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Trends and distribution of HIV incidence among children aged 0-14 years, Uganda, 2015–2023.

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Summary

Background: Uganda aims to achieve zero HIV transmission by 2030. However, HIV infections among children still accounted for 11% of all new HIV infections in 2023. We examined trends and distribution of HIV incidence among children aged 0-14 years, Uganda, 2015–2023.

Methods: We analyzed routinely reported HIV surveillance data from the electronic District Health Information Software Version 2 (DHIS2), 2015–2023. HIV incidence was calculated as the number of children newly diagnosed HIV positive divided by the annual population of the children aged 0-14 years per 100,000 disaggregated by sex, and age group. The significance of trends was determined using Mann-Kendall test.

Results: A total of 63,599 children aged 0-14 years were newly diagnosed HIV positive between 2015 and 2023, with an average of 7,128 children annually. HIV incidence among children initially increased from 33/100,000 in 2015 to peak at 57/100,000 in 2016 then declined to 22/100,000 in 2023 (p=0.01). Females persistently had higher incidences (69/100,000 in 2016, 30/100,000 in 2020, 28/100,000 in 2023) than males (55/100,000 in 2016, 25/100,000 in 2020, 24/100,000 in 2023). Children <5 years (49/100,000 in 2015, 32/100,000 in 2020, 30/100,000 in 2023) had higher rates than other age groups. Female children, aged 10-14 years were the most affected and consistently had higher HIV incidences than female children in other age groups. Kalangala District (117/100,000 in 2015, 83/100,000 in 2019, 120/100,000 in 2022) persistently had high HIV incidence throughout the study period. Districts: Kassanda, Kyenjojo, Luwero; and cities: Fort Portal, Gulu, Lira, and Jinja initially declined in HIV incidence from 2015 to 2020, then increased from 2020 to 2023.

Conclusion: HIV incidence among children aged 0–14 years reduced significantly from 2015 to 2023. Children <5 years and females had higher HIV incidences. We recommend strengthening elimination of mother-to-child transmission program, HIV prevention among females, and more focus on HIV prevention efforts in the more affected districts and cities.

Background

In Uganda, high HIV incidence among children aged 0-14 years accounted for 11% of all new HIV infections in 2023 against the global goal of zero infections by 2030(2,5,6).

High HIV incidence among children is a barrier to achieving global targets of ending HIV/AIDS by 2030 (4).
Uganda has implemented strategies to prevent new HIV infections among children, including Option B+ program and “Start Free, Stay Free, AIDS Free" campaign (6). Despite the HIV prevention strategies, HIV incidence among children has remained high (10,11). Moreover, these strategies have primarily focused on infants and children <2 years of age (12,13). We examined trends and distribution of HIV incidence among children aged 0-14 years, Uganda, 2015–2023 to assess progress towards the global target of zero HIV transmission by 2030.

Methods

Study setting, study design, and data source: Uganda had an estimated population of 44 million as of 2023. The overall HIV prevalence is 5.1% with females (6.5%) having a higher prevalence than males (3.6%) as of 2022 (5). The country has 15 non-administrative regions divided into districts and cities. HIV prevalence across the regions varies from 2.3% to 8.5% (5). We analysed routinely collected HIV surveillance data from the District Health Information Software Version 2 (DHIS2). Among other parameters, the DHIS2 includes aggregated data on the number who newly tested HIV positive disaggregated by age, sex, region, and district. We used aggregated monthly data on the number who newly tested HIV positive for the age group 0-14 years to achieve our study objectives.
Study variables, data abstraction, and data analysis: We abstracted and exported data to Microsoft Excel™ and STATA 16, from the health unit monthly report, also known as HMIS 105, 2015–2023. Data for each period was disaggregated into national, regional, district, sex (female and male), and age groups (<5 years, 5-9 years, 10-14 years). We calculated the HIV incidence as the number of children newly diagnosed as HIV positive divided by the annual population of children aged 0-14 years for the nation, and disaggregated by district, sex, and age group per 100,000 from 2015 to 2023. We obtained the population statistics for each stratum from the Uganda Bureau of Statistics (14). To further conceptualize findings, we abstracted data on reporting rates, calculated as the percentage of complete monthly reports divided by the number of expected reports from 2015 to 2023. We used line graphs to demonstrate trends for overall (national), sex, age group, and regional HIV incidences. We determined the significance of each trend using the Mann-Kendall (MK) significance test. Choropleth maps per region and district were generated using Quantum Geographic Information Software (QGIS) to demonstrate the spatial distribution of HIV incidence among children from 2015 to 2023.
Ethical considerations: Our study utilized routinely collected aggregated program surveillance data that did not have any personal identifiers. We obtained permission to use the HMIS data from the Ministry of Health Resource Centre which has the overall mandate to collect and store health-related information. Additionally, the U.S. Centers for Disease Control and Prevention (CDC) Center for Global Health determined our study was non-research whose primary intention was to address public health

problems. We stored data in password-protected computers and data was not shared with anyone outside the investigation team.

Results

Trends of HIV incidence among children aged 0-14 years, Uganda, 2015–2023

From 2015 to 2023, there were 63,599 children aged 0-14 years newly diagnosed HIV positive with an annual average of 7,128 children during the study period (Table 1). The overall HIV incidence was 35/100,000. Females (average HIV incidence=42/100,000) and <5-year-old (average HIV incidence=45/100,000) were the most affected throughout the study period (Figure 1).

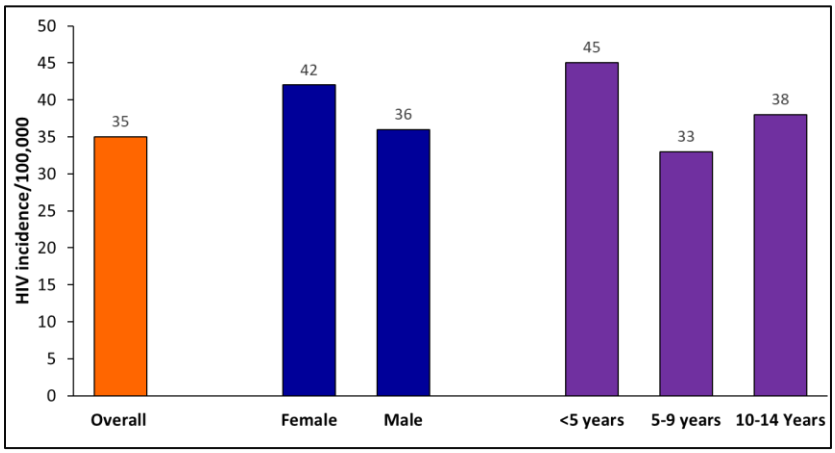

Figure 1: Overall HIV incidence among children aged 0-14 years (with further disaggregation by gender and age group), Uganda, 2015–2023

There was an initial increase in the overall HIV incidence from 33/100,000 to peak at 57/100,000 in 2016 and 56/100,000 in 2017, thereafter declined to 56/100,000 in 2023 (Figure 2A). From 2020 to 2023, HIV incidence remained constant. There was significant national overall decline in the HIV incidence among children aged 0-14 years from 2015 to 2023 (p=0.01). Outpatient reporting rates increased from 61% in 2015 to 85% in 2023.

From 2015 to 2023, HIV incidence among female children aged 0-14 years was persistently higher than that of male children aged 0-14 years throughout the study period. HIV incidence among female children initially increased from 34/100,000 in 2015, peaked at 69/100,000 in 2016 then declined to 28/100,000 in 2023 (p=0.02) (Figure 2B). HIV incidence among male children initially increased from 38/100,000 in 2015 to peak at 58/100,000 in 2017 then declined to 24/100,000 in 2023 (p=0.02). Children <5 years old had the highest HIV incidence from 2015 to 2023 in comparison to those aged 5-9 years and 10-14 years (Figure 2C). There was a general declining

trend observed in all age groups: <5 years (p=0.01), 5-9 years (p=0.02), 10-14 years (p=0.03). Female children aged 10-14 years had the highest incidence than other age groups throughout the study period (Figure 2D).

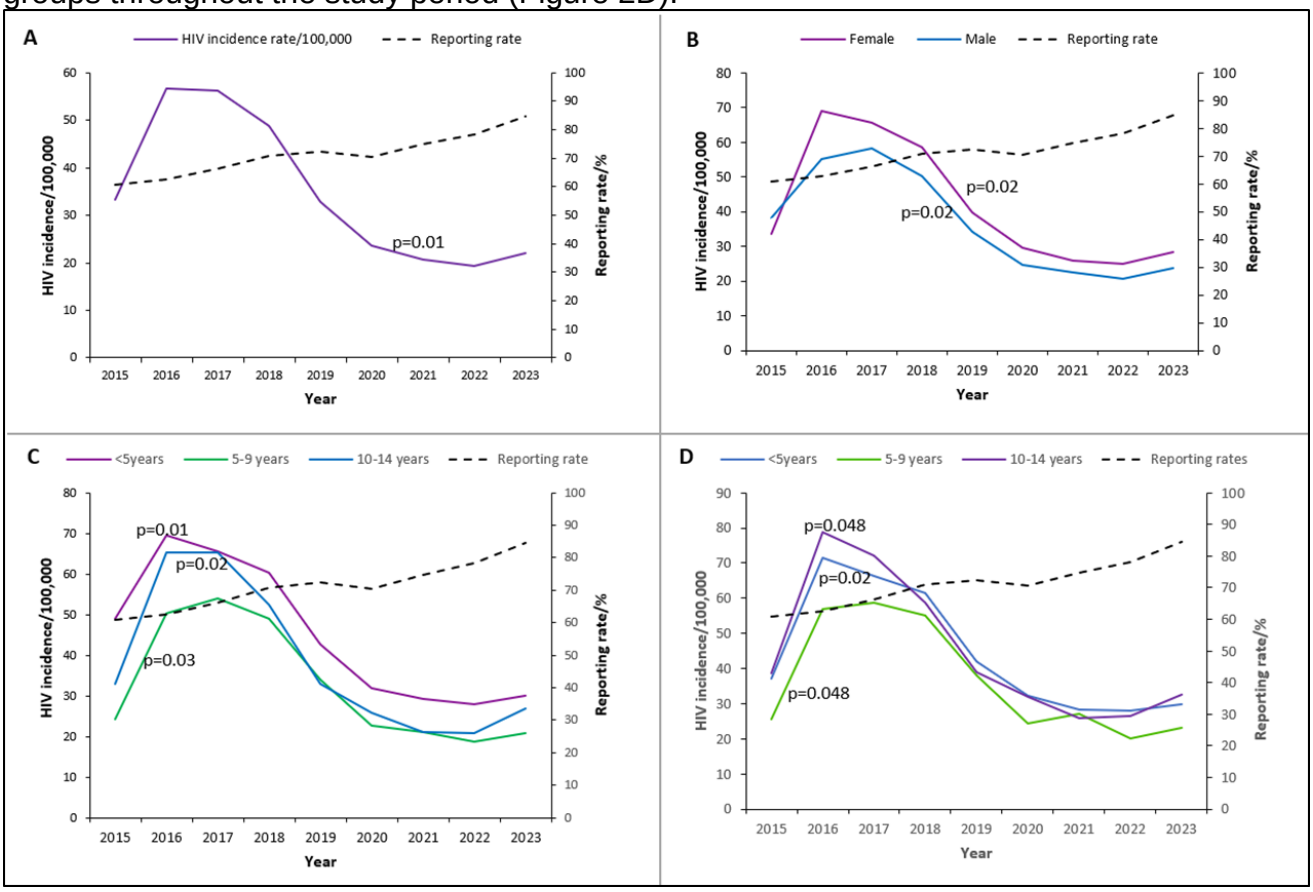

Figure 2: HIV incidence among children aged 0-14 years, Uganda, 2015-2023. Overall trends (A), and disaggregated by sex (B) and age (C). HIV incidence among female children was further disaggregated by age group (D)

Spatial distribution of HIV incidence among children aged 0-14years, Uganda, 2015–2023

Kalangala District persistently had high HIV incidence among children throughout the study period (Figure 3). Districts of Kassanda, Luwero, and Kyenjonjo; and cities of Jinja, Gulu, Lira and Fort Portal had increasing HIV incidence from 2021 to 2023.

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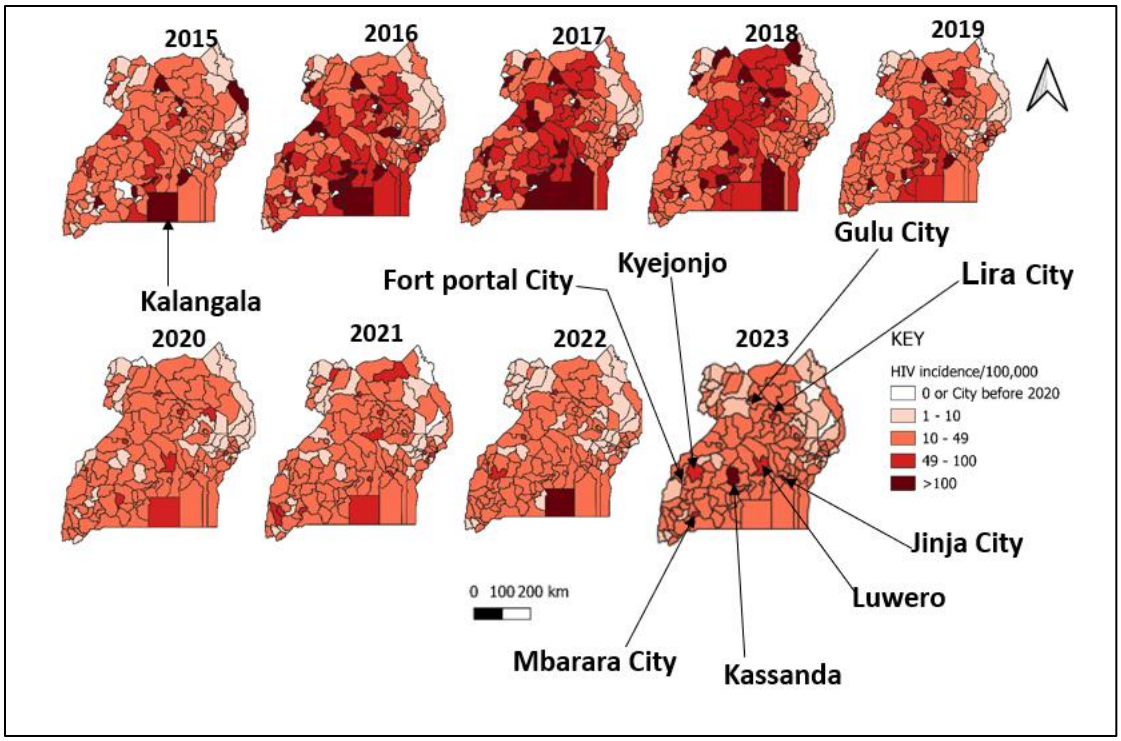

Figure 3: Spatial distribution of HIV incidence among children aged 0-14 years, by district, Uganda, 2015–2023

Discussion

This study found that HIV incidence among children aged 0–14 years in Uganda significantly declined from 2015 to 2023, but the rate of decline stagnated from 2020 to 2023. The highest HIV incidence was observed among female children, particularly those aged 10–14 years, and children under five years old. While overall incidence declined, districts of Kalangala, Kassanda, Kyenjojo, Luwero, and cities of Jinja, Gulu, Fort Portal and Lira experienced an increase in new infections from 2020 to 2023.

Female children persistently had higher HIV incidence than male children throughout the study period. Additionally, female children, aged 10-14 years are the most affected and consistently had higher HIV incidences throughout the study period. This is in concurrence with the literature that females are more at risk of contracting HIV than their male counterparts due to social and physiological factors (20–23). Children <5 years old are more affected than the other age groups throughout the entire study period due to the mother-to-child transmission of HIV infections which continue to account for the majority of infections under this age group (1,23,24). Prevention of HIV among children should focus on ensuring universal HIV testing during antenatal care, consistent ART adherence among pregnant women, and early infant diagnosis (EID).

Targeted interventions are needed in areas with rising pediatric HIV cases, particularly urban centers like Jinja, Gulu, and Lira, and districts such as Kalangala and Kassanda, where high-risk populations and limited services contribute to transmission.

Study limitations: Descriptive analysis of routinely reported surveillance data is liable to reporting bias caused by delays in reporting or non-reporting of new HIV cases by health facilities which may result in the under or over-estimation of HIV incidence. The measure of HIV incidence in this study relied on the number of children who tested HIV positive for the first time per 100,000 population which is not a World Health Organization recommended measure of incidence in a population (24,25). Use of recency assays among other methods is recommended for estimation of HIV incidence in populations. However, Uganda adopted recency testing in 2022 for individuals who have tested HIV positive but only for those aged 15 years and more. Yet, this analysis aimed to analyze trends and distribution of HIV incidence among children aged 0-14 years, 2015–2023, using HMIS data.

Conclusion: Uganda registered a significant decline in HIV incidence among children aged 0-14 years, 2015–2023. Stagnation in the decline of HIV incidence, 2020–2023 renders reaching the global target of zero HIV new infections by 2030 uncertain if prevention strategies are not revamped. Children <5 years old and females ages 10-14 years remain the largest contributors to high HIV incidence among children. There was increasing HIV incidence, 2020–2023 in the districts of Kassanda, Kyenjojo, Luwero, and cities of Fort Portal, Jinja, Gulu, Mbarara, and Lira. We recommend strengthening the EMTCT program to full pediatric HIV care and treatment coverage to all health facilities in the country; targeted HIV prevention among girls aged 10-14 years; and revamping HIV prevention efforts in the more affected districts and cities if we are to have zero new HIV infections among children by 2030.

Conflict of interest: The authors declare that they no conflict of interest

Authors' contribution: DW conceptualized the idea, analyzed and interpreted the data, and drafted the manuscript. EM analyzed part of the data. RM, BK, LB and ARA reviewed the bulletin article for intellectual content.

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References

1. Unaids. Fact sheet 2024 - Latest global and regional HIV statistics on the status of the AIDS epidemic. 2024;
2. UNAIDS. Global HIV & AIDS statistics — Fact sheet [Internet]. Fact Sheet 2023. 2023 [cited 2024 Sep 7]. p. 1–6. Available from: https://www.unaids.org/en/resources/fact-sheet
3. UNAIDS. UNAIDS data 2021. 2021. 4–38 p.

4. UNAIDS. THE GLOBAL ALLIANCE TO END AIDS IN CHILDREN [Internet]. 2021 [cited 2024 Jun 18]. Available from: https://www.unaids.org/sites/default/files/media_asset/20110609_JC2137_Global-Plan-Elimination-HIV-Children_en_1.pdf
5. Commission UA. HIV Fact Sheet. 2023;2023(December 2022):31–3. Available from: https://www.aacc.nche.edu/wp-content/uploads/2023/03/AACC2023_FastFacts.pdf
6. UNAIDS. Start Free, Stay Free, AIDS Free Final report on 2020 targets. Unaids [Internet]. 2021;(7):1–96. Available from: https://www.unaids.org/sites/default/files/media_asset/2021_start-free-stay-free-aids-free-final-report-on-2020-targets_en.pdf
7. Sciences H. Implementation of lifelong ART (Option B +) for Prevention of Mother-to-Child Transmission (PMTCT) of HIV in Uganda Aggrey David Mukose Implementation of lifelong ART (Option B +) for Prevention of Mother-to-Child Transmission (PMTCT) of HIV in Ug. 2024;
8. Miller K, Muyindike W, Matthews LT, Kanyesigye M, Siedner MJ. Program Implementation of Option B+ at a President's Emergency Plan for AIDS Relief-Supported HIV Clinic Improves Clinical Indicators But Not Retention in Care in Mbarara, Uganda. https://home.liebertpub.com/apc [Internet]. 2017 Aug 1 [cited 2024 Nov 23];31(8):335–41. Available from: https://www.liebertpub.com/doi/10.1089/apc.2017.0034
9. Miller K. Program Implementation of Option B+ at a PEPFAR-Supported HIV Clinic Improves Clinical Indicators but Not Retention in Care in Mbarara, Uganda. 2018 Mar 27 [cited 2024 Nov 23]; Available from: https://dash.harvard.edu/handle/1/41973472
10. MOH UGANDA. Impact of the National Program for Prevention of Mother - to Child Transmission of HIV in Uganda, Evaluation Report 2017 - 2019. 2022;(January). Available from: https://www.health.go.ug/wp-content/uploads/2022/08/PMTCT-E-REPORT_.pdf
11. Uganda BF. HIV Clinic Quarterly Performance Report, Jan-Mar 2024. Vol. 4. 2024.
12. Consolidated Guidelines for Prevention. 2016;(December).
13. Uganda Ministry of Health. Consolidated Guidelines for the Prevention and Treatment of HIV and AIDS in Uganda. Glob Health Action. 2022;10(1).
14. UBOS. The National Population and Housing Census 2014 – Main Report , Kampala, Uganda. 2016;
15. Kasamba I, Mugisha J, Abaasa A, Makanga R, Ruzagira E, Kaleebu P, et al. Thirty years of change in HIV incidence among adults in the Kyamulibwa General Population Cohort in rural southwest Uganda, 1989-2021. Int J Infect Dis. 2023 Apr 1;129:125–34.
16. Joshi K, Lessler J, Olawore O, Loevinsohn G, Bushey S, Tobian AAR, et al. Declining HIV incidence in sub-Saharan Africa: a systematic review and meta-analysis of empiric data. J Int AIDS Soc [Internet]. 2021 Oct 1 [cited 2024 Nov 10];24(10):e25818. Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC8528667/
17. Grabowski MK, Nakigozi G, Nalugoda F, Quinn T, Kigozi G, Gray RH, et al. Combination HIV prevention and HIV incidence in Rakai, Uganda. Top Antivir Med [Internet]. 2017;25(1):15s. Available from: https://www.embase.com/search/results?subaction=viewrecord&id=L616686157&from=export
18. Kagaayi J, Chang LW, Ssempijja V, Grabowski MK, Ssekubugu R, Nakigozi G, et al. Impact of combination HIV interventions on HIV incidence in hyperendemic fishing communities in Uganda: a prospective cohort study. Lancet HIV [Internet]. 2019 Oct 1 [cited 2024 Nov 15];6(10):e680–7. Available from: http://www.thelancet.com/article/S2352301819301900/fulltext
19. UNICEF. Reimagining a resilient HIV response for children, adolescents and pregnant women living with HIV. World AIDS Day Rep 2020 [Internet]. 2020;(November):16. Available from: http://www.childrenandaids.org/sites/default/files/2020-12/2020 World AIDS Day Report.pdf
20. Vithalani J, Herreros-Villanueva M. HIV Epidemiology in Uganda: survey based on age, gender, number of sexual partners and frequency of testing. Afr Health Sci [Internet]. 2018 Sep 1 [cited 2024 Sep 6];18(3):523. Available from: /pmc/articles/PMC6307011/
21. Dellar RC, Dlamini S, Karim QA. Adolescent girls and young women: Key populations for HIV epidemic control. J Int AIDS Soc. 2015;18(2):64–70.
22. Yi TJ, Shannon B, Prodger J, McKinnon L, Kaul R. Genital immunology and HIV susceptibility in young women. Am J Reprod Immunol. 2013 Feb;69(SUPPL.1):74–9.
23. Global T, Progress A, Aids E. TRANSFORMING VISION INTO The Global Alliance Progress Report on.
24. Uganda AIDS Commission. National HIV and AIDS Strategic Plan 2020/2021-2024/25. Ending the HIV and AIDS epidemics: communities at the forefront. Kampala, Uganda AIDS Commission. 2020;(August 2020). Available from: http://www.uac.go.ug
25. Agiresaasi A. Region's Remoteness Thwarts Efforts to Eliminate HIV [Internet]. 2022. Available from: https://globalpressjournal.com/africa/uganda/fishing-community-keeps-catching-hiv/