

Project Mwana: Using mobile technology to improve early infant diagnosis of HIV

UNICEF Zambia

The partnership

Project Mwana is an innovative health initiative implemented by the Zambian Ministry of Health with the support of UNICEF and its collaborating partners: the Zambia Centre for Applied Health Research and Development (ZCHARD), a Boston University affiliate; the Zambia Prevention, Care and Treatment Partnership (ZPCT); and the Clinton Health Access Initiative (CHAI). Through the use of RapidSMS mobile technology, the project delivers test results for diagnosis of human immunodeficiency virus (HIV) in infants in real time to rural clinics and facilitates communications between clinics and community health workers. The community health workers then inform mothers that the results are ready for their collection. Begun as a pilot in 13 districts of Zambia in June 2010, the project has shown a reduction in turnaround time – from sample collection to laboratory to the return of test results to the originating health facility – of more than 50 per cent in the country's rural and underserved communities.

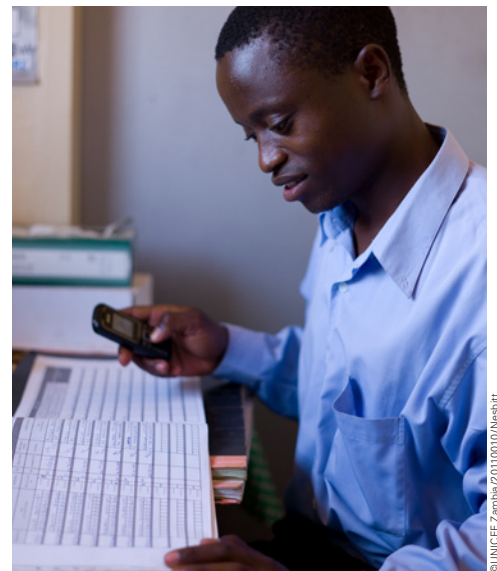
The challenge

In Zambia, where the HIV prevalence rate among the general population is 14.3 per cent, mother-to-child transmission accounts for 21 per cent of all new HIV infections.¹ Although the use of antiretroviral therapy (ART) in HIV-infected pregnant women can prevent mother-to-child transmission, when prevention fails, effective programmes for early infant diagnosis of HIV are critical, because the evidence suggests that early initiation of ART in HIV-infected children can substantially reduce HIV-related morbidity and mortality.² Up to 30 per cent of newborns who contract the virus from their mothers die before the age of one if they receive no treatment, whereas there is a 75 per cent improvement in survival rates among those diagnosed in time to begin treatment within their first 12 weeks of life.

In a resource-limited setting such as Zambia, however, the establishment of a system for the early infant diagnosis of HIV infection is beset with difficulties. The test used, the polymerase chain reaction (PCR), which tests directly for HIV DNA rather than the HIV antibody, is performed on small spots of dried blood. It differs from the test used to diagnose the virus in older children and adults and is so sophisticated that it can be performed only by three laboratories in Zambia.

¹ Republic of Zambia, *Zambia Country Report: Monitoring the Declaration of Commitment on HIV and AIDS and the Universal Access - Biennial report*, submitted to the United Nations General Assembly Special Session on AIDS, 31 March 2010, available at <www.unaids.org>.

² Becquet, Renaud, and Lynne M. Mofenson, 'Early antiretroviral therapy of HIV-infected infants in resource-limited countries: Possible, feasible, effective and challenging' *AIDS*, vol. 22, no. 11, 11 July 2008, pp. 1365–1368.



In remote rural settings with weak infrastructure and unreliable transportation, sending the blood samples from the point of collection to the often distant regional laboratories that do the testing can entail long delays – weeks and even months. These delays pose a significant barrier to the early initiation of antiretroviral therapy in infected infants and contribute to loss of follow-up and to the possible death of 30 per cent of affected children if no interventions are provided.

In this context, it was determined that mobile health (mHealth) technology offers a reliable and sustainable solution to the slow transmission of test results.

Background

UNICEF has been working for many years with the Ministry of Health and other partners to build capacity, extend appropriate systems to test for HIV and deliver results, and raise community awareness on HIV and maternal and newborn health. Project Mwana, which went live in June 2010 in a pilot involving 31 clinics in six provinces across Zambia, uses RapidSMS, a free, open-source programming framework that allows developers to build their own SMS-based applications. With it, project partners were able to leverage basic short message service (SMS) mobile phone technology to customize applications for data collection, logistics coordination and communications operations, thus strengthening health services for mothers and infants in rural clinics in a simple, scalable and impactful way.

The project consists of two applications. 'Results160', which speeds up the time it takes for health facilities where the samples are collected to get the results back from the regional processing laboratories, fulfils the project's primary objective of allowing test results to be communicated in a timely, efficient way. The second application, 'RemindMi', serves a second project objective, to improve the rate of postnatal follow-up, by reminding mothers to return for their six-day, six-week and six-month postnatal visits in line with Zambia's immunization schedule.

Since the project's inception, UNICEF has provided the Ministry of Health with the strategic vision and support necessary to develop and maintain the system.

Activities

Despite UNICEF's involvement and the Zambian Government's commitment to innovative solutions, the development, design, piloting and evaluation of Project Mwana was made possible only by engaging in partnerships and taking advantage of partners' different capacities and resources at each stage of the process. Partnerships therefore played a central role in providing the necessary technical expertise, local knowledge and outreach.

In late 2009, Johnson & Johnson provided flexible funding to support UNICEF in developing an innovative solution to remove bottlenecks in health delivery. In addition, through an informal partnership, McKinsey & Company, an international management consulting firm, supported UNICEF, on a pro bono basis, in the definition of the problem statement and visioning exercise. The company also helped UNICEF through process modeling and mentoring. This support provided the basis for organizing a scoping mission to Zambia. UNICEF also partnered with frog™ a global innovation firm that helps companies design and engineer products and services, and bring them to market, particularly in the areas of

consumer electronics. frog™ assigned a design team pro bono to support the project for an intensive six-week period. After this engagement, a one-day workshop brought together key stakeholders from public health programming and mobile health implementers to build alignment. UNICEF and frog™ also collaborated at a later date to work out recommendations for scaling up Project Mwana.

At the implementation phase, UNICEF partnered with the Clinton Health Access Initiative (CHAI), a global health organization committed to strengthening integrated health systems and expanding access to care and treatment for HIV/AIDS, malaria and tuberculosis. CHAI's field presence, technical expertise in capacity building and local knowledge made it the ideal partner to introduce the technology, train community health workers and support the operationalization of the project.

UNICEF also partnered with the Zambia Prevention, Care and Treatment Partnership (ZPCT), a cooperative agreement between Family Health International and the US Agency for International Development, funded by the President's Emergency Plan for AIDS Relief (PEPFAR), which since 2005 had been working with the Ministry of Health and others to strengthen HIV/AIDS services. Because it worked with local communities, NGOs and health-care workers, ZPCT had the outreach and field experience that allowed the project to avoid creating parallel structures and systems and foster the integration of programmes at district and facility levels.

UNICEF approached the Zambia Centre for Applied Health Research and Development (ZCAHRD) – a local non-governmental organization affiliated with Boston University – to lead on monitoring and evaluating the project to demonstrate the pilot's effectiveness and impact. In close collaboration with the university, ZCAHRD conducted a study of 10 sites over a period of almost eight months of implementation, providing the evidence needed to demonstrate the success of the pilot and advocate for its scaling up.³

UNICEF also underwrote the cost of mobile services provided by three large Zambian mobile operators.

Results

The ZCAHRD study, the results of which were published in the *Bulletin of the World Health Organization*, showed that Project Mwana improved the turnaround time for transmitting test results by more than 50 per cent.

The 'RemindMi' application used to trace patients via SMS to ensure that they receive key childhood interventions now also provides community health workers with a tool to register births. Its birth registration component has been adopted enthusiastically by community health workers, who now use it to register the majority of births in their catchment areas.

However, it is too early to establish whether the faster turnaround time for results leads to earlier ART access for exposed infants. Similarly, it is too early to know if SMS reminders significantly increase adherence to postnatal appointments. A full evaluation of Project Mwana's impact is planned in collaboration with Boston University at later date.

³ Phil Seidenberg et al, 'Early infant diagnosis of HIV infection in Zambia through mobile phone texting of blood test results', *Bulletin of the World Health Organization*, vol. 90, no. 5, May 2012, pp. 348–356.



Beyond the direct impact on communities, UNICEF and frog™ have created a model for incorporating user-centred design and real-time data into a wide range of initiatives – from education to sanitation and child safety – that is being rolled out across the organization.

Lessons learned and way forward

Project Mwana demonstrates that leveraging the comparative advantages of multiple actors can facilitate the creation, introduction and testing of innovation. A focus on programme needs and the results to be achieved is central to identifying the right partners, after which time is needed to build the partnership. For example, it took six months of dialogue between frog™ and UNICEF to identify areas of mutual interest and collaboration, define partnering principles and establish common goals. Upfront agreement on issues such as end-user design, openness, particularly open-source approach, and sustainability ensures that all partners are on the same page.

Furthermore, the availability of flexible seed funding for developing and implementing the innovations project was an important enabler. At global level, the US Fund for UNICEF facilitated the partnerships with the key US-based actors and made sure that the needs of both UNICEF and the partners were addressed. At country level, a dedicated project manager with the necessary technical and partnership skills played a central role in ensuring the project's success.

The project team confronted two main challenges: ownership of the project prior to initiation, and coordination among the partners. The approaches used to overcome these challenges were to regularly convene the partners to strategize and ensure that there was only one coordinating body, an SMS or mobile health (mHealth) technical working group led by the Ministry of Health. Also, one joint plan and one common monitoring and evaluation framework were established and reviewed on a regular basis.

Zambia is now in a position to scale up the system. A national scale-up plan has been developed, as has an implementation guide. Thirty additional facilities were added to the system in November 2011, and the aim is to achieve national scale by 2013. The preparation phase will focus on solidifying the technical, physical, monitoring and human infrastructure to allow the system to handle the stresses of expansion. Throughout the scale-up process, the project will be closely monitored to ensure that it is having a positive effect on the targeted health challenges. As the project scales up, UNICEF will continue to provide support, including capacity development at national and district levels.

The experience gained from development of Project Mwana can serve as the basis for future mobile health projects. The system could potentially have broader application in prevention of mother-to-child transmission of HIV than the delivery of test results, and could be extended to broader maternal and child health areas such as nutrition, as well to other results-delivery and diagnostic mechanisms or national health programmes for women and children.

Mobile phones, which can be found even in the most remote areas of Zambia, have the potential to 'reach the unreached', that is, the most disadvantaged communities. As the project demonstrated, these tools can effectively empower the community and remote health workers with diagnostic and information-sharing capabilities, and ultimately improve the monitoring of activities and outcomes.



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