

# I-TECH Ethiopia: Building Capacity for HIV Testing of Infants and Children

## Background

Globally, the number of infants and children newly infected with HIV has been increasing in recent years, primarily as a result of mother-to-child transmission. In 2008, sub-Saharan Africa accounted for 91% of new HIV infections among children. Many of these children were never diagnosed with HIV and did not receive proper treatment.<sup>1</sup>

In Ethiopia in 2008 there were an estimated 79,183 HIV-positive pregnancies and 14,093 HIV-positive births.<sup>2</sup> In the past, few tests were done to determine whether infants were exposed to the virus. It was one of the most challenging aspects of prevention of mother-to-child transmission (PMTCT) of HIV. With improved capacity for testing mothers and infants, however, that has begun to change.

I-TECH has been working in Ethiopia in three regions (Amhara, Tigray, and Afar) on activities aimed at prevention of HIV infection as well as improving HIV diagnosis, care, and treatment. In collaboration with the regional health bureaus, the Ethiopian Health and Nutrition Research Institute (EHNRI), and other partners, I-TECH is strengthening the capacity of health care workers to identify HIV-infected infants and children early and link them to life-saving care and treatment.

## Exposure of Infants to HIV

All HIV-exposed infants (infants of HIV-positive mothers) are at risk for HIV infection and opportunistic infections. Infants can be infected during pregnancy, labor and delivery, or postpartum through breastfeeding. Therefore, the easiest way to identify HIV-exposed infants is to test the mother during pregnancy. Most HIV infections in

infants can be avoided by the timely delivery of effective interventions to prevent mother-to-child transmission. Without treatment, however, an infant infected with HIV in Africa has a 35% chance of dying by his or her first birthday, and a 53% chance of dying before the age of two.<sup>3</sup>



*A health care worker pricks an infant's toe to gather a specimen at Felege Hiwot Hospital in Bahir-Dar, a city in northwest Ethiopia. (Photo: Solomon Amsalu)*

## Promoting Early Infant Diagnosis

Early infant diagnosis (EID) is the preferred strategy to identify HIV-infected newborns and infants (ideally at their first immunization visit, 6 weeks after birth). In Ethiopia, I-TECH has been working with governmental health institutions in Amhara, Tigray, and Afar to strengthen pediatric health care in hospitals and health centers by training health care providers. After their training, these health care providers are able to conduct early infant diagnosis and link HIV-infected infants and children to care and treatment.

The EID program in Ethiopia has expanded regionally through the strong leadership of EHNRI and concerted efforts by several partners working with the regional health bureaus. In addition to I-TECH, these partners include the US Centers for Disease Control and Prevention (CDC) in Ethiopia; Columbia University's International Center for AIDS Care and Treatment (CU-ICAP); Johns Hopkins University (JHU); the University of California, San Diego (UCSD); and the Clinton Health Access Initiative (CHAI).

### Improved Testing Methods

Testing infants for HIV requires special consideration. Infants born to HIV-positive mothers acquire HIV antibodies while still in the womb, and they will test positive for the HIV antibody during the first months of life even if they are not infected. Standard antibody tests cannot accurately diagnose infants until the age of 18 months, when maternal antibodies decay and uninfected infants' antibodies become HIV-negative. For this reason, specialized virologic tests are required for infants. These tests, for example, the polymerase chain reaction (DNA-PCR) test, are the only reliable means of detecting the HIV infection status of infants.



A blood spot sample is collected from a child's toe. Infants as young as 6 to 8 weeks can be tested for HIV. (Photo: Solomon Amsalu)



Reagent preparation for PCR testing at the Mekelle regional PCR laboratory, which was recently upgraded by I-TECH. (Photo: Julia Sherburne)



The upgraded Bahir-Dar regional PCR laboratory enables laboratory specialists to perform extraction of DNA from dried blood samples.

PCR testing using dried blood spot (DBS) samples contributes significantly to the improved early detection of HIV in infants. DNA-PCR testing is performed on a small sample of blood collected and then dried on a special sample collection paper. These dried blood spots make it easier to prepare, store, and transport samples to the nearest testing facilities, and they do not require refrigeration. Infants can be tested for HIV using DBS DNA-PCR as early as 6 weeks of age. If the test is positive, the child is HIV-infected. If the test is negative, the child is not HIV-infected.

## Upgrading Laboratory Facilities

To perform DNA-PCR tests on DBS collected from infants, a standard molecular laboratory that is able to accommodate DNA-PCR testing is needed. Therefore, in 2008, I-TECH upgraded the Bahir-Dar and Mekelle regional laboratories to function as molecular laboratories.



*A laboratory technologist performs amplification and detection of DNA at the Bahir-Dar regional laboratory. (Photo: Wubshet Mamo)*

Since the establishment of DBS DNA-PCR screening for HIV, the number of children diagnosed and linked to antiretroviral treatment in the three regions has increased significantly. Prior to these upgrades, DBS samples were routinely shipped from three high-volume hospitals (Felege Hiwot, Gondar, and Mekelle) of the Amhara and Tigray regions to the national HIV/AIDS laboratory in Addis Ababa for DNA-PCR testing. As a result, fewer than 50 samples were processed each month. Today, the Bahir-Dar and Mekelle referral testing sites provide services to these hospitals and to many smaller health centers, bringing the combined testing average for the two sites to 624 samples per month. Moreover, the turnaround time between sample collection and result delivery has dropped from 45 to about 15 days. The timely delivery of results can be life saving, allowing HIV-infected infants access to pediatric antiretroviral treatment and care at the earliest possible time.

## Strengthening Regional Capacity

I-TECH Ethiopia has also been working with regional health bureaus, EHNRI, CDC, CU-ICAP,

and CHAI to strengthen regional capacity in EID services. Through this collaborative effort, technical assistance and training were provided to 32 hospitals and 5 health centers in Amhara, Tigray and Afar regions. I-TECH's training has centered on DBS specimen collection for virologic (DNA-PCR) testing and on establishing linkages that promote follow-up, care and treatment for HIV-exposed infants. A total of 868 health care workers, including nurses, PMTCT service providers, and laboratory technicians, have been trained, and the number of sites providing EID services has grown from 3 to 37, representing an increase of 92%.

Through the expansion of early infant diagnosis services to the 37 health facilities, the three regions nearly doubled the number of infants tested for HIV within 1 year. I-TECH Ethiopia's laboratory team, in collaboration with pediatric advisors, played a key role in the success of this program. Overall, greater decentralization of EID services at hospitals and health centers, health care worker training, and the establishment of intermediary referral laboratories for HIV diagnosis have improved efficiency and increased the number of infants tested.

## Supporting Local Ownership

To ensure that improvements are sustainable, I-TECH Ethiopia also works to strengthen local ownership of EID programs. By training an adequate number of locally based health care workers, I-TECH helps to provide reliable and uninterrupted service. In addition, I-TECH is working with local partners to strengthen inventory management at clinics and laboratory facilities in order to reduce stockouts and ensure adequate supplies for HIV testing and treatment. This involves building the capacity of facilities to manage stock, working with collaborators to include EID forecasting (what supplies will be needed, and in what amounts), and reviewing and revising forecast and supply plans.

Finally, I-TECH supports local Infant Diagnosis Multidisciplinary Teams (IDMTs) in the Amhara and Tigray regions to plan, execute, and supervise program-related activities and coordinate support from implementing partners.

## Summary

In Ethiopia, accurate and timely HIV diagnosis of infants and strengthened laboratory capacity, together with prompt pediatric HIV care and treatment, are helping to save the lives of infants and children. I-TECH Ethiopia is pleased to support local partners and health care workers as they progress toward these goals, and anticipates continued participation in the future.

For more information on I-TECH Ethiopia's work with early infant HIV diagnosis, please contact Dr. Wubshet Mamo, Clinical Laboratory Director, I-TECH Ethiopia, at [Wubshetm@itech-ethiopia.org](mailto:Wubshetm@itech-ethiopia.org).

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1. *AIDS epidemic update*. Geneva: UNAIDS; 2009. Available from: <[www.unaids.org](http://www.unaids.org)>

2. *Ethiopian Ministry of Health, Federal HIV/AIDS Prevention and Control Office (HAPCO). Single point HIV prevalence estimate. Ethiopia: HAPCO; June 2007.*

3. *Newell, M.L. et al. Mortality of infected and uninfected infants born to HIV-infected mothers in Africa: a pooled analysis. The Lancet. 2004 October 2-8; 364 (9441):1236-1243.*



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