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Perspective Pieces

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mHealth revolution

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The use of mobile phones to deliver health programs (mHealth) has great potential in developing countries, and mHealth initiatives such as the NightWatch¹ malaria prevention program are becoming increasingly popular. However, even when an mHealth intervention is known to be effective, the structure of the telecommunications industry, combined with user behaviours, can make it extremely difficult to implement in some countries.

This article describes the case of Cambodia, where more than 90% of the population have access to a mobile phone² due to limited accessibility of landlines, but operational challenges plague even the simplest mobile interventions. The impact of this is already apparent with commercial mobile banking services. In Kenya the M-Pesa mobile banking system grew to around nine million users

(21% of the population) within three years of launch.³ Despite Cambodians having a similar need for financial services, an equivalent mobile banking product (Wing) has only reached around 250,000 Cambodian users (2% of the population) in its first three years.⁴

Four significant operational challenges facing mHealth programs in Cambodia have been identified through the author's own experiences implementing mHealth initiatives with the Cambodian Health Education Media Service (CHEMS). These challenges are potentially relevant to other countries with similar telecommunication markets.

Switching Subscriber Identification Module (SIM) cards

Perhaps the greatest challenge facing mHealth interventions in Cambodia is that most Cambodians have multiple Subscriber Identity Module (SIM) cards – and thus multiple phone numbers – which they change regularly. This practice is not limited to low-income groups. It is also common among wealthier Nongovernmental Organisation (NGO) workers and government staff.

There are several factors that promote this practice among users. The first is that, as of 2011, the Ministry of Posts and Telecommunications recognised eight different mobile networks within the country (some have since merged).⁵ It can be significantly cheaper to call within a network than between networks, so people keep different SIM cards for each network in order to save call costs. The introduction of phones such as the Nokia Dual SIM⁶ which are capable of taking two SIM cards at once may help with this, although many Cambodians have three or more SIM cards.

Fierce competition between the Cambodian mobile networks also promotes SIM card switching. Some companies offer free air time with their new SIM cards in an effort to get people to switch. This can make it cheaper to buy a new SIM card than to purchase credit for an existing SIM card. In addition, some Cambodian users have developed a preference for keeping different phone numbers for different personal relationships – particularly when they want to keep those relationships separate. For example, they may

have different phone numbers for their various girlfriends or boyfriends, or a separate phone number for sensitive work contacts. If the relationship sours then the SIM card is discarded so the person can no longer contact them.

In practice this constant switching of SIM cards can cause havoc even in basic mHealth interventions, such as sending Short Message Service (SMS) reminders. It is common for at least 20% of all phone numbers to be invalid immediately after collection, as people often provide one of their less used mobile phone numbers when asked. It is also common for a substantial proportion of the phone numbers to become invalid each month, as people switch SIM cards and discard their old numbers. This means that 6-12 months after the phone numbers have been collected the majority are invalid and need to be collected again. For example, in one mobile phone based survey that CHEMS conducted more than 50% of the numbers were invalid only 3-4 months after they were collected. Keeping the numbers up-to-date is difficult and time consuming, which ultimately reduces the cost effectiveness of mHealth interventions.

One possible solution is to provide incentives for people to keep the same SIM card and phone number. Participants could be periodically entered into a lucky prize draw, but will only be notified about the result by phone. However, the value of the future prize needs to be large enough to outweigh the immediate financial benefits of switching SIMs. Typical prizes such as digital cameras or gift vouchers have not been successful in getting participants to keep the same SIM card for CHEMS programs, although larger or more frequent prizes may give different results. Another option is to provide participants with free SIM cards that have subsidised call rates to all networks. This would make it financially beneficial for users to keep the same SIM card, but is likely to be cost-prohibitive for large scale programs.

Lack of functionality and Khmer language capability

Another significant challenge to implementing mHealth programs in Cambodia is that most mobile phones are not smart phones. Although the availability of accurate statistics

is limited, experience from CHEMS programs suggests that the majority of Cambodians are using basic handsets with limited functionality. For most Cambodian households the cost of even a basic handset is substantial relative to their income. This means that mHealth systems for use by the general population are limited to SMS and voice messaging, as most people do not have a smart phone and so are not able to install applications on their device.

The majority of mobile phones also do not support Khmer (the national language). Khmer is written in an Indian-derived script and the Cambodians successfully resisted an attempt by French colonizers in the 1940s to Romanise the alphabet.⁷ As Khmer is only spoken by around 15 million people,⁸ it is a low priority for handset and operating system providers compared to languages such as Thai, Chinese or Hindi. Although there are a small number of Nokia handsets that support a Khmer user interface,⁹ uptake has been slow.¹⁰ Even when they are available users often find the process of sending an SMS in Khmer time consuming and difficult.¹¹ Similar challenges may be faced in other countries that have a unique alphabet, such as Ethiopia.

Since most mobile phones do not support Khmer language, SMS messages for mHealth programs need to be sent in English, which is not understood by the majority of the population. There are several ways to address this, although none are ideal. One alternative is to send picture messages rather than text SMS, although many phones are also unable to receive picture messages.

Another option is to use audio messages. The user receives a call and when they answer a pre-recorded message is played in Khmer, with responses being given using numbered options or a voice recognition system. While this solves the language problem, it also dramatically increases the cost of the message. Sending one SMS costs around two cents, while sending a one voice message costs around 15 cents. Some mobile networks also send an English SMS first informing the recipient they have a voicemail and asking them to call a number in order to hear the message. If the recipient cannot read the instructions for accessing the voicemail they will not be able to listen to the Khmer voice

message.

Although organizations such as Innovative Support to Emergencies Diseases and Disasters (InSTEDD) have created successful voice response systems in Khmer to circumvent the language barrier,¹² the inability to use text SMS continues to be a major limitation. Young Cambodians are already finding their own ways around this problem by writing SMSs using unofficial Romanised Khmer. A recently launched SMS dating service called Chibi¹³ has been very successful, with the majority of messages being written in a hybrid of English and Romanised Khmer. The creator of Chibi has developed a system that is able to interpret this hybrid language.¹⁴ However, since the majority of users are young Cambodians who have greater exposure to English at school this is unlikely to be a workable solution for older users.

Sharing mobiles

Although more than 90% of Cambodians have access to a mobile phone, a USAID assessment estimated that only around half actually *own* a mobile phone.¹⁵ This means that a large proportion of the population share a mobile with other people, often their family members. In one program for HIV positive rural women conducted by CHEMS and Cambodia HIV/AIDS Education & Care (CHEC), around 30% of the women could not be reached on the mobile number they provided, often because their husbands or another family member had the phone. This can make it particularly difficult to deliver mHealth interventions on sensitive topics, such as gender based violence or HIV. Even on less sensitive topics, such as maternal and child health, it can mean that the intended recipient of the message never receives it.

One option is to provide participants with a mobile phone and SIM card, although this is prohibitively expensive for large scale programs. Oxfam and their local partner Women for Prosperity took this approach with their Pink Phones program.¹¹ They spent around \$750 United States Dollars to purchase 30 mobile phones for women leaders in rural areas. The women leaders used the phones to help other women, for example by getting market updates, calling the police to respond to domestic violence

cases or accessing health information. At \$25 per phone plus the cost of a SIM card and credit, scaling up this intervention would require a very large budget.

Competition with commercial spam

Cambodia enforces very few regulations regarding consumer privacy and spam for the telecommunications industry. Mobile networks regularly send unsolicited mass SMS and voice messages promoting their own products, and as advertisements for other companies. In most cases it is not possible to unsubscribe from these messages. This makes users more likely to ignore an SMS or to hang up immediately on a recorded voice message, regardless of the topic or sender. Since mobile networks are able to make substantial revenue through these messages they are less interested in sending messages for targeted mHealth programs that may have lower volumes and budgets compared to advertising campaigns by private companies.

Some mobile networks are willing to support mHealth programs as part of their corporate social responsibility program. For example, Smart mobile has partnered with InSTEDD (Innovative Support to Emergencies Diseases and Disasters) to implement mHealth systems for the Ministry of Health.¹⁶ However, the proliferation of NGOs and health programs in Cambodia means that it is not possible for mobile networks to support all of them.

Conclusion

Organizations implementing mHealth programs in Cambodia face a range of operational challenges that can make even the simplest interventions unworkable. The potential solutions are expensive and may offset any cost-effectiveness gains. As a result, Cambodia could be left behind in the mHealth revolution.

Of course, Cambodia is not the only country facing challenges in mHealth implementation. The need to address socio-cultural, informational, economic and individual vulnerabilities in mHealth programs has also been identified with HIV/AIDS SMS campaigns in Uganda.¹⁷ Network coverage continues to be a issue even in developed countries, such as in rural Australia,¹⁸ and the sharing of mobile phones and language barriers have

both been raised as concerns in South African HIV/AIDS mHealth programs.¹⁹

It is possible that over time the challenges in Cambodia will disappear as market competition is reduced through mergers and acquisitions. A younger generation of Cambodians will grow up using Romanised Khmer, and Khmer language phones may become more widely available. Cambodians may also eventually find that keeping the same phone number is more useful than getting the cheapest possible calls. Ministry of Health support for mHealth programs such as the Day 3 malaria alert system created by Malaria Consortium,²⁰ may also provide the impetus for change. However, these changes are likely to take many years. In the meantime donors, NGOs and government need to have a clear understanding of how these operational challenges will be addressed before implementing new mHealth initiatives in Cambodia.

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