

## Viewpoint

## India calling: harnessing the promise of mobile phones for HIV healthcare

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The technology that has been able to straddle the digital divide most effectively in resource-constrained settings has been the mobile phone. The tremendous growth seen in Africa and Asia in mobile phone use over the last half decade has spurred plans to integrate mobile phones with healthcare delivery globally. A major challenge in HIV healthcare is sustaining good adherence to antiretroviral treatment. This report focuses on specific applications of mobile phones in the area of HIV healthcare delivery. It highlights the widespread use of mobile phones in developing areas of the world, those which have a heavy burden of HIV and infectious diseases. There is scope for exploiting existing mobile phone technology and infrastructure for healthcare enhancement in resource-constrained settings.

**keywords** mobile phones, healthcare, HIV, health information technology

Interest in the dynamic intersection of mobile phones and healthcare has mounted recently with the increasing use of telecommunications globally. Today there are over 4 billion mobile phones in use, more than 60% of which are owned by people living in emerging market economies (UN 2009). Interest has been particularly kindled in the arena of HIV healthcare, where there mobile technologies could support the existing health infrastructure to reach out to rural and marginalized regions (Haberer *et al.* 2010; Lester & Karanja 2008).

With over 3.2 million people living with HIV in India (UNAIDS 2007), the nation continues to face challenges of limited infrastructure and shortage of healthcare workers (WHO 2006). Successful efforts by the government have resulted in over 320 000 individuals accessing antiretroviral therapy under the national program as of March 2010 (National AIDS Control Organization 2010). To meet the challenge of an expanding ambulatory population on therapy, effective communications systems must be constructed to meet patient counselling, monitoring and long-term follow-up goals. While physical infrastructure is lacking across large tracts of India, wireless communication has caught on, and the country has become one of the fastest-growing mobile phone markets in the world. In June 2010, there were more than 450 million mobile phone subscribers in India; 12 million new mobile users were

being added every month (Cellular Operator Association of India 2010). Low costs have contributed to the ubiquity of the mobile phone even in rural settings.

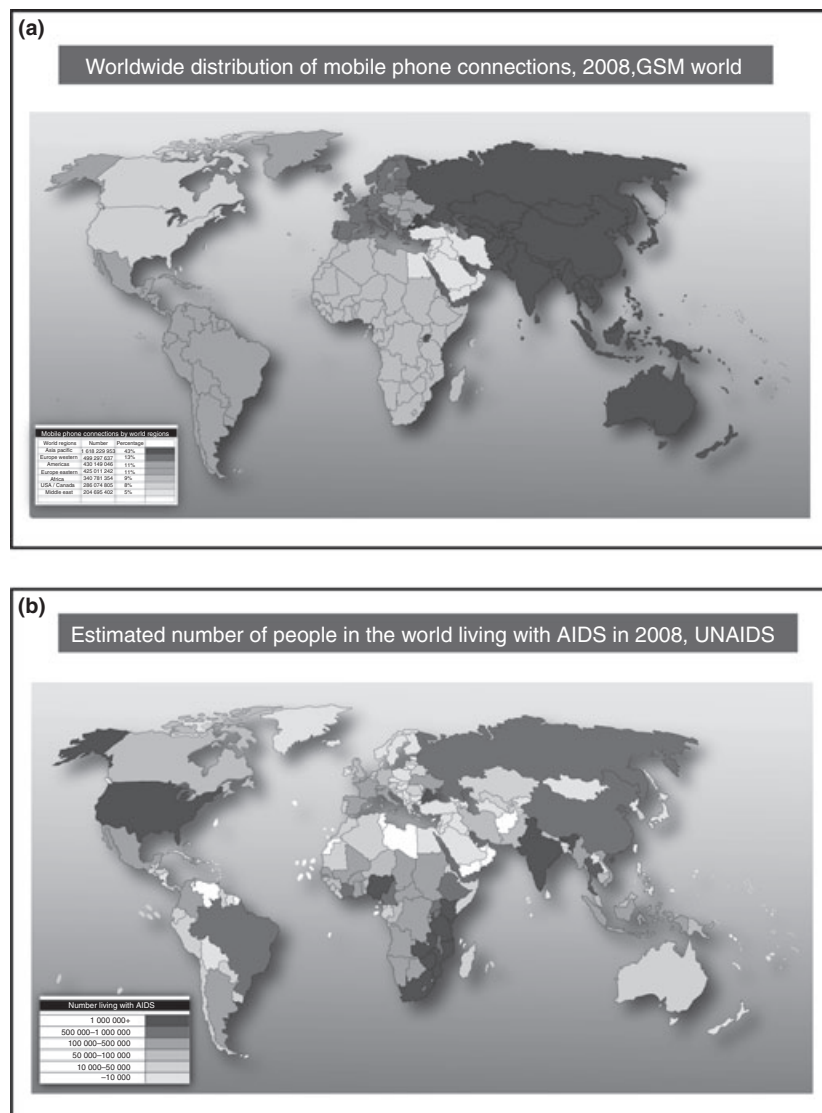
The advantages of mobile telecommunications have been considered in several studies involving chronic diseases such as diabetes and asthma in developed nations (Kaplan 2006). Similar initiatives in resource-limited settings are surprisingly limited, although interest is fast catching up in Asia, particularly India, where a number of such initiatives are ongoing. The Freedom HIV/AIDS Project disseminates HIV-related information in an attractive manner in the form of games that may be downloaded on mobile phones. Other health applications of mobile technology in India are the Mobile-Based Primary Healthcare Management System, which was designed to strengthen primary health centres in both rural areas and urban slums in India, and the 'TeleDoc: Jiva Healthcare Project', which uses mobile phones to connect rural healthcare workers with doctors in urban areas for remote diagnosis and treatment.

We studied mobile phone access and usage among 322 ambulatory HIV-infected patients or their caregivers who attended three HIV clinic sites in southern India where they received routine clinical care and follow-up (Shet *et al.* 2010). A third of the respondents lived in rural areas, 42% were women and 23% were illiterate. Mobile telephones were accessible to 75%, a quarter of whom shared these

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with family. Automated reminders on mobile phones were perceived as helpful in maintaining adherence by 75% of respondents, with fewer than 10% expressing apprehensions over loss of privacy. In the recent past, 66% of respondents had specifically used their phone to contact their respective healthcare worker, and 79% said they would contact their worker for queries, irrespective of mobile phone possession. Our experience demonstrates

a narrow gap between mobile phone access and usage for healthcare purposes in this setting. This is in contrast to a similar study in Kenya where a larger gap between access and use was revealed (Lester *et al.* 2006). Although intrinsic differences between the populations in the two studies may exist, the potential of mobile phones to leverage health innovation in resource-limited settings is evident. Based on these preliminary findings, a randomized



**Figure 1** Areas that have a high burden of HIV/AIDS tend also to have high numbers of mobile phone connections and usage, suggesting potential use of this technology in improving HIV healthcare. (a) Worldwide distribution of mobile phone connections, 2008. Source: GSM World. Available at: [http://www.gsmworld.com/newsroom/market-data/market\\_data\\_summary.htm](http://www.gsmworld.com/newsroom/market-data/market_data_summary.htm). (b) Estimated number of people in the world living with HIV/AIDS, 2008, UNAIDS. (Source: UNAIDS 2008 Global Report on AIDS Epidemic. Available at: [http://data.unaids.org/pub/GlobalReport/2008/jc1510\\_2008\\_global\\_report\\_pp211\\_234\\_en.pdf](http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp211_234_en.pdf)).

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trial of mobile phones for HIV treatment adherence monitoring is being organized in this setting (De Costa *et al.* 2010). Other trials examining the role of mobile phones in improving adherence are also underway (Lester *et al.* 2009).

Mobile phones have the potential to induce a paradigm shift in healthcare delivery in resource-limited settings by empowering patients to stay connected to healthcare providers, personalizing healthcare messages, facilitating collection of patient data and training rural professionals with health updates. As Figure 1 illustrates, nations that have some of the heaviest HIV burdens have also seen explosive growth of mobile telecommunications in the last few years, with continued growth likely into the next decade. Mobile phones thus provide a powerful opportunity for the integration of technology and global HIV healthcare on a large scale, promising an innovative strategy for more efficient healthcare delivery in the future.

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