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Finding Children Living With HIV in Low-prevalence Countries:

HIV Prevalence and Testing Yield From 5 Entry Points in Ethiopia

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Abstract

Background: Limited data in low HIV prevalence settings such as Ethiopia limit policy development and implementation of optimized pediatric testing approaches to close the treatment gap. This study aimed to determine HIV prevalence, testing yield and factors associated with HIV among children at 5 entry points.

Methods: We conducted a cross-sectional study from May 2017 to March 2018 in 29 public health facilities in Amhara and Addis Ababa regions in Ethiopia. Children 2–14 years were enrolled through 5 entry points. Data were obtained from registers, medical records and interviews with caregivers. HIV prevalence and testing yields were calculated for each entry point. Mixed-effects logistic regression analysis identified factors associated with undiagnosed HIV.

Results: The study enrolled 2166 children, of whom 94 were HIV positive (40 newly diagnosed). HIV prevalence and testing yield were the highest among children of HIV-positive adults (index testing; 8.2% and 8.2%, respectively) and children presenting to tuberculosis clinics (7.9% and 1.8%) or with severe malnutrition (6.5% and 1.4%). Factors associated with undiagnosed HIV included tuberculosis or index entry point [adjusted odds ratio (aOR), 11.97; 95% CI 5.06–28.36], deceased mother (aOR 4.55; 95% CI 1.30–15.92), recurrent skin problems (aOR 17.71; 95% CI

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7.75–40.43), severe malnutrition (aOR 4.56; 95% CI 2.04–10.19) and urban residence (aOR 3.47; 95% CI 1.03–11.66).

Conclusions: Index testing is a critical strategy for pediatric case finding in Ethiopia. Strategies and resources can prioritize minimizing missed opportunities in implementing universal testing for very sick children (tuberculosis, severe malnutrition) and implementing targeted testing in other entry points through use of factors associated with HIV.

Keywords

HIV; testing; children; Ethiopia

Globally, only 53% of the estimated 1.8 million children living with HIV (CLHIV) were receiving antiretroviral therapy (ART) in 2019.[1] ART coverage in Ethiopia is lower in children than adults (48% vs 76%),[1] mainly due to challenges with pediatric case identification. Studies in high-prevalence Sub-Saharan African countries have shown high HIV positivity among children who are malnourished,[2] diagnosed with tuberculosis (TB),[3–5] and admitted to inpatient wards.[2,6–8] Other studies have indicated high HIV prevalence among children of HIV-positive mothers[6,9,10] and orphans and vulnerable children (OVC).[11,12] HIV testing services (HTS) at these entry points have been prioritized for pediatric case finding in high-prevalence countries.[13] Lack of data in low-prevalence countries, including Ethiopia, limits informed policy development and implementation of optimized pediatric testing. A recent survey in urban Ethiopia found HIV prevalence in children 0–14 years was 0.3%,[14] creating challenges for pediatric case finding in this large, populous country. Identifying strategies to find undiagnosed CLHIV is critical for expanding Ethiopia's pediatric ART program.

HIV-testing policies for children in Ethiopia during our study[15] recommended priority populations for HTS: biological family members of index cases, all children <5 years visiting health facilities, children orphaned by parents deceased due to HIV/AIDS and clients with clinical signs and symptoms of HIV/AIDS in outpatient departments (OPDs) or inpatient wards. HTS capacity exists at facility entry points, and national testing algorithms are available; however, gaps in systematic testing make it difficult to assess settings with the highest yield and case identification.

This study aimed to inform national and international pediatric testing priorities by determining HIV prevalence and testing yield by entry point (inpatient, malnutrition, TB, OVC and index testing). This study also identified risk factors associated with undiagnosed CLHIV to inform development of risk screening tools applicable to low-prevalence countries.

METHODS

Study Design

This was a cross-sectional study conducted from May 2017 to March 2018 in 29 public health facilities in Amhara and Addis Ababa regions in Ethiopia at 5 service delivery points:

medical inpatient wards, malnutrition treatment points, TB clinics, index testing and referral of OVC.

Study Population

All children 2–14 years of age accompanied by a caregiver and presenting to the five service delivery points at participating facilities during the study period were eligible for inclusion in the study. All children presenting for index testing were of unknown HIV status, while some children presenting to other entry points were known CLHIV. Children <2 years were excluded as they receive virologic testing for HIV diagnosis and present to different entry points.

Study Location

Eight facilities were selected in the Addis Ababa and Amhara regions [Addis Ababa: Yekatit Hospital, Zewditu Hospital, Addis Ketema Health Center and Entoto Fana (Woreda One) Health Center; Amhara: Felege Hiwot Hospital, Debre Birhan Hospital, Kobo Health Center and Shewa Robit Health Center]. Due to anticipated low enrollment rate for the TB entry point because of low case volume, 21 “expansion sites” in Addis Ababa were included for the entire study duration to achieve sample size from the TB entry point. During study implementation, there were unanticipated challenges achieving sample size in the index testing entry point, so data for index testing were collected from the expansion sites for the last 2 months of the study. The Addis Ababa and Amhara regions were selected because HIV burden and prevalence are higher and more HIV tests performed than other regions. All 29 study facilities were selected based on client load and high number of HIV tests and provided routine HTS per the national program.

Sample Size

Minimum sample size was determined for each of the five entry points by considering client load and number of children tested during the prior fiscal year and assumed pediatric HIV prevalence by entry point from published literature[4] and program data from facilities and implementing partners (Text, Supplemental Digital Content 1, http://links.lww.com/INF/E518, and Table, Supplemental Digital Content 2, http://links.lww.com/INF/E519, respectively). For the OVC entry point, each study facility had an OVC program that referred children for facility-based testing. The number of children served by each OVC program determined the proportional number of OVC to be enrolled at each site. OVC program rosters were used to select children for the study based on simple random sample method. If a caregiver declined to participate, replacement was made using the same sampling process until the sample size was met. Once minimum sample size was reached for an entry point, enrollment at that entry point was stopped. Minimum sample size was reached for all five entry points.

Study Enrollment

Study personnel were permanently stationed at study sites to ensure that eligible children were offered testing, HTS was conducted routinely and results recorded. Study staff

reviewed facility registers and reports to ensure quality and consistency of data collection during the study.

Caregivers of all children 2–14 years of age who presented to medical inpatient, malnutrition and TB entry points, including known CLHIV, were offered enrollment in the study. For index testing, case managers and healthcare workers in ART clinics routinely conduct assessments to elicit sexual partners and biological children of people living with HIV and biological siblings of CLHIV. Caregivers are encouraged to bring these children to ART clinic for testing, and testing status is tracked in index testing registers. All children presenting for index testing were of unknown status and were offered HTS and study enrollment.

For the community-based OVC entry point, OVC program staff routinely discuss HTS with families. Caregivers of children selected for study participation were approached by the OVC staff to discuss the study. The OVC staff notified facility-based study staff of the specific day and time the caregiver and child would present to the facility for HTS and study enrollment. Risk assessments to determine eligibility for HTS were not utilized; all selected OVCs were referred for HTS and study enrollment.

Caregivers of eligible children were consented. Assent was obtained from adolescents ≥12 years following the national recommendations for research. Age of consent for HTS in Ethiopia is 15 years, although mature minors may be tested at 13 years.

Variables

Basic demographic, anthropometric and medical information was obtained from available registers and records or collected from participants. All HTS was done at facilities by healthcare workers following the national testing algorithm as per standard of care, following national policies for universal testing at priority entry points. HIV test results were abstracted by study staff from patient charts and registers. Children with clear medical documentation of HIV status before the study visit were enrolled in the study but not retested and classified as “known positives” or “known negatives”; however, no children enrolled had documentation of prior negative test. CLHIV was linked to care and treatment services following national guidelines.

Data Analysis

SPSS, version 20, and R3.5.1 were used to compute descriptive and analytical statistics. Prevalence of HIV was calculated as the sum of the number of new and known CLHIV divided by the total number of enrolled children. Testing yield was calculated as the number of newly diagnosed CLHIV divided by the number newly tested.

The study design was accommodated in the analyses by including clinics as random effects in mixed-effects models for estimation of effects of region, caregiver type, sex and other characteristics on HIV prevalence. Within settings, differences in prevalence were assessed between those with moderate or severe malnutrition (within malnutrition treatment). Mixed-effects logistic regression analysis using univariate and multivariate techniques, adjusted for differences in health facilities, identified factors associated with new diagnosis of HIV.

Variables that had a *P* value <0.2 in univariate analysis were incorporated in the mixed-effects model. The model with the smallest Akaike and Bayesian information criteria was selected as the final model.

Weight-for-height was calculated, and moderate and severe malnutrition were defined using weight-for-height or mid-upper arm circumference as per Ethiopian national guidelines.[16] Malnutrition entry point data were analyzed by degree of malnutrition: severe, moderate and other (children classified by healthcare workers as malnourished or were receiving treatment for malnutrition but had normal anthropometric measurements at study enrollment).

Ethical Considerations

This study complied with local and international regulations for Good Clinical Practice, Human Subjects Protection and institutional review board guidelines. Before initiation, the protocol was reviewed by the Institutional Review Board of the Ethiopian Public Health Institute, Amhara Regional Health Bureau, Addis Ababa City Administration Regional Health Bureau and the Centers for Disease Control and Prevention. Consent and assent forms were translated into Amharic and received institutional review board approval. All study staff and relevant hospital staff were trained in confidentiality and Human Subjects Protection to ensure a high level of ethical conduct. Permission for data collection was obtained from all participating facilities.

RESULTS

Enrollment Characteristics

During the study period, 2212 children presented to the five entry points at participating sites, of whom 2166 (97.9%) were enrolled (26 refused HIV testing, and 20 refused study enrollment). The distribution of enrolled children by region and entry point is shown in the Table (Supplemental Digital Content 3, http://links.lww.com/INF/E520).

Sociodemographic Characteristics

The median age of study participants was 8 years (interquartile range, 7 years), with similar enrollment by gender (49.0% female and 51.0% male). As shown in Table 1, the majority of children enrolled were 10–14 (38.6%) and 5–9 years of age (35.1%). The primary caregiver for most children was a parent, either the mother (56.0%) or father (29.7%). For most children, their parents were still alive (95.6% for mother and 86.7% for father). Most children (71.7%) lived in homes with electricity. Place of residence was reviewed for participants with and without electricity, and presence and lack of electricity was strongly associated with urban and rural residence, respectively (data not shown).

Clinical Characteristics

Almost half the participants had moderate or severe acute malnutrition (SAM; 46.0%; Table 1) and were present in each of the five entry points, not just the malnutrition entry point (data not shown). Although 347 (16.0%) children had previous hospitalizations, only 82 (3.8%) had been recently admitted (within the previous 3 months). Only 523 (24.1%) participants reported poor health in the previous 3 months, 152 (7.0%) reported recurrent

skin problems and 233 (10.8%) reported missing school due to poor health, although 30.8% reported their child was not old enough to attend school.

HIV Prevalence

Among the 2166 enrolled children, 54 were known CLHIV at study enrollment, with 53 (98%) on ART. The remaining 2112 children were tested, with 40 (1.9%) children testing positive and 2072 children testing negative. HIV prevalence and testing yield for each entry point are shown in Table 2. Prevalence and yield were the highest in index testing (8.2% and 8.2%, respectively), followed by TB clinics (7.9% and 1.8%) and children with SAM (6.5% and 1.4%). Prevalence and yields were the lowest among OVC (2.4% and 0.3%), children with moderate malnutrition (1.5% and 0.5%) and inpatients (3.2% and 0.7%). Prevalence and yield increased with age and were the highest in 10- to 14-year-olds (5.9% and 2.2%) and the lowest in 2- to 4-year-olds (2.3% and 1.6%; Table 3). The highest volume of undiagnosed CLHIV was identified in index testing (n=28), followed by malnutrition (n=5), TB clinic (n=3), inpatient (n=2) and OVC (n=2).

Factors Associated With Undiagnosed HIV Infection

Children enrolled through the index testing entry point were highly associated with undiagnosed HIV [crude odds ratio (cOR), 15.92; 95% CI 7.73–36.08]. Other factors related to undiagnosed HIV included maternal death (cOR 5.65; 95% CI 2.05–13.34), recurrent skin problems (cOR 33.03; 95% CI 15.68–72.01), poor health (cOR 1.86; 95% CI 0.93–3.61), SAM (cOR 3.41; 95% CI 1.74–6.64), missing school (cOR 3.40; 95% CI 1.58–6.84) and urban residency (cOR 4.11; 95% CI 1.65–12.49).

Adjusted odds ratios (aORs) were computed to take into consideration the combined effect of all the above variables. In that analysis, children were more likely to have undiagnosed HIV if they were enrolled through the index testing entry point (aOR 24.44; 95% CI 10.23–63.97), had a deceased mother (aOR 4.47; 95% CI 1.07–15.08), had recurrent skin problems (aOR 16.82; 95% CI 7.78–40.37), had SAM (aOR 4.45; 95% CI 1.90–10.21) or missed school (aOR 5.85; 95% CI 2.06–16.21; Table 4). Other variables including paternal death, poor child health status, age >5 years, urban residence, TB clinic entry point and “ever hospitalized” did not show significant association with undiagnosed HIV in adjusted analysis.

DISCUSSION

HIV prevalence in our study (4.3% overall, 1.9% for undiagnosed HIV) was over 10 times higher than the national prevalence (0.3% in urban Ethiopia, 0.15% for undiagnosed HIV). Pediatric HIV prevalence and testing yield increased with age and were the highest in 10- to 14-year-olds, likely due to missed opportunities and late diagnosis, as well as improving access and coverage of prevention of mother-to-child transmission efforts, although programmatic data on scale and effectiveness of prevention of mother-to-child transmission in Ethiopia are limited. In Ethiopia, 24% of women and 2% of men have had sexual intercourse before 15 years of age,[17] so sexual transmission may also contribute to higher prevalence in 10- to 14-year-olds. Our study highlights missed opportunities in early

infant diagnosis, as 69.2% of the HIV-positive 2- to 4-year-olds were newly diagnosed. Ethiopian pediatric testing guidance can be reviewed to identify strategies to strengthen early infant diagnosis and universal testing in index testing, TB and severe malnutrition entry points, which had yield >1%.

When comparing our findings with published literature from high-prevalence countries, the yield in index testing (8.2%) is consistent with reported yields of 0.9%–18%[6,9,10] and is higher than the pooled positivity from a meta-analysis (3.3%).[6] However, yield among children admitted to inpatient wards in our study (0.7%) is lower than reported yields in high-prevalence countries (up to 23%)[2,6–8] and pooled testing yield from a meta-analysis (12.2%).[6] Although prevalence among all children enrolled from the malnutrition entry point in our study (4.0%) was lower than that reported in high-prevalence countries (pooled prevalence from meta-analysis, 13.1%),[2] children with severe malnutrition were more comparable (6.5%). The high prevalence in TB clinics in our study (7.9%) is consistent with studies from high-prevalence countries (6%–56%)[3,5] but is lower than a previous study from Ethiopia (12%).[4] Although one study in Zimbabwe (a high-prevalence country) found yields up to 18% among OVC <5 years,[11] OVC does not appear high yield in Ethiopia (yield, 0.3%). Some studies from high-prevalence countries focused on children <5 years,[2,11] while our population included children up to 14 years, which may have contributed to the differences in the OVC and malnutrition entry points. These studies also included data collected several years ago, when lower prevention of mother-to-child transmission coverage would have led to more undiagnosed pediatric HIV.

Overall, our findings show that even in low-prevalence countries, index testing, TB clinics and severe malnutrition have a prevalence and yield comparable with high-prevalence countries; universal HTS should be optimized at these entry points. The US President's Emergency Plan for AIDS Relief 2021 guidance notes that while there is no target HIV testing yield for children receiving index testing, the yield is typically higher than the HIV prevalence for children,[18] which was seen in this study (index yield, 8.2% vs. national prevalence, 0.3%). Prevalence and yield among inpatients and OVC programs is much lower than high-prevalence settings. Universal testing at these entry points may not be as effective, and strategies for more targeted testing of higher risk children are needed.

Strategies for targeted testing can include careful family history of HIV infection to determine eligibility for index testing and utilizing factors associated with undiagnosed HIV to develop HIV risk screening tools. In our study, undiagnosed HIV was significantly associated with severe malnutrition, maternal orphan status, recurrent skin problems, missed school and enrollment through index testing. Some of these factors are similar to findings from pediatric risk screening tool studies in Zimbabwe, which found that children with history of hospitalization, poor health in the previous 3 months, recurrent skin infections and orphan status were more likely to have HIV.[19,20] The Zimbabwe studies recruited children only from OPDs, while our study enrolled children from 5 distinct entry points. The Zimbabwe team also found their risk screening tool had lower sensitivity when validated in a community setting, due to lower prevalence of health-related screening items,[21] indicating that factors associated with undiagnosed HIV may vary across entry points. Risk screening

tools need to be developed using factors associated with HIV in their context and validated for the relevant geographic area and target population.

Strengths of this study include the large sample size, although the small sample size of CLHIV limits precision. Findings from this study may not be nationally representative or generalizable due to the study design. Study findings are limited to children whose caregivers consented for HTS and study enrollment and may, therefore, under- or overestimate HIV prevalence and yield; however, the low refusal rate for HTS and study enrollment is reassuring (data on reasons for refusal were not collected). Due to resource limitations, enrollment at high-volume OPD settings was limited to children with malnutrition; therefore, study findings may not be extrapolated to well-nourished children attending OPD settings. Nutritional status assessments were not routinely practiced in some health facilities, especially for children >5 years of age, which may have resulted in lower identification of malnourished children and missed opportunities for HTS and study enrollment. In some facilities, HIV-positive adults at ART clinic were reluctant to bring their children for testing, leading to missed opportunities in index testing. The study did not capture data on HIV status of caregivers for all enrolled children or duration on ART for caregivers of children enrolled through index testing; these data may have provided further insight into improving testing yields and programmatic implementation of index testing, at ART clinic and other entry points. The exclusion of children <2 years of age may have resulted in missed opportunities for diagnosis at these entry points and potentially impacted representativeness of the results. High rates of known CLHIV on ART presented to TB clinics, inpatient wards and malnutrition treatment, indicating that high-quality pediatric HIV services are needed to ensure children are on effective ART and receive appropriate screening and prompt treatment for malnutrition and opportunistic infections.

CONCLUSION

In this study, the highest pediatric HIV prevalence, testing yield and numbers of CLHIV identified were in children presenting for index testing, TB clinics and severe malnutrition. Index testing is a critical strategy for pediatric case finding in low-prevalence countries such as Ethiopia. Strategies and resources can prioritize minimizing missed opportunities in implementing universal testing for very sick children (TB, severe malnutrition). HIV screening tools to target testing to high-risk children could be helpful to improve testing yield in low-prevalence countries in inpatient wards, children with moderate malnutrition and OVC programs, using factors associated with undiagnosed HIV.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Sociodemographic and Clinical Characteristics of Study Participants (n=2166)

Characteristic	n	%
Age group		
2–4 years	568	26.2
5–9 years	761	35.1
10–14 years	837	38.6
Sex		
Female	1062	49.0
Male	1104	51.0
Caregiver		
Mother	1213	56.0
Father	644	29.7
Sibling	72	3.3
Grandparent	119	5.5
Uncle/aunt	92	4.2
Other	26	1.2
Mother		
Alive	2071	95.6
Deceased	89	4.1
Unknown	4	0.2
Missing	2	0.1
Father		
Alive	1879	86.7
Deceased	244	11.3
Unknown	43	2.0
Home electricity		
Yes	1553	71.7
No	613	28.3
Nutritional status * using both weight-for-height or MUAC		
SAM	475	21.9
Moderate acute malnutrition	521	24.1
Normal	1170	54.0
History of hospitalization		
Yes	347	16.0
No	1819	84.0
Hospitalization in the previous 3 months		
Yes	82	3.8
No	2084	96.2
Poor health for the previous 3 months		
Yes	523	24.1
No	1643	75.9

Characteristic	n	%
Recurrent skin problems		
Yes	152	7.0
No	2014	93.0
Missed school due to poor health		
Yes	233	10.8
No	1266	58.4
Not applicable †	667	30.8
HIV status		
Known positive	54	2.5
New positive	40	1.8
New negative	2072	95.7
Total	2166	100.0

* The Federal Democratic Republic of Ethiopia Ministry of Health (FMOH). Guidelines for the management of acute malnutrition, FMOH, July 2016.

† Child not old enough to attend school.

Table 2.

HIV Prevalence and Testing Yield by Entry Point (n=2166)

Entry Point	Enrolled Known Positive	Enrolled New Positive	Enrolled New Negative	Overall HIV Prevalence, %* (95% CI)	Prevalence Among the Undiagnosed (HIV Testing Yield), %† (95% CI)
Inpatient (n=308)	8	2	298	3.2 (0.2–2.4)	0.7 (0.2–2.4)
Malnutrition (n=618)	20	5	593	4.0 (2.8–5.9)	0.8 (0.4–1.9)
Severe	16	4	290	6.5 (4.2–9.8)	1.4 (0.5–3.4)
Moderate	2	1	198	1.5 (0.5–4.3)	0.5 (0.1–2.8)
Others‡	2	0	105	1.9 (0.5–6.6)	0 (0.0–3.5)
TB clinic (n=177)	11	3	163	7.9 (4.8–12.8)	1.8 (0.6–5.2)
Index testing (n=340)	0	28	312	8.2 (5.8–11.6)	8.2 (5.8–11.6)
OVC (n=723)	15	2	706	2.4 (1.5–3.7)	0.3 (0.1–2.6)
Total (n=2166)	54	40	2072	4.3 (3.6–5.3)	1.9 (1.4–2.6)

*Overall prevalence=(enrolled new positives+enrolled known positives)/(enrolled new positives+enrolled known positives+enrolled new negatives).

†Prevalence among the undiagnosed (testing yield)=enrolled new positives/(enrolled new positives+enrolled new negatives).

‡Children classified by healthcare workers as malnourished but who had normal anthropometric measurements at time of study enrollment.

Table 3.

HIV Prevalence and Testing Yield in Children 2–14 Years by Demographic and Clinical Characteristic

Characteristic	Enrolled Known Positive	Enrolled New Positive	Enrolled New Negative	Overall HIV Prevalence, %* (95% CI)	HIV Testing Yield, %† (95% CI)
Age					
2–4 years	4	9	555	2.3 (1.3–3.9)	1.6 (0.8–3.0)
5–9 years	19	13	729	4.2 (3.0–5.9)	1.8 (1.0–3.0)
10–14 years	31	18	788	5.9 (4.5–7.7)	2.2 (1.4–3.5)
Sex					
Female	28	19	1015	4.4 (3.3–5.8)	1.8 (1.2–2.9)
Male	26	21	1057	4.3 (3.2–5.6)	1.9 (1.3–3.0)
Maternal status					
Alive	40	34	1997	3.6 (2.9–4.5)	1.7 (1.2–2.3)
Deceased	14	6	69	22.5 (15.0–32.2)	8.0 (3.7–16.4)
Unknown	0	0	4	0 (0–49.0)	0 (0–40.0)
Paternal status					
Alive	38	33	1808	3.8 (3.0–4.7)	1.8 (1.3–2.5)
Deceased	14	6	224	8.2 (5.4–12.3)	2.6 (1.2–5.6)
Unknown	2	1	40	7.0 (2.4–18.6)	2.4 (0.4–12.6)
Place of residence					
Urban	47	35	1471	5.3 (4.3–6.5)	2.3 (1.7–3.2)
Rural	7	5	601	2.0 (1.1–3.4)	0.8 (0.4–1.9)
Nutritional status					
Severe malnutrition	23	18	434	8.6 (6.4–11.5)	4.0 (2.5–6.1)
Moderate malnutrition	11	3	507	2.7 (1.6–4.5)	0.6 (0.2–1.7)
Normal	20	19	1131	3.3 (2.4–4.5)	1.7 (1.1–2.6)
Poor health					
Yes	32	15	476	9.0 (6.8–11.7)	3.1 (1.9–5.0)
No	22	25	1596	2.9 (2.2–3.8)	1.5 (1.0–2.3)
Recurrent skin problem					
Yes	21	22	109	28.3 (21.7–35.9)	16.8 (11.4–24.1)
No	33	18	1963	2.5 (1.9–3.3)	0.9 (0.6–1.4)

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Characteristic	Enrolled Known Positive	Enrolled New Positive	Enrolled New Negative	Overall HIV Prevalence, %* (95% CI)	HIV Testing Yield, %† (95% CI)
Missed school					
Yes	27	11	195	16.3 (12.1–21.6)	5.3 (3.0–9.3)
No	20	16	1230	2.8 (2.1–3.9)	1.3 (0.8–2.1)
Not applicable	7	13	647	3.0 (1.9–4.6)	2.0 (1.2–3.3)
Total	54	40	2072	4.3 (3.6–5.3)	1.9 (1.4–2.6)

*Overall prevalence = (Enrolled new positives + Enrolled known positives)/(Enrolled new positives + Enrolled known positives + Enrolled new negatives).

†=Testing yield = Enrolled new positives/(Enrolled new positives + enrolled new negatives).

Table 4.

Factors Associated With HIV Among Newly Tested Children (n=40)

Variable	cOR	95% CI for cOR	*P* Value	aOR	95% CI for aOR	*P* Value
Index testing entry point	15.92	7.73–36.08	<0.01	24.44	10.23–63.97	<0.01
TB clinic entry point	3.27	0.72–11.07	0.08			
Mother deceased	5.65	2.05–13.34	<0.01	4.47	1.07–15.08	0.02
Recurrent skin problem	33.03	15.68–72.01	<0.01	16.82	7.78–40.37	<0.01
Poor health	1.86	0.93–3.61	0.07			
SAM	3.41	1.74–6.64	<0.01	4.45	1.90–10.21	<0.01
Missed school	3.40	1.58–6.84	<0.01	5.85	2.06–16.21	<0.01
Urban residence *	4.11	1.65–12.49	<0.01			

* Presence of electricity used as proxy for urban residence.