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ETHIOPIA NETWORK FOR HIV/AIDS TREATMENT, CARE, & SUPPORT

THE MISSED HIV-INFECTED CHILDREN OF ETHIOPIA



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ABOUT ENHAT-CS

The Ethiopia Network for HIV/AIDS Treatment, Care, and Support (ENHAT-CS) program is a USAID initiative funded by PEPFAR and implemented by a Management Sciences for Health (MSH)-led consortium of national and international partners. The program works in the Amhara and Tigray regions and supports the Regional Health Bureaus, *woreda* (district) health offices, health centers, and communities to deliver quality, comprehensive HIV services that are integrated with and strengthen other services, including: maternal, newborn and child health; family planning; tuberculosis; sexually-transmitted diseases; malaria; neglected tropical diseases; nutrition; mental health; and laboratory services.

ENHAT-CS supports the Government of Ethiopia to scale-up the provision of comprehensive HIV services, including antiretroviral treatment, by training nurses and health officers at health centers to perform services previously provided only by physicians at hospitals. This practice of task shifting is endorsed by the World Health Organization and has been shown to be an effective way to address shortages of human resources without compromising the quality of care.¹ ENHAT-CS continued support to 152 health centers supported by its predecessor, the HIV Care and Support Program (HCSP), and expanded comprehensive HIV service delivery to an additional 124 health centers, for a total of 276 by 2014.

i. Mike Callaghan, Nathan Ford, and Helen Schneider: "A systematic review of task-shifting for HIV treatment and care in Africa" Human Resources for Health, 2010. www.human-resources-health.com/content/8/1/8 (accessed 8/1/14).

ABSTRACT

Background: In Ethiopia, over 60% of all people who are eligible for antiretroviral therapy (ART) receive it. However, coverage is only 12% among children under 15 years of age. Due to scarcity of data and limited awareness of possible HIV infection, especially in older children, the AIDS epidemic among Ethiopian children appears neglected in national programs.

Methods: We analyzed national HIV data for Ethiopia, using the Spectrum/Estimation and Projection Package (EPP) and primary data on children living in households with at least one HIV-infected adult in the Amhara and Tigray regions of Ethiopia. Descriptive analysis of the age and sex distribution of HIV-infected orphans and vulnerable children (OVC) in Ethiopia was performed.

Findings: Our Spectrum/EPP analysis estimated the population of HIV-infected children under 15 years old to be 160,000 in 2013. The majority of children (81.6%) were aged 5 to 14 years. The estimated number of orphans due to AIDS was 800,000. The empirical data from almost 10,000 OVC under 18 years showed that 11.9% were HIV-infected, the majority of whom were between 5 and 10 years old with no significant difference between males and females.

Interpretation: There is a large population of children living with HIV in Ethiopia, the magnitude of which was not previously recognized. The majority were vertically infected and never identified nor linked into treatment. OVC represent a reachable group that could account for a substantial proportion of HIV-infected older children. We recommend that HIV programs urgently synergize with social protection sectors and provide these children with HIV testing and related services

Introduction

Improved coverage and effectiveness of prevention of mother-to-child transmission (PMTCT) programs reduced new HIV infections among children under 15 years of age by 35% globally between 2009 and 2012.¹ Yet in 2012 there were still about 3.3 million children under 15 years of age living with HIV, representing about 10% of all people living with HIV. The vast majority of these children are in sub-Saharan Africa.¹

Significant challenges remain to reach these children with treatment and care services.² In 2012, treatment coverage for HIV-infected children under 15 years old in low- and middle-income countries was 34% compared to 64% for adults.¹

Recently, an AIDS epidemic among older children who contracted the virus from their mothers has become apparent in many parts of Southern Africa.^{3,4} The limited data on survival among vertically-infected children who are slow progressors has resulted in a failure to anticipate the magnitude of the epidemic.^{4,5}

Global estimates indicate there are 17.8 million children who have lost at least one parent to HIV, 85% of whom live in sub-Saharan Africa.⁵ We posit that orphans represent a sizeable group that can be reached and may account for a substantial proportion of the population of older children infected with HIV.

OVC are at an increased risk for being HIV-infected compared to other children. A meta-analysis of studies on HIV infection in orphaned populations aged 24 years and younger, which mostly include samples from sub-Saharan Africa, revealed nearly two-fold greater odds of HIV infection among orphaned youth.⁶ Similarly, findings from a population-based HIV counselling and testing initiative in Western Kenya confirmed high risk of HIV infection among orphaned adolescents even in a low prevalence area; orphans were 4.3 (2.2 – 8.1) times more likely to have HIV. Double orphans were 21.4 (10.5 – 43.9) times more likely to have HIV.⁷ However, these studies did not delve into the potential contribution of perinatal transmission as a contributing factor for the higher observed HIV prevalence in the group.

In a study by Ferrand *et al.*⁸ on about 500 adolescents attending acute primary care (APC) in Harare, Zimbabwe, maternal transmission was considered to be likely in 80% of the HIV-infected APC attendees. Age and sex did not differ by HIV status, but HIV-infected APC attendees were significantly more likely to be maternal or double orphans than their HIV-negative counterparts. In another study on the same dataset, HIV prevalence was reported to be 17%, and infection was independently associated with client-reported orphan hood.⁹

Estimates from sub-Saharan Africa show that even in the absence of ART and cotrimoxazole prophylaxis (CTX), 25% of children infected perinatally would still be alive at 10.6 years of age and at 16.9 years for those infected through breastfeeding.¹⁰ In mature epidemics, 33% of infants are estimated to be slow-progressors with a median survival of about 16 years.³

However, the magnitude of the population of older HIV-positive children, infected through vertical transmission, is insufficiently recognized. In Ethiopia, the emphasis on PMTCT and achieving an “HIV-free generation” through elimination of mother-to-child transmission (MTCT) has unintentionally led to the false notion that HIV-exposed babies who do not receive treatment will not survive (*Authors observations from HIV stakeholders discourse, Ethiopia*). In addition, in Ethiopia as elsewhere,¹¹ HIV messages tend to stress sexual transmission of HIV in adults and adolescents and MTCT in relation to infants only. In a study of attitudes toward HIV counseling and testing (HCT) in the suburbs of Harare, Zimbabwe, HIV-negative participants were not aware that long-term survival following MTCT could occur while adolescents

reported that HIV diagnosed at their age must have been sexually acquired.¹¹ Due to the scarcity of data, limited awareness of possible HIV infection in older children that are not sexually active, combined with denial/stigma and lack of specific training of health care workers, these older children living with vertically-acquired HIV appear all but forgotten in national programs.

In Ethiopia, in response to its high MTCT rates over previous years, the government has recently begun implementing an accelerated plan to eliminate MTCT,¹² including the adoption of lifelong treatment for all pregnant women. The MTCT rate after breastfeeding was estimated at 24% at the end of 2012; it was 30% or higher in earlier years (Spectrum/EPP estimates). Moreover, the proportion of children receiving antiretroviral (ARV) drugs in the context of PMTCT has been negligible.¹³ The previous low PMTCT coverage has resulted in a large number of children being born with HIV, with a likely large majority lost to follow-up and no specific mechanisms to trace them to offer them the HIV services they need.

While the evidence is scant, data from 2008 to 2010 of HCT services in the Tigray Region of Ethiopia, showed high HIV prevalence among the zero to 14 year-old group, particularly in urban areas (9.6% prevalence in 2010 in urban areas compared with 0.7% in rural areas).¹⁴ Although the number of children tested was relatively small and there are strong selection biases, the HIV prevalence in a population of youth not yet regarded as sexually active—only 1.2% of males and 10.9% of females aged 15–24 years had sexual intercourse before age 15¹⁵—is likely to reflect the cumulative result of a PMTCT program lacking in coverage and quality over the years.¹⁴

This paper analyzes the potential magnitude and characteristics of the AIDS epidemic among vertically-infected older Ethiopian children and suggests targeting the subgroup of orphaned children as a priority to reach currently unserved HIV-infected children and provide them with HIV services.

Methods

The national burden of HIV infection in children and the number of HIV orphans in Ethiopia was estimated through secondary analysis of national HIV data, using Spectrum/Estimation and Projection Package (EPP) (version 4.47), a software used globally to produce HIV estimates. The Spectrum/EPP model generates an epidemic curve based on data from antenatal sentinel surveillance and national surveys with seroprevalence testing. In the case of Ethiopia, the data were derived from the national Demographic Health Surveys of 2005 and 2011 and antenatal HIV sentinel surveillance. We used other programmatic data as

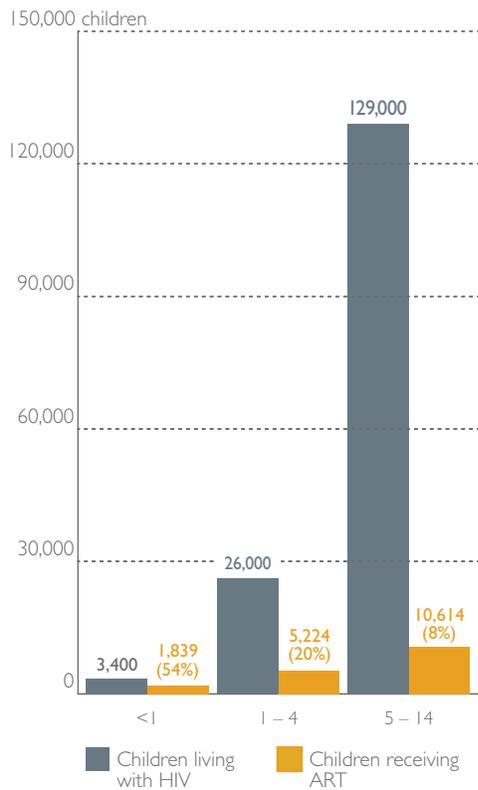


Figure 1. Estimated number of children younger than 15 years living with HIV and receiving ART, by age, Ethiopia, 2012

Source: EPP/Spectrum estimates for children living with HIV; Estimates from the Federal HIV Prevention and Control Office (FHAPCO) and PEPFAR data for children receiving ART.

inputs to model age-disaggregated estimates of prevalence and population sizes and the number of orphans due to AIDS among others (see Stover *et al.*¹⁶ for full details of methods).

We complemented the national estimates with primary data on the number, age, sex, and HIV status of children living in households with at least one HIV-infected adult supported by the National Network of Positive Women Ethiopians (NNPWE) in the Amhara and Tigray regions of Northern Ethiopia. NNPWE is a member association of HIV-infected women that provides community-based care and support to HIV-infected and affected families through a network of HIV-infected volunteers. Each volunteer provides home-based support to highly vulnerable HIV-infected households.

The data were collected and reported by 350 NNPWE volunteers in August 2013 through a partnership between NNPWE and ENHAT-CS. As the data are from highly vulnerable HIV-infected households, the analysis reflects a select sub-population that would be expected to have higher HIV prevalence than that found in the general population. However, the descriptive analysis of this data provides evidence of the age and sex distribution of HIV-infected OVC in Ethiopia.

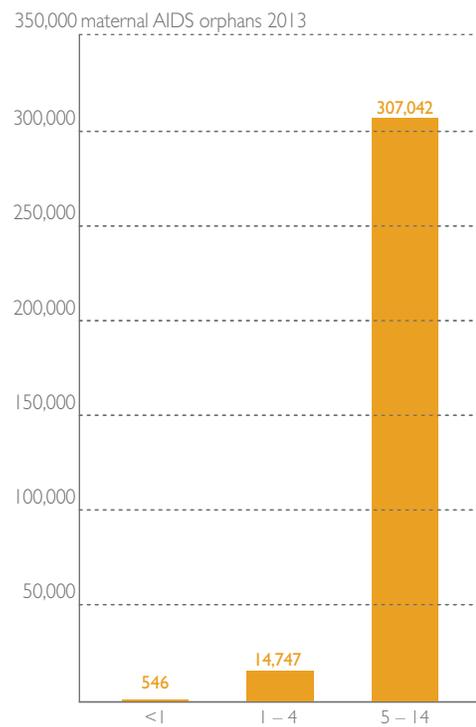


Figure 2. Number of maternal AIDS orphans, by age, 2013

Source: EPP/Spectrum estimates for children living with HIV, 2012

Results

Ethiopia's HIV prevalence in the adult population was 1.5% in 2011.¹⁵ No population-based HIV prevalence surveys exist for children below the age of 15. Modeled HIV prevalence among zero to 14 year olds was 0.4% in 2013 (Spectrum/EPP estimates). Of the 785,000 people currently living with HIV (PLHIV) in Ethiopia, 158,400 (20%) were estimated to be children.¹⁷

When modeling the age distribution of PLHIV in Ethiopia, 3,400 (2.1%) children were under one year old, 26,000 (16.4%) were children aged one to four years, and 129,000 (81.6%) children were aged 5 to 14 years (Figure 1).

In the same time period, Ethiopia had only 17,677 HIV-infected children enrolled on ART (12% coverage).¹³ Figure 1 shows the age distribution of children receiving ART.

A vital set of complementary data when looking at issues of HIV in children in Ethiopia concerns orphans. In 2013, there were an estimated 800,000 orphans due to AIDS in Ethiopia (in addition to 3,700,000 non-AIDS orphans).¹⁷ Of those, 300,000 were estimated to be double orphans (Figure 2). We postulate that orphans, in

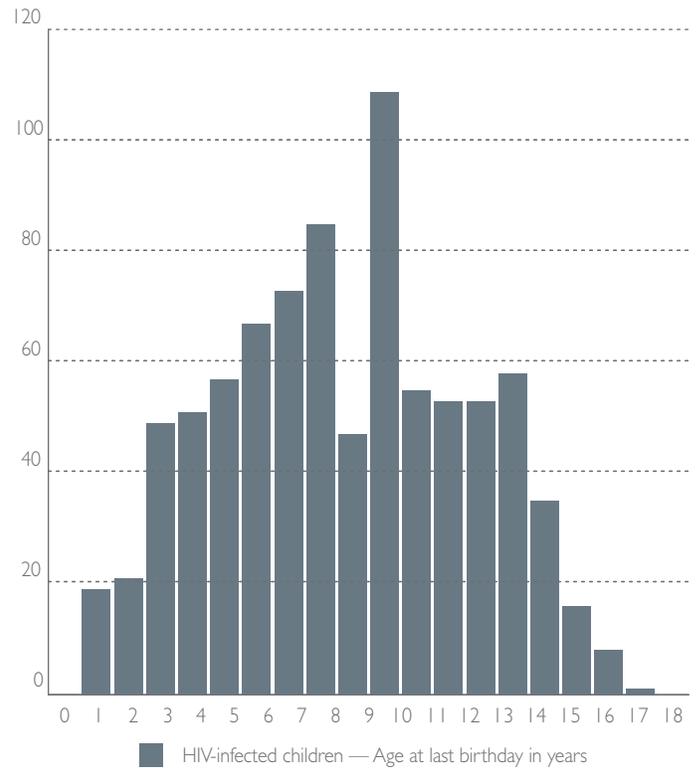
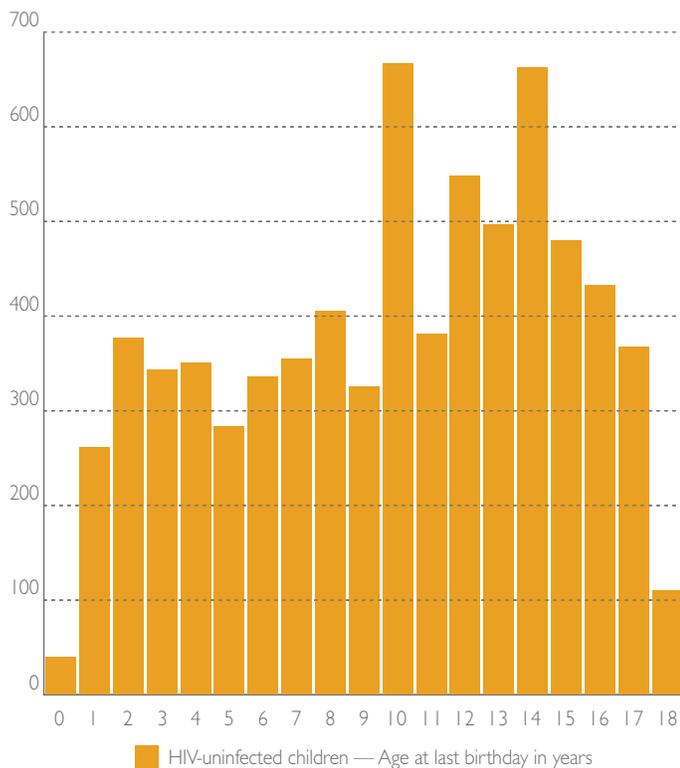


Figure 3. Age distribution of HIV-uninfected and HIV-infected OVC supported by NNPWE through the USAID ENHAT-CS program, Amhara and Tigray regions, Ethiopia, 2013

Source: Data collected on OVC supported by NNPWE through the USAID ENHAT-CS program, Amhara and Tigray regions, Ethiopia, 2013

particular maternal orphans, may have had a higher chance of exposure to HIV as infants; therefore, a significant portion of the HIV-infected children may be found among this group.

Complementing the findings of the Spectrum modeling, we obtained household-level data for 11,374 OVC under 18 years of age, from 9,961 households (an average of 1.1 children per household). Among the 11,374 children, 10,602 (93%) reported knowing their HIV status and of those, 1,124 (11.9%) were HIV infected. The age distribution was available for 8,724 (82%) of these children and shows that both OVC with HIV and those without HIV were found across all ages, even as the numbers in each age group among both infected and uninfected children steadily declined after the age of 14 years (see Figure 3). In addition, there is a sudden drop in the number of HIV-infected children after the age of ten. This drop is not seen in uninfected children.

This age distribution is further borne out by age-specific HIV prevalence, which peaked in the five to nine year-old age group, for both boys and girls (Figure 4). This is similar to EPP/Spectrum modeled age distribution of HIV-infected children, where the majority is above five years old.

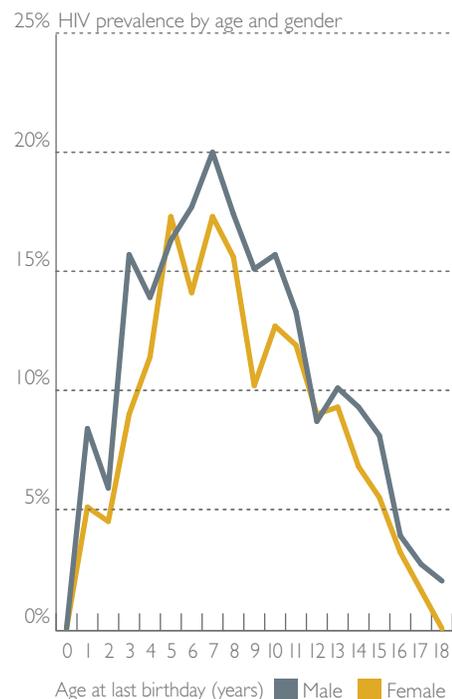


Figure 4. HIV prevalence by age and gender

Source: Data collected on OVC supported by NNPWE through the USAID ENHAT-CS program, Amhara and Tigray regions, Ethiopia, 2013

Discussion

The magnitude of the HIV burden in older, not yet sexually active children has never been recognized or documented in Ethiopia. Our EPP/Spectrum analysis brought to light the large population of almost 160,000 children between 5 and 15 years old estimated to be living with HIV in Ethiopia in 2013. This represents 20% of all PLHIV estimated to live in Ethiopia. The modeled estimates are supported by the empirical data that we collected from almost 10,000 households that have at least one HIV-infected adult in the Amhara and Tigray regions, showing that 11.9% of children under the age of 18 years in those households were infected with HIV. The majority of the HIV-positive children were aged between five and ten years. The overall trend by age appeared similar between boys and girls, suggesting that infection was the result of survival rather than early onset of sexual relations. If the main mode of transmission was sexual, we would expect a larger prevalence in the female group and in older ages than their male counterparts due to their earlier sexual debut, as evidenced by the HIV prevalence of 0.5% for females and 0.1% for males between the ages of 15 to 24 years in Ethiopia.¹⁸ The significant drop in the number of OVC with HIV after the age of 14 years, but not in the number of HIV-uninfected OVC in the affected households, also indicates that the HIV-infected children are survivors of vertical transmission. This finding is consistent with earlier estimates that the median survival of slow progressors is 16 years³ and indicates the urgency of having OVC tested early.

However, finding the approximately 160,000 children under 15 years of age who are estimated to be HIV-infected has proven challenging, in part because so many critical questions remain unanswered in the Ethiopia context including: Who and where are these children? Which—if any—HIV testing services are available for older children and how easy is it for them to access existing services? How can programs identify and provide adequate support for children that are not living in family structures, thus excluded from family centric approaches, and are not otherwise accessing health services?

Furthermore, in Ethiopia there are legal barriers to access HCT for children younger than 15 years of age. Current guidelines for Ethiopia state that HCT for children under 15 years shall only be

done with the knowledge and consent of parents or guardians, with the exception of children aged 13–15, who are in specific circumstances: married, pregnant, commercial sex workers, street children, heads of families, or sexually active.¹⁸ The latter are regarded as “mature minors” who can consent to HIV testing. It appears from the guidelines that the focus is on sexually active children, overlooking those who were vertically infected and still alive.

As with any medical intervention, HIV testing is an ethical priority if it is clinically necessary to support life-saving treatment, such as initiation of ART. In all circumstances, the best interests of the child should be the guiding principle. Policy on the testing of children should address the specific circumstances of OVC.¹⁹ Lack of clarity about age of consent and procedures for HCT may inhibit providers from offering services and limit access.²⁰ Policies and guidelines may need to be revised to reflect who is responsible for testing and referral, to clarify age-appropriate consent and disclosure procedures, and to account for the special circumstances of children without parents or guardians.¹⁹ National modeling data showed that only 12% of HIV-infected children 15 years and younger are on ART, compared to more than 60% of adults. The widest gap in terms of ART coverage is among children in the older age groups. Delaying HIV testing can have serious implications for the health of children living with HIV. Access to ART improves immunological response and reduces opportunistic infections and co-morbidities.²¹ While recognizing the complexities, it is important to facilitate greater uptake of HIV testing among children and in particular those groups of children that might have a higher prevalence of HIV. In Ethiopia, reaching orphans—of whom about 20% are estimated to be orphans due to AIDS—with HCT services may provide the greatest returns in identifying and responding to the HIV needs of children.

To improve case finding and provision of HIV services to the missing HIV-infected children of Ethiopia, the pediatric ART delivery model needs to be rethought. The family-based model is essential but not sufficient and there is a need for improved integration with the social protection sector and cooperation with actors serving the broader arrays of vulnerable children's needs.

To address the diverse and complex needs of OVC in Ethiopia, current interventions cover food/nutrition, shelter and care, legal protection, health care, psychosocial support, education, and

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economic strengthening. Health care services include provision of primary care, monitoring health, immunization, and HIV prevention. While treatment for HIV-infected children is captured, there is no proactive approach to providing HIV testing to children who are receiving other OVC services.²² In addition to identifying children living with HIV, the HIV testing program would further provide opportunities for increased HIV awareness.

Although only a small fraction of OVC receive support services in Ethiopia,¹³ they still represent a sizable population of children—more than 500,000 in 2013 according to PEPFAR programmatic data. These children that are already enrolled in a program represent a good entry point for promotion of HIV testing and provision of treatment. In Zimbabwe, an algorithm was developed and evaluated to be used by health workers to identify children likely to be HIV infected and one of the significant predictive factors is orphanhood, a finding that highlights the feasibility of selectively testing.⁹ Although we acknowledge that OVC in Ethiopia are a much broader category than orphans, which includes other vulnerable children,²² targeting OVC still represents a programmatically feasible way to identify HIV-infected children through universal testing outside the health facilities (beyond provider-initiated HIV testing and counseling and tracing of children of HIV-infected individuals) and already exists as a beneficiary category for programs. It would be questionable to single out orphans within the broader category of OVC.

HIV should encompass the clinical, adherence, mental health, sexual health, and social spheres of children;⁴ the latter is of particular significance for OVC.

Moreover, as soon as children transition into adolescence and adulthood, the additional risk of sexual transmission of HIV needs to be taken into account. In the case of Ethiopia, the risk of sexual transmission might be even higher given that most of these children are unaware of their HIV status.

Conclusion

New attention needs to be given to the issue of undiagnosed HIV infection in children born to HIV-infected parents. There is an urgent need to put robust systems for identifying and testing the children of all HIV-infected adults receiving HIV services into place. There is also need to go beyond the health sector and provision of HIV testing in health facilities. Since many of the children living with HIV might be found among orphans, and more broadly (taking programmatic reasons into account) OVC, a more comprehensive strategy is required to identify them and address their needs. Synergies with social protection and child protection stakeholders and programs need to be sought to integrate HIV testing and provision of HIV treatment into broader programs of care and support.

Since many of the children living with HIV might be found among orphans, and more broadly (taking programmatic reasons into account) OVC, a more comprehensive strategy is required to identify them and address their needs.

Harmonization of pediatric ART treatment with adult regimens and optimization (simpler, easier to administer such as fixed-dose combinations, and affordable) of available formulations may facilitate the actual implementation of ART programs once children are identified.²³ As with other chronic conditions, it will be critical to look at issues of long-term treatment, monitoring and management of the response to ART.²⁴ Compared with adults, adolescents in southern Africa are less adherent to ART²⁵ and the percentage of non-adherence is higher among children who have lost one or both parents compared to children with both parents alive.²⁶

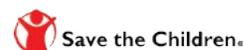
OVC may face additional challenges, such as multiple caretakers, or lack of them, the fact that they may be themselves caretakers, stigmatization, depression, fear of disclosure, poverty, and inadequate nutrition.²⁴ Provision of care for children living with

Although more studies are warranted to assess HIV prevalence and access to services among OVC, it is urgent and vital to advocate for HIV services for OVC in Ethiopia to expand beyond HIV prevention programs such as behavior change communication, to include proactive case finding and access to ART for those in need. An important number of current OVC have been vertically infected but remain asymptomatic; they critically deserve the chance to receive HIV testing and referral to ART if needed. HIV diagnosis, treatment, care, and support should be integrated in the package of economic and psychosocial support that is particularly important for the estimated 800,000 children who have lost one or both parents to AIDS in Ethiopia. Only an integrated approach can facilitate access, support long-term adherence to medication, and ensure the continuity of care for those children. ■

References

1. UNICEF. Towards an AIDS-free generation. Children and AIDS. Sixth Stocktaking Report. New York, United States: UNICEF, 2013.
2. Augusto GF. Newsdesk. Treatment of HIV infection: are we failing the children? *Lancet Infect Dis* 2012; 12 (9): 664-53.
3. Ferrand RA, Corbett EL, Wood R et al. AIDS among older children and adolescents in Southern Africa: projecting the time course and magnitude of the epidemic. *AIDS* 2009; 23(15):2039-46. doi: 10.1097/QAD.0b013e32833016ce
4. Lowenthal ED, Bakeera-Kitaka S, Marukutira T, Chapman J, Goldrath K, Ferrand RA. Perinatally acquired HIV infection in adolescents from sub-Saharan Africa: a review of emerging challenges. *Lancet Infect Dis* 2014. [http://dx.doi.org/10.1016/S1473-3099\(13\)70363-3](http://dx.doi.org/10.1016/S1473-3099(13)70363-3)
5. UNAIDS. Report on the global AIDS epidemic. Geneva, Switzerland: *Joint United Nations Programme on HIV/AIDS (UNAIDS)*, 2013.
6. Operario D, Underhill K, Chuong C, Cluver L. HIV infection and sexual risk behaviour among youth who have experienced orphanhood: systematic review and meta-analysis. *J Int AIDS Soc* 2011; 18:14-25.
7. Braitstein P, Vreeman RC, Ayuku DO et al. High risk of HIV among orphaned adolescents: findings from a population-based HIV counselling and testing initiative in Kenya. Abstract CDC279 presented at 6th IAS Conference on HIV Pathogenesis, Treatment and Prevention; 2011 July 17-20; Rome, Italy.
8. Ferrand RA, Munaiwa L, Matsekete J et al. Undiagnosed HIV Infection among Adolescents Seeking Primary Health Care in Zimbabwe. *Clinical Infectious Diseases* 2010. 51(7):844-851.
9. Ferrand RA, Weiss HA, Nathoo K et al. A primary care level algorithm for identifying HIV-infected adolescents in populations at high risk through mother-to-child transmission. *Tropical Medicine and International Health* 2011. 16(3):349-355. doi:10.1111/j.1365-3156.2010.02708.x
10. Marston M, Becquet R, Zaba B et al. Net survival of perinatally and postnatally HIV-infected children: a pooled analysis of individual data from sub-Saharan Africa. *Int J Epidemiol* 2011; 40(2): 385-396.
11. Ferrand RA, Trigg C, Bandason T et al. Perception of risk of vertically acquired HIV infection and acceptability of provider-initiated testing and counseling among adolescents in Zimbabwe. *Am J Public Health* 2011; 101(12): 2325-2332.
12. EFMOH. The national strategic plan for elimination of mother to child transmission of HIV (e-MTCT of HIV). 2013-1015. Addis Ababa, Ethiopia: *Federal Democratic republic of Ethiopia Ministry of Health (EFMOH)*, 2013.
13. FHAPCO. Annual performance report of the EFY 2005 (July 2012-June 2013). Multisectoral HIV/AIDS response. Addis Ababa, Ethiopia: *Federal HIV/AIDS Prevention and Control Office (FHAPCO)*, 2013.
14. TRHB/THAPCO, FHAPCO, UNAIDS. Tigray Regional State synthesis of the HIV epidemic and response. Addis Ababa, Ethiopia: *TRHB (Tigray Regional Health Bureau)/THAPCO*, 2012.
15. Ethiopia CSA. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: *Central Statistical Agency (Ethiopia) and ICF International*, 2012.
16. Stover J, Brown T and Marston M. Updates to the Spectrum/Estimation & Projection Package (EPP) model to estimate HIV trends for adults and children. *Sex Transm Infect* 2012; 88:111-116. doi:10.1136/sextrans-2012-050640
17. EHNRI. HIV related estimates and projections for Ethiopia. Addis Ababa, Ethiopia: *Ethiopia Health and Nutrition Research Institute (EHNRI), Federal Ministry of Health*, 2012.
18. FHAPCO. Guidelines for HIV counselling and testing in Ethiopia. Addis Ababa, Ethiopia: *Federal HIV/AIDS Prevention and Control Office, Federal Ministry of Health*, 2007.
19. WHO. HIV testing in young children. Technical Briefing Paper: WHO/HIV/11.02. Geneva, Switzerland: *World Health Organization (WHO)*, 2011.
20. Pitorak H, Bergmann H, Fullem A, and Duffy MH. Mapping HIV services and policies for adolescents: A survey of 10 Countries in Sub-Saharan Africa. Arlington, VA: *USAID's AIDS Support and Technical Assistance Resources, AIDSTAR-One, Task Order 1*, 2013.
21. WHO. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach. Geneva, Switzerland: *World Health Organization (WHO)*, 2013.
22. MOWCYA. Standard service delivery guidelines for orphans and vulnerable children's care and support programs. Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia: *Ministry of Women, Children and Youth Affairs (MOWCYA) and Federal HIV/AIDS Prevention and Control Office (FHAPCO)*, 2010.
23. UNAIDS. Treatment 2015. Geneva, Switzerland: *Joint United Nations Programme on HIV/AIDS (UNAIDS)*, 2012.
24. Musoke P. The challenge of growing up HIV infected in resource-limited settings. Presented at the 3th HIV pediatrics workshop; 2011 July 15-16; Rome, Italy.
25. Nachega JB, Hislop M, Nguyen H et al. Antiretroviral therapy adherence, virologic and immunologic outcomes in adolescents compared with adults in southern Africa. *J Acquir Immune Defic Syndr* 2009. 51(1):65-71.
26. Vreeman RC, Ayaya SO, Nyandiko WM et al. Adherence to antiretroviral therapy among HIV-infected children in East Africa International Epidemiologic Databases to evaluate AIDS (IeDEA). Presented at the 3th HIV pediatrics workshop; 2011 July 15-16; Rome, Italy.

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