conditions.
- 5- Inconsistent healthcare-seeking behavior, insufficient healthcare training and concerns over acceptability of tests or treatments are other barriers to NCDs prevention and control in developing countries.

Different Approaches of the use of m-Health for NCDs prevention and control



The potential use of m-Health in developing countries can be summarized in the three following categories: 1- as an educational tool, to improve health education and lifestyle behaviors; 2- to optimize the use of limited resources by overcoming geographical barriers and financial constraints; 3- to improve use of healthcare by providing appointment and treatment reminders in order to improve disease prevention and management.

Rigorous trials have reported the benefits of text messaging, automated telephone monitoring, treatment reminders and self-care support for improving health outcomes related to chronic disease management. For NCD prevention, m-Health behavior change interventions in the form of mobile phone applications or text messaging have been implemented to encourage individuals to exercise, improve their diets and/or reduce tobacco use.

Text messaging has been used to help people quit smoking, to increase the use of sunscreen, to improve compliance in the management of diabetes and to encourage and increase the use of condoms, among many other behavioral change initiatives⁶. Studies on the use of technology for smoking cessation in the developed world indicate significant potential for behavioral change, and often show a doubling of quit rates compared to the control group. In addition, Lancet and WHO found that SMS-based cessation programs are 2 to 6 times more effective than traditional methods. Examples of other m-Health NCDs interventions range from applications that allow individuals to monitor their diabetes and to plan their treatment programs. Other innovative approaches combine sensors with mapping to track the contexts in which people with asthma use their inhalers, which furthers public health knowledge of asthma and the environment.

Progress made and barriers to progress

Recognizing that NCDs are a major challenge for development in the 21st century, and given the potential for m-Health to dramatically increase disease awareness and improve health literacy, the Political Declaration adopted by the United Nations General Assembly in September 2011 called on the World Health Organization (WHO) to lead and coordinate global actions against NCDs. The International telecommunication Union (ITU), WHO, the UN information and communication technologies (ICTs) and health agencies, have come together in a ground breaking partnership to focus on the use of mobile technology to improve NCDs prevention and treatment. This partnership aims to contribute to global and national efforts to save lives, minimize illness and disability, and reduce the social and economic burden due to NCDs. This new UN initiative will harness the best mobile technology available and make it accessible for all countries to deliver health promotion messages on NCD risk factors, to survey this growing epidemic, to persuade users to change unhealthy behaviors and to help countries implement national laws on NCDs.

Governments are primarily responsible for addressing NCDs, including ensuring access to essential medicines and technologies. However, governments also need the contribution and cooperation of the private sector, as well as intergovernmental organizations (IGOs) and civil society organizations, to ensure good quality research and evidence-based decision in order to improve the prevention and control of NCDs. Almost all research projects conducted in developing countries, Cameroon inclusive, are not used by local health authorities because the results are neither discussed by local scientists, validated, nor transmitted to health authorities to be taken into consideration when updating health care policies and guidelines. Channels for the dissemination of research results done by organizations of the civil society include conferences and prestigious journals that are both not known by health authorities and financially less accessible to local scientists.

Connectivity and coverage also represents a major challenge in the use of m-Health in NCDs interventions. This problem is compounded by the energy crises in many developing countries making it very difficult to reach certain patient populations. To meet these challenges there is the need to identify and put in place clear and coordinated policies with all actors involved, especially as m-Health approaches will be confronted with the challenge of managing complex applications and sensitive health information.

Conclusion

Recent technological innovations are changing the healthcare and health management context for NCDs, and providing the global community with new opportunities for prevention and control. Mobile phones have already been successfully used in the communicable disease and maternal/child health fields to improve access to health services, to train health workers, to ensure treatment compliance, in monitoring and surveillance, and in the management of chronic diseases. In the non-communicable disease field there is good evidence for disease management using mobile applications. With half of the disease burden preventable through focused behavioral change programs and increased health literacy, mobile phones can become a central tool in NCDs prevention. The list of advantages is long, from increasing access to health information in remote locations, empowering individuals, to assisting patients on a direct and personal basis in managing lifelong conditions. Solutions that can be adapted for multiple diseases will match reality better than solutions that focus on single diseases, as people will develop at least one NCD in their lifetime. This does not only apply to NCDs and all efforts must take into consideration the coexistence of cancer, diabetes, and heart diseases in patients with HIV, tuberculosis, and malaria.

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