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Determinants of partner and family-based index case HIV testing among adults receiving antiretroviral therapy in Asella, Ethiopia

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Abstract

Index case testing supports people living with HIV to facilitate voluntary testing for sexual partners and family members. Evidence on its uptake and determinants in Asella, Ethiopia, is limited. We conducted a facility-based analytical cross-sectional study among adults receiving antiretroviral therapy at three health facilities from 7 August to 30 September 2023. Systematic random sampling and face-to-face interviews were used. Logistic regression was performed using SPSS version 27. Of 422 sampled clients, 410 were analysed; 294/410 (71.7%, 95% CI 67.3–76.1) reported that at least one family member or sexual partner had been tested. In multivariable analysis, married participants (AOR 2.97, 95% CI 1.06–8.30), divorced or widowed participants (AOR 6.36, 95% CI 1.79–22.60), HIV-status disclosure (AOR 4.20, 95% CI 1.69–10.40), provider-led counselling and elicitation (AOR 4.96, 95% CI 2.20–11.10), and good HIV knowledge (AOR 3.00, 95% CI 1.50–5.71) were independently associated with testing. Uptake was substantial but incomplete. Strengthening provider-led counselling, supporting safe disclosure, and improving HIV-related knowledge may increase index case testing coverage.

Introduction

Human immunodeficiency virus (HIV) remains a major public health challenge, particularly in sub-Saharan Africa. The global HIV response has adopted ambitious testing, treatment, and viral suppression targets, including the UNAIDS 95–95–95 targets for 2025 [1, 2]. Achieving the first of these targets requires identifying people living with HIV who have not yet been diagnosed, including those who may be reached through the social and household networks of people already receiving HIV care [1–5]. National strategic plans and global operational guidance prioritize targeted strategies to close the testing gap [3–5].

Index case testing is a targeted approach in which a person living with HIV, referred to as the index client, is supported to facilitate voluntary HIV testing among sexual partners, children, and other family members who may have been exposed [3, 6, 7]. The approach can identify previously undiagnosed infections and link newly diagnosed individuals to treatment and prevention services [6–10]. Evidence from diverse programme settings demonstrates that family-centred index testing can yield high diagnostic positivity, particularly among children and young people who might otherwise remain unreached [4, 7, 9, 10].

In Ethiopia, partner and family-based index testing has been incorporated into national HIV testing guidelines [5]. However, uptake varies considerably between settings [8, 11–15]. Studies across Sub-Saharan Africa and various regions in Ethiopia—including Oromia, Woliso, Nekemte, Gedeo, and Wolaita—have reported different levels of index testing and identified factors such as HIV-status disclosure, counselling quality, knowledge, duration on ART, and perceived benefits as key correlates [8, 11–21]. Such variation may reflect differences in programme implementation, population characteristics, and definitions of index testing [8, 11, 16].

Despite the importance of targeted testing for reaching potentially exposed family members and partners [3, 4], evidence specific to urban ART clinics in Asella Town is limited. The present study therefore assessed the proportion of adults receiving ART who reported partner or family HIV testing through the index case approach and identified factors independently associated with testing uptake.

Results

Participant characteristics

Of the 422 clients sampled, 410 were included in the analysis. Participants were predominantly aged 25–44 years (265/410, 64.6%) and female (219/410, 53.4%). More than half lived in urban areas (216/410, 52.7%), had secondary education or above (260/410, 63.4%), and were married or cohabitating (225/410, 54.9%) (Table 1).

Table 1
Selected sociodemographic characteristics of adults receiving ART in Asella Town, Ethiopia (n = 410).

Characteristic	n	%
18–24	56	13.7
25–34	142	34.6
35–44	123	30.0
> 45	89	21.7
Male	191	46.6
Female	219	53.4
Urban	216	52.7
Rural	194	47.3
Illiterate	18	4.4
Primary school	132	32.2
Secondary and above	260	63.4
Single	105	25.6
Married/cohabitating	225	54.9
Divorced/widowed	80	19.5
Family size < 5	230	56.1
Family size ≥ 5	180	43.9

Magnitude of index case testing

Overall, 294 of 410 participants (71.7%, 95% CI 67.3–76.1) reported that at least one family member or sexual partner had been tested for HIV through the index case approach. Among participants with biological children younger than 15 years, 81.9% reported that at least one child had been tested.

Factors associated with index case testing

In the multivariable logistic regression model, marital status, HIV-status disclosure, provider-led counselling and elicitation, and HIV knowledge remained independently associated with index case testing. Compared with single participants, married participants had higher odds of reporting index case testing (AOR 2.97, 95% CI 1.06–8.30), as did divorced or widowed participants (AOR 6.36, 95% CI 1.79–22.60). Participants who had disclosed their HIV status had higher odds of index case testing than those who had not disclosed (AOR 4.20, 95% CI 1.69–10.40). Provider-led counselling and elicitation was also strongly associated with testing (AOR 4.96, 95% CI 2.20–11.10). Participants with good HIV knowledge had threefold higher odds of index case testing (AOR 3.00, 95% CI 1.50–5.71).

Table 2
Multivariable logistic regression analysis of factors associated with partner and family-based index case HIV testing (n = 410)

Predictor	Category	Tested yes/no	COR (95% CI)	AOR (95% CI)
Marital status	Single	25 / 80	1.00	1.00
	Married/cohabitating	198 / 27	23.5 (12.8–42.9)	2.97 (1.06–8.30)
	Divorced/widowed	71 / 9	25.2 (11.0–57.7)	6.36 (1.79–22.60)
HIV-status disclosure	No	97 / 110	1.00	1.00
	Yes	197 / 6	37.2 (15.8–87.7)	4.20 (1.69–10.40)
Provider-led counselling/elicitation	No	36 / 87	1.00	1.00
	Yes	258 / 29	21.5 (12.5–37.1)	4.96 (2.20–11.10)
HIV knowledge	Poor	98 / 93	1.00	1.00
	Good	196 / 23	8.1 (4.8–13.6)	3.00 (1.50–5.71)

Note: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval. Hosmer–Lemeshow goodness-of-fit test: p = 0.76; omnibus model test: p < 0.001.

Discussion

In this multi-facility study in Asella Town, 71.7% of adults receiving ART reported that at least one family member or sexual partner had been tested through the index case approach. The estimate indicates substantial uptake but also a meaningful gap in reaching potentially exposed contacts. The observed proportion aligns with regional data from Sub-Saharan Africa and falls within the range reported across Ethiopian settings [11–16, 20]. For example, index testing uptake was reported at 85.2% in Nekemte [18], 96.5% in Woliso [19], 80.2% in Oromia [16], 72.8% in Arba Minch [13], and 65.6% in Shashemene [12]. Variations in study populations, outcome definitions, health facility protocols, and study period timing account for these differences [11, 14–17].

HIV-status disclosure was strongly associated with index case testing. Participants who had disclosed their status had more than fourfold higher adjusted odds of reporting contact testing. This finding reinforces systematic review evidence and regional studies showing disclosure to be an essential catalyst for partner notification [22–25]. Disclosure reduces secrecy, facilitates risk communication, and encourages contacts to seek testing [22, 23]. However, as highlighted in WHO guidelines and global stigma evaluations, disclosure counselling must remain voluntary, safe, and confidential to minimize risks of intimate partner violence or discrimination [3, 26].

Provider-led counselling and elicitation showed one of the strongest associations in our study. Participants who received these services had nearly fivefold higher odds of index testing. Trained healthcare providers play a central role in guiding clients through contact tracing options, addressing fears, and building trust [6, 7, 10]. Similar observations in Malawi, Kenya, and Ethiopian ART facilities confirm that provider initiative and structured contact elicitation significantly improve notification yields [10–12, 18].

Good HIV knowledge was also associated with higher uptake. Participants with good knowledge had threefold higher adjusted odds of testing. Comprehending HIV transmission, treatment benefits (such as Undetectable = Untransmittable), and secondary prevention encourages index cases to act in the health interest of their families [14, 21, 25]. This finding aligns with health behavior models emphasizing knowledge as a foundational driver of service utilization [21, 24].

Marital status was independently associated with index case testing. Married and previously married (divorced/widowed) clients demonstrated higher odds than single participants. Marital status often correlates with cohabitation, established communication structures, and a higher likelihood of co-parenting, making contact elicitation more direct compared to non-spousal or casual relationships [16, 18, 22].

Strengths and Limitations

This study adhered to observational reporting standards (STROBE guidelines), utilized multi-facility sampling, and applied robust statistical validation. However, several limitations should be noted. First, the cross-sectional design precludes establishing temporal causality. Second, contact testing status was reported by index clients rather than verified through medical record matching, introducing potential recall and social desirability bias. Third, facility-based sampling excludes PLHIV not enrolled in care. Finally, diagnostic positivity yields among contacts were not evaluated.

Conclusion

Partner and family-based index case HIV testing reached 71.7% of adults receiving ART in Asella Town. Status disclosure, provider counselling, HIV knowledge, and marital status were primary determinants. ART programmes should strengthen client-centred counselling, support safe disclosure, and routinely integrate structured contact elicitation into clinical care.

Methods

Study design and setting

A facility-based analytical cross-sectional study was conducted from 7 August to 30 September 2023 in the ART clinics of Asella Referral and Teaching Hospital, Rehoboth Private General Hospital, and Asella Health Center in Asella Town, Oromia, Ethiopia. The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [27].

Study population and eligibility

The source population comprised people living with HIV attending ART clinics in Asella Town. Eligible participants were adults aged 18 years or older who had been receiving ART for at least two visits and had a sexual partner, including a spousal or non-spousal partner. New clients without previous follow-up, individuals without a sexual partner, and clients who were severely ill or mentally unable to participate were excluded.

Outcome and explanatory variables

The primary outcome was partner and family-based index case HIV testing, defined in this study as reporting that at least one eligible sexual partner or family member had been tested for HIV through the index case approach. Explanatory variables included sociodemographic characteristics, clinical and treatment-related factors, HIV-status disclosure, HIV knowledge, and health-facility factors including counselling and contact elicitation. HIV knowledge was assessed using 10 questions; a score above the observed mean of 7.42 was categorized as good knowledge" [28].

Sample size and sampling

Sample size (n = 422) was calculated using a single population proportion formula (p = 49%) based on standard survey sampling methodology [15, 29], with a 10% non-response allowance. Systematic

random sampling (k = 11) was applied proportionally across facilities: Asella Referral Hospital (n = 330), Asella Health Center (n = 88), and Rehoboth Hospital (n = 4). A total of 410 complete records were analyzed.

Data collection and analysis

Data were gathered via pre-tested, structured face-to-face interviews by trained non-provider staff. Data entered into Epi-Info were analyzed using IBM SPSS version 27. Multivariable logistic regression was conducted, reporting COR and AOR with 95% CIs. Multicollinearity was ruled out (VIF < 10) to ensure stability of regression estimates [30]. Model fitness was confirmed using the Hosmer–Lemeshow goodness-of-fit test (p = 0.76) and the omnibus test (p < 0.001) as described by Hosmer et al. [31].

Abbreviations

AOR	Adjusted Odds Ratio
ART	Antiretroviral Therapy
CI	Confidence Interval
COR	Crude Odds Ratio
FMOH	Federal Ministry of Health
HIV	Human Immunodeficiency Virus
ICT	Index Case Testing
PNS	Partner Notification Services
PLHIV	People Living with HIV
SPSS	Statistical Package for Social Sciences
UNAIDS	Joint United Nations Programme on HIV/AIDS
VIF	Variance Inflation Factor
WHO	World Health Organization

Declarations

Ethics approval and consent

Ethics Approval and Consent to Participate: Ethical approval for this study was granted by the Institutional Ethical Review Committee (ERC) of the College of Health Sciences, Arsi University on April 10, 2023 (Protocol Approval Number: CoHS/R/37/2023). The study was conducted in strict accordance with the Declaration of Helsinki. Official operational letters of cooperation were obtained from the

administrative offices of Asella Referral and Teaching Hospital, Rehoboth Private General Hospital, and Asella Health Center.

Prospective recruitment of human participants took place between August 7, 2023, and September 30, 2023. Prior to enrollment, all eligible adult participants (≥ 18 years) were provided with a comprehensive explanation of the study objectives, benefits, and potential risks in their local language. Written informed consent was obtained directly from each participant prior to initiating the face-to-face interviews. Participant confidentiality was maintained through anonymized identification codes.

Data availability

The de-identified dataset supporting the findings of this study is not publicly available because it contains sensitive HIV-related information and unrestricted release could compromise participant confidentiality. The dataset is available from the corresponding author on reasonable request, subject to appropriate ethical and data-protection requirements.

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Author contributions

B.G. and A.D. conceived the study and contributed to study design and methodology. B.G. conducted data collection, data curation, statistical analysis and initial interpretation. A.D., M.K., H.B, T.G. and T.A. contributed to validation, interpretation and critical revision of the manuscript. All authors reviewed and approved the final manuscript.

Transparency statement

The authors affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Competing interests

The authors declare no competing interests.

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Consent for publication

Not applicable. No identifiable individual data, photographs or videos are presented in this manuscript.

References

1. **UNAIDS.***The path that ends AIDS: UNAIDS Global AIDS Update 2023*. Geneva: Joint United Nations Programme on HIV/AIDS; 2023.
2. **Bekker LG, et al.** Advancing global health and strengthening the HIV response in the era of the Sustainable Development Goals: the International AIDS Society—Lancet Commission. *Lancet*. 2018;392(10144):312–358.
3. **World Health Organization.***Consolidated guidelines on HIV testing services*. Geneva: World Health Organization; 2019.
4. **PEPFAR.***PEPFAR 2021 Country Operational Plan Guidance for All Operationally Active Countries*. Washington, DC: US Department of State; 2021.
5. **Federal Ministry of Health Ethiopia.***National Guidelines for Comprehensive HIV Prevention, Care and Treatment*. Addis Ababa: FMOH; 2021.
6. **Dalal S, et al.** Improving the efficiency of HIV testing with peer-delivered HIV self-testing and partner notification. *J Int AIDS Soc*. 2017;20(1):21371.
7. **Sharma M, et al.** Assisted partner notification services for populations evident of HIV risk: A systematic review and meta-analysis. *PLOS Med*. 2016;13(8):e1002107.
8. **Ahmed S, et al.** Index case finding facilitates identification and linkage to care of children and young persons living with HIV/AIDS in Malawi. *Trop Med Int Health*. 2017;22(8):1021–1029.
9. **Lasry A, et al.** Scaling up testing for human immunodeficiency virus infection among contacts of index patients—20 countries, 2016–2018. *MMWR Morb Mortal Wkly Rep*. 2019;68(21):474–477.
10. **Hamilton R, et al.** Scalability and yield of index case testing in Kenya: A multi-site prospective cohort. *J Acquir Immune Defic Syndr*. 2020;84(2):145–153.
11. **Mwenda M, et al.** Index testing performance and notification pathways in Zambia. *Trop Med Int Health*. 2021;26(3):312–321.
12. **Shaka MF, Megerso F, Ami B, Daud HA.** Index case testing uptake and determinants among HIV clients attending Shashemene town public health facilities, Southern Ethiopia. *Sci Rep*. 2025;15:18712.
13. **Ezo E, Zeleke M, Ashine TM, Heliso AZ.** Acceptance rate of index case human immunodeficiency virus testing and its associated factors among patients receiving anti-retroviral therapy in Arba Minch Town, Southern Ethiopia. *SAGE Open Nurs*. 2026;12:1–11.
14. **Tetteh JK, et al.** Comprehensive HIV/AIDS knowledge and HIV testing among men in sub-Saharan Africa. *J Biosoc Sci*. 2022;54(4):610–625.
15. **Wegu Y, Sileshi T, Melis T.** Assessment of index case family testing among adults attending ART clinic at Kule Refugee Camp, Southwest Ethiopia. *HIV AIDS (Auckl)*. 2022;14:13–21.

16. **Hussen MA, Kadire D, Kefeni BT, Abdu Z, Chilo E.** Index case HIV testing uptake and its associated factors at Oromia, Ethiopia. *J Int Assoc Provid AIDS Care*. 2024;23:1–10.
17. **Assefa E, Figa Z.** Acceptance of Index Case HIV Testing and Associated Factors among Anti-Retroviral Therapy Patients in Gedeo Zone, Southern Ethiopia. *INQUIRY*. 2024;61:1–9.
18. **Edosa M, Merdassa E, Turi E.** Acceptance of index case HIV testing and its associated factors among HIV/AIDS clients on ART follow-up in West Ethiopia. *HIV AIDS (Auckl)*. 2022;14:451–460.
19. **Uma TH, Bedada HG.** Assessment of partner and family-based index case HIV testing in Woliso Town, Oromia, Ethiopia. *AIDS Care*. 2023;35(9):1322–1328.
20. **Koyra AB.** Prevalence and Factors Associated with Family-Based HIV Index Case Testing in Wolaita Zone, Southern Ethiopia. *medRxiv Preprint*. 2026; doi:10.64898/2026.04.08.26350444.
21. **Teshale AB, et al.** Factors associated with HIV testing uptake among adult populations in Ethiopia: Spatial and multilevel analysis. *PLOS ONE*. 2021;16(3):e0247877.
22. **Medley A, et al.** Rates, barriers and outcomes of HIV status disclosure to sexual partners in developing countries: A systematic review. *Bull World Health Organ*. 2004;82(4):299–307.
23. **Deribe K, et al.** Disclosure of HIV status to sexual partners and associated factors among HIV-positive cohort in Ethiopia. *BMC Public Health*. 2008;8:81.
24. **Obermeyer CM, et al.** Facilitators and barriers to HIV testing in health facilities in sub-Saharan Africa. *Am J Public Health*. 2011;101(12):2339–2346.
25. **Girma S, et al.** ART duration, adherence, and HIV status disclosure as predictors of secondary transmission prevention behavior in Ethiopia. *AIDS Res Ther*. 2020;17:45.
26. **Katz IT, et al.** Impact of HIV-related stigma on treatment adherence and disclosure: A systematic review. *J Int AIDS Soc*. 2013;16(3Suppl 2):18640.
27. **von Elm E, et al.** The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLOS Med*. 2007;4(10):e296.
28. **Tetteh JK, et al.** Comprehensive HIV/AIDS knowledge and HIV testing among men in sub-Saharan Africa. J Biosoc Sci. 2022.
29. **Kish L.***Survey Sampling*. New York: John Wiley & Sons; 1965.
30. **Vittinghoff E, McCulloch CE.** Relaxing the rule of ten events per variable in logistic and Cox regression. *Am J Epidemiol*. 2007;165(6):710–718.
31. **Hosmer DW, Lemeshow S, Sturdivant RX.***Applied Logistic Regression*. 3rd ed. Hoboken: John Wiley & Sons; 2013.