

# Acceptance of Index Case HIV Testing and Its Associated Factors Among HIV/AIDS Clients on ART Follow-Up in West Ethiopia: A Multi-Centered Facility-Based Cross-Sectional Study

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**Background:** Index case HIV/AIDS testing (ICHT) is a good approach for addressing and improving the efficiency and yield of testing among high-risk populations. Partners and families of people living with HIV/AIDS are among the high-risk populations for contracting HIV/AIDS. However, there is limited study on index case HIV testing among HIV patients attending Anti-Retroviral Therapy (ART). Hence, this study was aimed at assessing the magnitude and factors associated with ICHT among HIV patients attending ART in Nekemte town public health facilities.

**Methods:** An institution-based cross-sectional study was conducted at Nekemte town public health facilities from May 20 to July 21, 2020. A systematic random sampling method was used to select the study participants. Multivariable logistic regression analysis was used to determine the predictors of acceptance of ICHT among HIV patients.

**Results:** The ICHT acceptance was 85.2% (95% CI=84.9–91.1%). Disclosure of their HIV status (AOR=9.74, 95% CI=4.11–23.06), having good knowledge of ICHT (AOR=4.70, 95% CI=1.92–11.61), believing HIV index case testing has benefits (AOR=3.43, 95% CI=1.27–9.29), and being on ART for more than 1 year (AOR=4.78, 95% CI=2.13–10.76) were significantly associated with index case HIV test acceptance.

**Conclusion and Recommendation:** This study revealed a significant proportion of index case HIV testing acceptance. HIV status disclosure of index cases, knowledge of ICHT, the perceived benefit of ICHT, and long duration on ART were found to be significantly associated with acceptance of ICHT. Hence, it is essential to give attention to counseling on the importance of ICHT, enhance people living with HIV (PLWHIV) to have positive belief on the advantage of ICHT, strengthen disclosure counseling, and assist HIV status disclosure in health facilities.

**Keywords:** index case HIV test acceptance, ART, HIV/AIDS, Nekemte, Ethiopia

## Background

The human immune deficiency virus (HIV) continues to be a major global public health concern, with nearly 38 million individuals living with HIV/AIDS globally, of which over 16% of people do not know their status. More than two-thirds (68%) of people living with HIV are found in sub-Saharan Africa.<sup>1</sup>

Ethiopia has established the global 90–90–90 targets to reduce new HIV infection, achieve elimination of the HIV/AIDS epidemic, and end AIDS as a public health threat by 2030.<sup>2,3</sup> Ethiopia has considered HIV/AIDS as one of the immediately notifiable diseases and established a case-based surveillance system including index case HIV testing.<sup>4</sup> Identifying the potential contributors of new HIV infection such as the most at-risk groups and infected individuals who would have been missed plays a paramount role. Partners and family members of HIV positive clients should be watchful for index case HIV testing and counseling services.<sup>5</sup> Index case testing is defined as when a person with

confirmed HIV infection (index case) is asked to contact family members (children, spouse, sexual partners, siblings, and parents) on their own initiative or assisted by providers.<sup>6</sup> The index case testing has increased uptake of HIV test services and identified partners with an undiagnosed infection. This approach is a key intervention in diagnosing people living with human immune deficiency virus (PLWHIV) and enrolling and sustaining them in treatment and care.<sup>7</sup>

Knowing one's serostatus through an index case HIV test is an important step to adopting safer sexual behaviour which enables PLWHA to protect their partners from acquiring HIV, promote safer sexual practices, and encourage disclosure to sexual partners. Prevention of new HIV infection is essential to avert future care and treatment costs.<sup>8</sup> In Ethiopia, a total of 117,731 index cases were tested from October 1, 2016, to March 31, 2018, and 4,154 people were identified as HIV positive.<sup>9</sup>

There are limited studies on the acceptance index cases HIV test and its associated factors. In addition, the magnitude of index case HIV test and counseling varies from place to place. For instance, a meta-analysis conducted in eight countries on partner notification showed that patients identified an average of two partners each and this resulted in 0.44 partners per index patient getting tested.<sup>10</sup> A study conducted in 12 districts of Zimbabwe on index case testing and partner notification shows that 95% of study participants gave consent to contact their family and partner for HCT.<sup>11</sup> A cross-sectional study done on partner notification in Kenya shows that, among 341 clients who tested HIV-positive, only 205 of them have consent for participating in community settings HTS.<sup>12</sup> In another study conducted in western Kenya on PICT acceptance of HIV-positive caregivers living with children of 18 months to 13 years, only 57% of HIV-positive caregivers gave consent for HIV testing of their children.<sup>13</sup> A study conducted in Lesotho revealed that a total of 7,916 clients diagnosed with HIV (index clients) were approached for family member testing (biological children and sexual partners) in five scale-up districts and 5,937 (75%) consented for home visits.<sup>10</sup> Also, a study conducted in Tanzania showed that 3.9% of index clients refused to list their sexual partners.<sup>14</sup>

A study conducted in Ethiopia revealed that 73% of family members of PLWHIV had been ever tested for HIV, 20% had never been tested for HIV, and 7% of respondents did not know whether their family members had been tested.<sup>8</sup> Another study conducted in Ethiopia showed that 53% of them were willing to provide the referral document to their partners.<sup>15</sup> Another study done in Ethiopia on PICT acceptance show that the PICT acceptance level among pregnant mothers was 70.1%.<sup>16</sup> A study conducted at Asosa reveal that PICT acceptance among pregnant women was 80.8%.<sup>17</sup> This study aimed to assess the magnitude and associated factors of HIV index case test acceptance among patients attending an antiretroviral therapy clinic in Nekemte town public health facilities.

## Methods

### Study Area and Period

The study was carried out in three public health facilities of Nekemte town. Nekemte town is in the Oromia Regional State western part of Ethiopia, which is 331 km from Addis Ababa, the capital city of Ethiopia. According to the population estimate for the year 2020, the estimated total population of the town is 210,688.<sup>18</sup> The town has two health centers and two public hospitals, one specialized hospital and Wollega University Teaching and Referral hospital. The hospitals provide comprehensive adult ART and care services; 24-hour emergency, pharmacy, and delivery services; antenatal care; and physiotherapy, inpatient, and psychiatry services to the surrounding community. The study was conducted from May 20 to July 21, 2020.

### Study Design and Population

The institution-based cross-sectional study design was conducted. The source population for this study was all PLWHA who are on ART follow-up at the public health facilities of Nekemte town. The study population was all HIV-positive individuals aged 18 years or above and getting clinical, care, and support services at Nekemte specialized hospital, Nekemte health center, and Cheleleki health center at the time of the study.

## Inclusion and Exclusion Criteria

All patients whose ages were 18 years or above were included in the study. Patients with mental illness and severe medical illness who were unable to respond were excluded from the study.

## Sample Size and Sampling Procedure

The sample size was determined using a single population proportion formula by taking a proportion of 37.7% from a cross-sectional study done on disclosure at Jimma specialized hospital.<sup>19</sup>

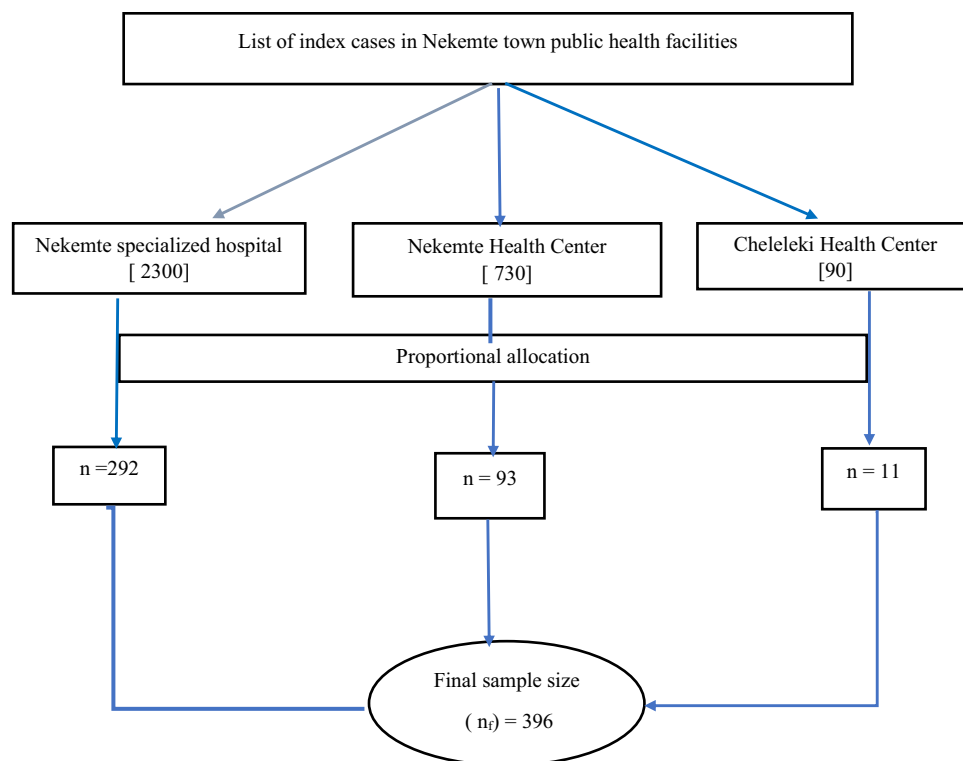
$$\frac{Z(a/2)^2 * p(1 - p)}{d^2}$$

where  $n$  is the sample size, the  $Z$  value corresponds to the 95% significance level, and  $p$  is the proportion taken from the previous study conducted at Jimma specialized hospital. Assuming a 95% CI, 5% margin of error ( $d = 0.05$ ) and considering a 10% non-response rate, the final sample size was 394.

The sample was selected by using systematic random sampling with a sampling interval at  $K$  value employed among people living with HIV/AIDS who have been enrolled in public health facilities of Nekemte town. The sample size was proportionally allocated to each health facility based on the number of clients on ART follow-up at each site. From Nekemte specialized hospital, 292 out of 2,300 eligible patients, from Nekemte health center, 92 participants out of 730 eligible patients, and from Cheleleki health center, 11 participants out of 90 eligible patients were selected for the study (Figure 1).

## Data Collection Techniques and Data Quality Assurance

A structured interviewer-administered questionnaire and reviewing some records as secondary data were used to collect the data. The tool was first developed in English and translated into Afan Oromo by experts in both languages and was translated back to English by another person to ensure its consistency and accuracy. The questionnaire contains socio-demographic characteristics of PLWHA who are on ART, disclosure status, clinical related factors, knowledge of index



**Figure 1** Schematic representation of proportional allocation of patient on ART at public health facilities, Nekemte town, West Ethiopia, 2020.

case HIV testing (ICHT), and their perceived benefit to ICHT. Four female case managers (counselors) who have diplomas were involved in data collection. To assure the quality of the data, an appropriately designed questionnaire was pre-tested on 5% of the sample size in a health facility outside the study area. The collected data were reviewed and checked for completeness and consistency of the response by the supervisor on a daily basis.

## Variables and Outcome Measurement

### Dependent Variable

The dependent variable is acceptance of the index case HIV test.

### Independent Variable

Independent variables included 1) socio-demographic variables, such as residence, age, sex, marital status, educational status, and level of income; 2) HIV/AIDS-related characteristics of the participants, such as time since diagnosis, duration on treatment, and CD4 level; 3) behavior-related characteristics of the patients, such as alcohol use disorder (AUD), smoking, and current khat chewing; 4) level of social support; and 5) disclosure status.

### Operational Definition

The index case is individuals already diagnosed as HIV positive, aware of their status, and enrolled in HIV care and treatment.<sup>20</sup>

Index testing is a voluntary process where counselors or health care workers ask index clients to list all of their sexual partners within the past year and children.<sup>21</sup>

Acceptance is when index clients welcome testing of their family and the consent of the index client is obtained that shows the test result of their partner and/or children are in the individual folder.<sup>21</sup>

The knowledge status of study respondents on index case testing was computed from the eight knowledge-related questions. Accordingly, it was categorized as good knowledge if correctly responding to  $\geq 7$  or more questions, moderate knowledge if correctly answered 5–6 questions, and poor knowledge if correctly answered  $< 5$ .<sup>22,23</sup>

PLWHIV who heard about index case testing and responded "Yes" to the question "Do you think ICHT is important to partner for family living with indexes?" will be considered as a client having a perceived benefit of ICHT.<sup>24,25</sup>

### Data Analysis and Management

The completed questionnaire was coded and entered into a computer using Epi-Data 4.6.0.2 statistical programs. The data was exported to SPSS windows version 20.0 for analysis. Descriptive statistics such as percent, frequency, and graphs were done. The bivariable analysis was performed between the dependent variable and each of the independent variables. The independent variables having a  $p$ -value  $< 0.2$  in the bivariable were considered for multivariate analysis.<sup>26</sup> Finally, multivariable binary logistic regression analysis was performed to identify the association of each independent variable with the acceptance of index case HIV testing. Independent variables with  $p$ -values less than 0.05 on multivariable logistic regressions were considered as having statistically significant associations. The multivariable results were interpreted using adjusted odds ratios (AOR) with a 95% confidence interval.

## Results

### Socio-Demographic Characteristics

A total of 384 HIV positive patients on ART who fulfilled the inclusion criteria participated in the study with a response rate of 96.9%. More than half of the study participants (213; 55.5%) were within the age range of 25–34 years. The mean ( $\pm$ SD) age of respondents was 33.49 years ( $\pm 6$ ). The majority of study respondents (243/384; 63.3%) were females and 301 (78.4%) were Christian. Regarding the place of residence of respondents, 318 (82.8%) were from urban areas. More than half of the study participants (236; 61.5%) have a monthly income of  $\geq 1,000$  ETB (19.08 USD) (Table 1).

### HIV/AIDS-Related Characteristics of the Study Participants

Among study participants, 327 (85.2%; 95% CI=84.9–91.1) of index clients agreed to tests of their partner and children. From the total participants who accepted ICHT, 88% of them preferred facility-based HIV index case testing. Among

**Table 1** Socio-Demographic Characteristics of HIV/AIDS Patients on ART Follow-Up in Nekemte Town (n=384)

Variables	Categories	n	%
Age group	18–24 years	22	5.7
	25–34 years	218	56.8
	≥35 years	144	37.5
Gender	Male	141	36.7
	Female	243	63.3
Religion	Christian	301	78.4
	Muslim	83	21.6
Marital status	Married	325	84.6
	Separated	59	15.4
Residence	Urban	318	82.8
	Rural	66	17.2
Education	No formal education	53	13.8
	Primary school	50	13.0
	Secondary school	142	37.0
	College and above	139	36.2
Occupation	Daily laborers	110	28.6
	Employed (private, gov't)	129	33.5
	Merchant	52	13.2
	Others (farmer, student)	93	24.2
Income	<1,000	142	37.0
	≥1,000	242	63.0

study respondents who participated, 371 (96.6%) were counseled on ICHT by the health care provider. Among 384 respondents, 354 (92%) believed index case HIV testing ICHT is important for their children and family (Table 2). Among study participants, 57 (14.8%) did not accept index case HIV testing. The frequent reasons for not accepting ICHT were fear of stigma and discrimination (31; 38%) followed by fear of physical violence (16; 20%) (Figure 2).

## Factors Associated with Index Case HIV Test (ICHT) Acceptance

In multivariable logistic regression, four independent variables like HIV status disclosure, knowledge of index case HIV test acceptance, having the positive belief of index case HIV test acceptance, and duration of stay on ART were found to be statistically significantly associated with index case HIV test acceptance.

Clients who disclose their HIV status are 9.4-times more likely to accept index testing compared to those who do not disclose their status (AOR=9.74; 95% CI=4.11–23.06). Clients who do have good knowledge of the index case HIV test are 4.7-times more likely to have accepted the index case test compared to the group having poor knowledge (AOR=4.70, 95% CI=1.92–11.61). Index case HIV test acceptance for patients who think index case HIV testing has benefits is 3.43-times higher than for those who think it has no importance (AOR=3.43, 95% CI=1.27–9.29). Study participants who

**Table 2** HIV/AIDS Related Characteristics and Acceptance of ICHT of HIV/AIDS Patients on ART Follow-Up in Nekemte Town

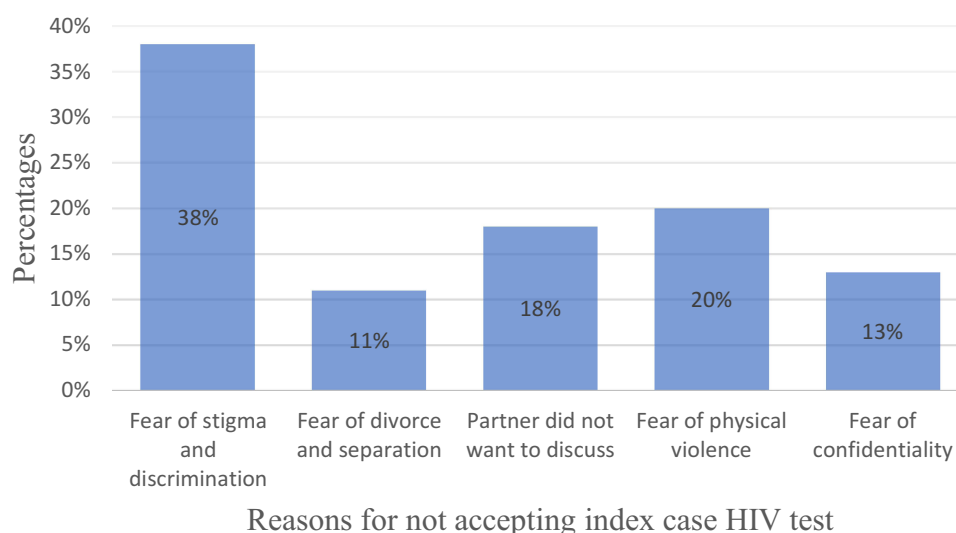
Variables	Categories	Frequency (n)	%
Disclosure status	Disclosed	324	84.4
	Not disclosed	60	15.6
Knowledge level	Good	321	83.6
	Moderate	23	6.0
	Poor	40	10.4
Counseled on HIV index case testing	Yes	371	96.6
	No	13	3.4
Place of preference for HIV test (n=327)	Health Facility	289	88.0
	Home	19	5.5
	Community	22	6.5
Time preferred for HIV test	Regular	302	92.0
	Irregular	25	8.0
HIV index case testing has benefits	Yes	354	92.2
	No	30	7.8
Duration on ART	<12 months	60	15.6
	≥12 months	324	84.4
Perceived benefit of ICHT	To know serostatus	78	20.3
	To interrupt HIV transmission	213	55.5
	To bring to care and support	54	14.1
	To protect from getting HIV	23	6.0

stayed more than 1 year on treatment are 4.6-times more likely to accept index case HIV testing compared to those who do not (AOR=4.78, 95% CI=2.13–10.76) (Table 3).

## Discussion

In this study, more than eight in ten (85.2%) have accepted index case HIV testing (ICHT) and brought either their partner or children of less than 15 years of age or both for index case HIV testing. Findings from the study also revealed that ICHT was significantly associated with HIV status disclosure, knowledge of index case HIV test acceptance, having a positive belief of index case HIV test acceptance, and duration of stay on ART. The level of ICHT in this study is relatively lower than a study conducted in Tanzania in which 96.1% of participants accepted HIV testing of their indexes<sup>14</sup> and a study conducted in Zimbabwe on index case testing and partner notification of 95%.<sup>11</sup> Possible explanations for this variation may be socioeconomic differences among the study population and the time when the initiative was started in respective countries.

However, it is relatively higher than studies done in Kenya (60%), Lesotho (75%), and Ethiopia (73%), respectively.<sup>8,21</sup> Also, this study is higher than a study conducted in western Kenya in which 57% of HIV positive caregivers have consent for HIV test of their children (23), and a study done in Ethiopia in which 73% of family members with PLWHIV had been tested,<sup>8</sup> a study done in Addis Ababa on partner referral acceptance in which only 53%



**Figure 2** Reasons for not accepting index case HIV test among HIV patients attending ART clinic in public health facilities of Nekemte Town, West Ethiopia.

were willing to provide the referral document to their partners.<sup>15</sup> A possible explanation for this variation may be a difference in the study population and study setting. For instance, the finding of this study is higher than a study conducted among adults attending ART clinics in Southwest Ethiopia. This might be due to the difference between the

**Table 3** Factors Associated with Index Case HIV Testing Acceptance Among HIV/AIDS Patients on ART Follow-Up in Nekemte Town

Characteristics		HIV/AIDS Index Case Testing Accepted, N (%)		COR (95% CI)	AOR (95% CI)
		Yes	No		
Age group	15–24 years	13 (61.9)	8 (38.1)	1	1
	25–34 years	176 (82.6)	37 (17.4)	2.07 (1.13–5.60)	1.8 (0.54–6.41)
	≥35	138 (92)	12 (8)	7.0 (2.40–20.40)	5.25 (0.95–20.43)
Religion	Muslim	77 (92.8)	6 (7.2)	2.62 (1.08–6.34)	2.34 (0.73–7.55)
	Christian	250 (83.1)	51 (16.9)	1	1
Educational level	No formal Education	41 (77.4)	12 (22.6)	1	1
	Primary	48 (96)	2 (4)	7.02 (1.49–33.22)	3.38 (0.25–32.69)
	Secondary	116 (81.7)	17 (18.3)	1.31 (0.60–2.82)	1.37 (0.48–3.89)
	College & above	122 (87.8)	17 (12.2)	2.10 (0.93–4.77)	2.22 (0.73–6.76)
Disclosure	Yes	299 (92.3)	25 (7.7)	13.67 (7.13–26.2)	9.74 (4.11–23.06)*
	No	28 (46.7)	32 (53.3)	1	1
Knowledge of ICHT	Poor	21 (52.5)	19 (47.5)	1	1
	Moderate	17 (73.9)	6 (26.1)	2.5 (0.8–7.8)	2.3 (0.52–10.46)
	Good	289 (90)	32 (10)	8.10 (3.9–16.7)	4.7 (1.92–11.61)*
ICHT has benefit	Yes	311 (87.9)	43 (12.1)	6.30 (2.80–13.8)	3.43 (1.27–9.29)*
	No	16 (53.3)	14 (46.7)	1	1
Duration on ART	<1 year	40 (66.7)	20 (33.3)	1	1
	≥1 year	287 (88.6)	37 (11.4)	3.8 (2.05–7.33)	4.78 (2.13–10.76)*

Note: \*  $p < 0.05$ .

study population in which the study conducted in Southern Ethiopia was done at Kule Refugee Camp and HIV testing might be less of a priority issue in such settings. Thus, the finding of this study implies that there is already an encouraging platform for index case HIV testing, in Nekemte town as in other similar areas but less than the strategic goal of 2020. This study showed that the main reason for not accepting ICHT was fear of stigma and discrimination (38%) which is consistent with a study done in Ethiopia.<sup>27</sup> This might be due to the fear of loss of relationship with their partners, as evidenced by pocket studies conducted in Ethiopia.<sup>28,29</sup>

This study finding revealed that age, sex, religion, marital status, and income were not statistically significant. This is consistent with a study in China in which sex, socio-economic status, and time to reach the HIV clinic seem not to have influenced HIV care.<sup>30</sup> But a study done in four African countries shows higher educational attainment is significantly associated with the likelihood of HIV testing,<sup>31</sup> and a study done in Ethiopia on PICT acceptance showed that educational status and place of residence were significantly associated with HIV test acceptance.<sup>32</sup> This study also found a strong association between the education level and index case HIV test acceptance. This might be due to the fact that educated individuals are more knowledgeable about the benefits of family testing and had better recognition of the importance of knowing one's HIV status.<sup>21</sup>

This study also shows that index case HIV testing has a significant association with HIV status disclosure of index cases. This study demonstrated that the odds of index case HIV testing were found to be higher among index cases who have disclosed their HIV status compared to those who have not disclosed their HIV status. This finding is consistent with a study done in Ethiopia on disclosure of HIV status to family, which showed that partners who were aware were about two times more likely to accept HIV testing and counseling when compared to partners of the index clients who had not disclosed their status<sup>8</sup> and also consistent with a study in Assosa town in which the odds of acceptance of provider-initiated HIV testing was higher among those who planned to disclose their test results to their husbands than those who did not.<sup>17</sup>

Findings from this study also show that index clients who stayed on ART for more than 1 year were more likely to bring their partner and children of less than 15 years of age for HIV testing as compared to those who stayed on ART for less than 1 year. This finding was consistent with a study done at Jimma in which clients who stayed on ART for more than 2 years disclosed their HIV status were 2-times more likely when compared to those who stayed on ART for less than 2 years.<sup>19</sup> And also, a study done in east Gojjam showed that clients on ART for less than 1 year were less likely to disclose their HIV status.<sup>33</sup> But this study is not consistent with a study conducted in Tanzania which showed that disclosure and ART duration has no association.<sup>34</sup>

In this study, having a positive belief about index case HIV test importance is strongly associated with acceptance of ICHT. This finding is consistent with the study conducted in Uganda that showed perceived benefits of HIV test have a positive significance for HIV testing when compared to those who have negative beliefs.<sup>35</sup>

Additionally, the study found that having knowledge regarding ICHT is associated with acceptance of ICHT. The findings shows that those who have good ICHT knowledge were 4-times more likely to accept ICHT when compared to those who had poor ICHT knowledge. This finding is consistent with a study conducted on HIV test acceptability in Ethiopia that knowledge of HIV test was found to be positively associated with HIV test acceptance.<sup>14</sup> Likewise, a study conducted in China on HIV counseling and testing HCT utilization shows that higher levels of HIV-related knowledge were significantly associated with greater willingness to utilize HTC service.<sup>30</sup>

This study is also not without some limitations. First, the cross-sectional design of this study does not allow us to establish cause-effect relationships. Despite the data collectors being well trained, some respondents may not have revealed their real feelings, and this could lead to a bias in understanding the real factors for not accepting ICHT among PLWHA. Moreover, our findings only indicate the associated factors of ICHT acceptance among registered PLWHA. Hence, it is strongly recommended for future researchers to conduct a qualitative study to understand the effect of quality of services and counseling on ICHT acceptance.

## Conclusion and Recommendations

The results of this study suggest that acceptance of index case HIV testing among PLWHA on ART is high. This study showed that HIV status disclosure of index cases, knowledge of ICHT, having perceived benefit of ICHT, and patients'

duration on ART were significantly associated with the acceptance of index case HIV testing. It is important to increase counseling on the importance of ICHT which enhances PLWHIV to have a positive belief on the advantages of ICHT, strengthening disclosure during counseling, and assisting HIV status disclosure in health facilities with a fully trained provider and qualified health providers. Therefore, strengthening counseling on the importance of ICHT, enhancing PLWHIV to have a positive belief in the advantage of ICHT, and helping them to refer the indexes through the referral method they choose. Furthermore, qualitative research is needed to explore factors associated with ICHT acceptance.

## Abbreviations

AOR, adjusted odds ratio; ART, antiretroviral therapy; COR, crude odds ratio; PLWHA, people living with HIV/AIDS; ICHT, Index Case HIV Testing.

## Data Sharing Statement

Data will be available upon request from the corresponding authors.

## Ethical Considerations

Ethical clearance was obtained from Wollega University and letters for co-operation were written to all Nekemte town public health facilities. Written informed consent was taken from all individuals who participated in the study. All information obtained during the study was kept confidential. Furthermore, this study was conducted according to the principles of the Declaration of Helsinki.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare that they have no conflicts of interest for this work.

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