

# Factors associated with acceptance of provider-initiated HIV testing and counseling among pregnant women in Ethiopia

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**Introduction:** The global human immunodeficiency virus (HIV) epidemic disproportionately affects sub-Saharan African countries, including Ethiopia. Provider-initiated HIV testing and counseling (PITC) is a tool to identify HIV-positive pregnant women and an effective treatment and prevention strategy. However, its success depends upon the willingness of pregnant women to accept HIV testing.

**Objectives:** To describe the level of acceptance of PITC and associated factors among pregnant women attending 8 antenatal care clinics in Adama, Ethiopia.

**Methods:** Trained nursing students and employees from an HIV clinic conducted face-to-face structured interviews in private offices at the clinics from August to September, 2016.

**Results:** Among the 441 respondents, 309 (70.1%) accepted PITC. Women with more antenatal care visits (odds ratio [OR] =2.59, 95% CI: 1.01–6.63), reported better quality of the PITC service (OR =1.91, 95% CI: 1.19–3.08), and higher level of knowledge on mother-to-child transmission (OR =1.82, 95% CI: 1.03–3.20), were more likely to accept PITC, while women who were older in age (OR =0.37, 95% CI: 0.19–0.74) and perceived negative attitudes from their partners toward HIV-positive results (OR =0.31, 95% CI: 0.10–0.94) were less likely to accept the PITC service.

**Conclusion:** About one-third of pregnant women are not willing to accept PITC. When designing intervention program to improve the acceptance of PITC, we should take into consideration the personal factors, HIV-related knowledge, and attitude of women as well as institutional factors.

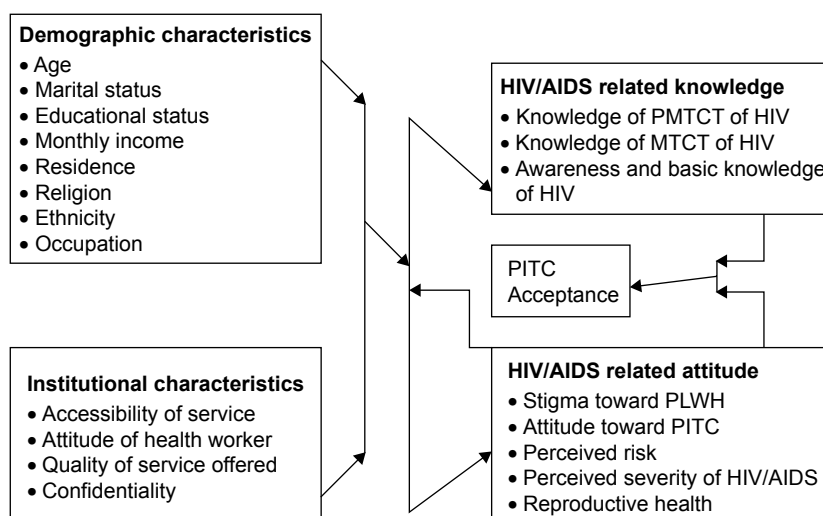
**Keywords:** pregnant woman, HIV, provider initiated HIV testing and counseling (PITC), Ethiopia

## Introduction

Human immunodeficiency virus/acquired-immunodeficiency syndrome (HIV/AIDS) continues to be a major health concern worldwide and the primary cause of death among young adults in Africa. A total of 90% of HIV infections in children are acquired through mother-to-child transmission (MTCT) in sub-Saharan African countries, where an estimated 1,500,000 women living with HIV become pregnant every year.<sup>1,2</sup> In Ethiopia, as of 2016, 671,941 people were living with HIV/AIDS, including 109,133 children, with a countrywide HIV prevalence of 1.1%.<sup>3</sup>

There has been a drop in the HIV prevalence in general; however, for pregnant women, after a decrease from 3.55% in 2007 to 1.1% in 2009,<sup>4,5</sup> HIV prevalence increased to 2.1% in 2012 worldwide.<sup>5</sup> MTCT is the main transmission route in children <15 years old. To prevent the MTCT (PMTCT) of HIV, a nationwide antenatal

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**Figure 1** Factors affecting PITC acceptance.

**Abbreviations:** AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; MTCT, mother-to-child transmission; PITC, provider-initiated HIV testing and counseling; PLWH, people living with HIV; PMTCT, prevention of mother-to-child transmission.

care program was developed worldwide and has now become the largest national antenatal screening program globally.<sup>6</sup>

In Ethiopia, the PMTCT service sites were available in 43% of all antenatal care facilities, and HIV testing among pregnant women increased from 2% in 2005 to 26% in 2010. The percentage of women getting tested remained low compared with the severity of the problem.<sup>5</sup> Furthermore, the number of HIV-positive pregnant women identified at the PMTCT sites also increased from 1.88% in 2006 to 22.1% in 2010. Afterward, the number of pregnant women in need of PMTCT service reached 25,246, of whom 18,370 needed antiretroviral therapy.<sup>3</sup> Concurrently, the number of health facilities providing PMTCT service grew from 21.3% to 61.9%.<sup>7</sup>

Knowing one's HIV status motivates individuals and/or couples to engage in HIV prevention; HIV testing is an obligatory entry point for care and support services for individuals living with HIV/AIDS.<sup>8,9</sup> Identification of HIV infection in pregnant women is done primarily by voluntary counseling and testing (VCT).<sup>10</sup> VCT and guidelines emphasize the importance of confidentiality, voluntary participation, and informed consent, and rely on personal motivation to seek testing.

There are so many obstacles to VCT that only <10% of the key populations in low- and middle-income countries who may have been exposed to HIV can access VCT; a majority of the population miss out on opportunities to confirm HIV diagnosis,<sup>11</sup> especially pregnant women with very low acceptance of VCT.<sup>12,13</sup> Indeed, only 1 in 5 pregnant women were tested for HIV from 2009 to 2011.<sup>14</sup> Thus, provider-initiated HIV testing and counseling (PITC) was established by World Health Organization as an HIV testing method to replace

VCT. Nevertheless, only 11% of pregnant women received HIV testing even after the establishment of PITC in 2011 during antenatal care visits in Ethiopia.<sup>10,14</sup>

PITC is a good entry point for tackling the transmission of HIV from mother to child, even though studies are limited in this area and PITC is not widely accepted in low- and middle-income countries. Studies conducted in other regions of Ethiopia revealed different rates of PITC acceptance with some contradictory factors.<sup>10,15,16</sup>

In the present study, we explore factors that may hinder or augment PITC in the antenatal care clinics in Ethiopia, with the goal of guiding intervention programs to improve the service delivery system of PITC and PMTCT. Health Belief Model was used in this study as the conceptual framework to reveal health behaviors as the core element of socio-demographic characteristics, knowledge, and perception in people. This model states that people's beliefs influence their behaviors, like developing preventive behaviors against diseases by taking preventive actions in case of acquiring certain diseases and being aware of the severe complications.<sup>17</sup> Hence, this conceptual framework states socio-demographic factors and institutional factors may influence the individuals to obtain some knowledge of and form correct attitude toward HIV/AIDS, and its transmission and prevention, which may ultimately affect the PITC acceptance (Figure 1).

## Methods

### Study design and setting

In a facility-based cross-sectional study, pregnant women attending antenatal care clinics in Adama, Ethiopia, were interviewed from August to September 2016. Adama is

100 km away from the capital Addis Ababa and has a population of 324,000.<sup>18</sup> According to the information recorded by the antenatal clinics between the years 2015 and 2016, the HIV prevalence was 2.48% among pregnant women.<sup>19</sup> Antenatal care was available to all pregnant women, which included 4 visits: the first visit was as early as suspected pregnancy; the second scheduled between 28 and 32 weeks of gestational age; the third after 36 weeks of gestational age, and the fourth before the expected date of delivery or any time consultancy. All routine antenatal care recommended by WHO would be provided to the pregnant women in the sites.

## Recruitment of participants

Pregnant women aged 15–49 years who received antenatal care services during the study period were included. Those who were critically ill, unable to hear, or with other disabilities such as impaired communication ability, and those who had already received HIV testing during current pregnancy were excluded.

PITC service was provided with informed consent to all pregnant women attending antenatal care facilities per national guidelines.<sup>9,20</sup> All the health sectors providing qualified PMTCT service in Adama were included in the study. The institutions included 4 governmental health centers, 2 private clinics, 1 private hospital, and 1 governmental hospital. The stratified sampling technique was used to select the study units in each health sector. Based on the number of pregnant women who visited each health sector 10 months before this survey, the total sample size was calculated with a single proportion formula to get the required number of pregnant women from each health sector. Pregnant women were recruited on working days (from Monday to Friday) over a 4-week period.

## Study variables and measurement

### Acceptance of PITC

The acceptance of PITC was measured by asking 1 question: “Did you take HIV test today?” Women who gave a Yes to the question were regarded as accepting PITC.

### Socio-demographic factors

The socio-demographic factors were obtained from the general information sheet, including age, residence, religion, educational status, occupation, marital status, ethnicity, and monthly income.

### Institutional factors

The institutional factors, including accessibility of service, attitude of health worker, quality of service offered, preference

of counselors, and confidentiality condition were measured in the general information sheet.

## HIV-related knowledge

### Knowledge about HIV transmission and prevention

This part of the questionnaire was designed to assess the basic knowledge of HIV transmission and prevention method, such as HIV transmission routes. The knowledge score was assessed with the participant’s correct responses. The questionnaire contained 10 items with a total of 40 points. Each correct response got 4 points and a wrong response got 0.

### Knowledge on MTCT of HIV and its prevention

This part was used to assess the knowledge of pregnant women with regard to MTCT and preventive methods such as hearing about the existence of MTCT and knowing the risk of MTCT during pregnancy, labor, and delivery or breast-feeding. Knowledge about HIV prevention included safe delivery, exclusive breastfeeding for the first 6 months after delivery, taking antiretroviral therapy drugs, and other methods such as HIV testing of infants and HIV-positive mothers administering the antiretroviral drug to their newborns for the first 6 weeks after the delivery. There were 5 questions in this part with a total of 20 points: each correct response got 4 points and a wrong response 0 point.

Modified Bloom’s cut-off point was used during analysis, which was adopted from Nyasinde Mujumali’s KAP study. A score of 75%–100%, 50%–74%, and <50% placed the respondents in good, moderate, and poor HIV/AIDS knowledge groups, respectively.<sup>21,22</sup> A total of 20 items was set to gauge the knowledge of the study participants. Cut-off points for each part are presented in the Table 1.

## HIV-related attitude

This part consisted of 22 items, which included attitude toward PITC, perceived severity of HIV infection, and stigmatizing attitude toward people living with HIV (PLWH). The items were on a 5-point Likert scale. The study participants were asked to respond to what extent they agree with those statements, ranging from strongly agree to strongly disagree and scoring from 5 to 1, respectively. The total score was calculated by summing up the individual scores of each item. The detailed score cut-off points are described in Table 1.

Five experts, including 2 researchers, 1 lecturer, 1 nursing manager, and 1 registered nurse were invited to review the quality of the questionnaire and evaluate the content validity and this was calculated based on their reports. Accordingly, it was rated at 0.98 with a Cronbach’s alpha score of 0.802.

The interview guide was initially prepared in English and translated into the local languages, Amharic and

**Table 1** Cutoff points of level of HIV-related knowledge and attitude

		Cutoff points	Level
Knowledge	HIV transmission and prevention	30–40	Good
		20–29	Moderate
		<20	Poor
	MTCT of HIV	16–20	Good
		12–15	Moderate
		<12	Poor
	PMTCT of HIV	16–20	Good
		12–15	Moderate
		<12	Poor
Attitude	Toward PITC	≥25.5	Good
		<25.5	Poor
	Toward perceived severity of HIV/AIDS	≥20.88	Severe
		<20.88	Not severe
	Stigmatizing attitude toward PLWH	≥14.17	Had
		<14.17	Did not have
	Perceived partner reaction toward positive result of HIV/AIDS	≥6.8	Positive
		<6.8	Negative

**Note:** Modified Bloom's cutoff point was used and scores of 75%–100%, 50%–74%, and 50% placed the respondents in good, moderate, and poor HIV/AIDS knowledge groups, respectively.

**Abbreviations:** AIDS, acquired-immunodeficiency syndrome; HIV, human immunodeficiency virus; MTCT, mother-to-child transmission; PITC, provider-initiated HIV testing and counseling; PMTCT, prevention of mother-to-child transmission; PLWH, people living with HIV.

Afaan Oromo, and then it was translated back to English to check the comprehension and consistency. As this study was conducted in the city, the majority of people spoke Amharic language in addition to their native language despite their ethnic group difference. Data collectors who spoke both the local languages (Amharic and Afaan Oromo) fluently were recruited and trained for data collection. The completeness of the data collection was checked by the supervisor and investigator on a daily basis. Prior to the date of actual data collection, a pilot test was done on 15 pregnant women and then minor modifications were made and omissions corrected for ambiguous questions based on the pilot test.

## Ethical considerations

The ethical clearance and approval letter were obtained from the Ethical Review Committee of Xiangya School of Nursing, Central South University, China. Based on the ethical approval letter from China, the Ethical Review Committee of Oromia regional health bureau of Ethiopia reviewed and approved this study by an informed letter to the health facilities of the study setting. The health facilities with their own ethical review committee also reviewed and approved the research. Moreover, the verbal consent from the participants was approved by all ethical committees. For participants aged <18 years, verbal consent from the mother

was obtained, together with assent from the participant before data collection. Furthermore, the nature and purpose of the study were explained to all the participants during the recruitment. The participants had the right to withdraw from the study at any time without getting compensation for the interview.

## Data analysis

The data were edited and cleaned with Epi data version 3.1 software and skipping pattern was kept appropriately. Double entry was done to ensure the accuracy of the database. Data were exported to SPSS Version 23 for data checking, cleaning, and analysis.

Mean, SD, frequency, and percentage were used to describe the data. Univariate analysis was used to determine the association between selected explanatory variables with the outcome variable acceptance of PITC. For those variables significantly associated with one another in the univariate analysis, multivariate logistic regression was used for controlling some potential confounders and checking for their real association independently.

## Results

### Participant description

Totally, 441 participants were recruited (after the removal of 2 incomplete questionnaires). As seen in Table 2, 86% of participants were from the urban area. The majority of study participants were from the Oromo ethnic group at 39.9%, with the unemployed reaching 72.1%. The illiteracy rate of the Oromo ethnic group was 9.8%, and 20.16% of this ethnic group finished grade 1 to 12, and 9.09% finished college and higher education. However, among Amhara ethnic group, 3.17% were illiterate, 18.13% were educated between grade 1 and 12, and 7.70% had passed college and above. The majority of the study participants were young (mean = 26.6 years). When receiving the interview, 216 (49%) study participants were in their first antenatal care visit and 222 (50.3%) were primigravida.

### Descriptive data of HIV-related awareness, knowledge, and attitude

All study participants were aware of HIV/AIDS, and 84.4% of them had heard of MTCT of HIV. However, only 50.1% of them knew that the intervention could reduce MTCT of HIV. With regard to knowledge, 54.6% of the study participants had a moderate knowledge (mean = 5.6, SD = 1.07) of HIV transmission and prevention method. Similarly, 66% of the sample had good knowledge of MTCT. However, only 13% had good knowledge of MTCT prevention. Only half

**Table 2** Demographic characteristics and their association with PITC acceptance (N=441)

Socio-demographic Variable	Frequency (%)	PITC		OR (95% CI)	$\chi^2$	p-value
		Acceptors	Non-acceptors			
<b>Age (years)</b>						
15–24	175 (39.7)	133	42	–	19.67	0.00 <sup>a</sup>
25–34	221 (50.1)	157	64			
35–49	45 (10.2)	19	26			
<b>Residence</b>						
Urban	379 (85.9)	275	104	2.18 (1.26–3.77)	7.98	0.00 <sup>a</sup>
Rural	62 (14.1)	34	28			
<b>Religion</b>						
Christian	304 (68.9)	209	95	0.81 (0.52–1.28)	0.81	0.37
Muslim	137 (31.1)	100	37			
<b>Ethnic group</b>						
Oromo	176 (39.9)	81	47	–	6.21	0.18
Amhara	128 (29)	123	53			
Gurage	64 (14.5)	51	13			
Tigre	40 (9.1)	30	10			
Other	33 (7.5)	24	9			
<b>Marital status</b>						
Married	341 (77.3)	247	94	1.61 (1.01–2.67)	4.01	0.05
Unmarried	100 (22.7)	62	38			
<b>Educational status</b>						
Illiterate	88 (20)	48	40	–	20.59	0.00 <sup>a</sup>
Grade 1–12	253 (57.4)	198	55			
College and above	100 (22.7)	63	37			
<b>Occupation</b>						
Employed	123 (27.9)	85	38	0.94 (0.60–1.48)	0.08	0.78
Unemployed	318 (72.1)	224	94			
<b>Average monthly income</b>						
>1,000 ETB	302 (68.5)	221	81	1.58 (1.03–2.43)	4.42	0.04 <sup>a</sup>
≤1,000 ETB	139 (31.5)	88	51			
<b>Gravidity</b>						
One	222 (50.3)	165	57	–	6.24	0.10
Two	123 (27.9)	84	39			
Three	63 (14.3)	42	21			
≥4	33 (7.5)	18	15			
<b>Number of ANC visits</b>						
Once	216 (49.0)	123	93	0.28 (0.18–0.43)	34.77	0.00 <sup>a</sup>
≥2	225 (51.0)	186	39			

**Notes:** Religion: Christianity, includes Orthodox, Catholic, and Protestant. Marital status: Married refers to formally married and living together, unmarried includes single, divorced and widowed. Illiterate refers to people with no schooling. Occupation: Employed (government and private), unemployed (merchant, housewife, student and other), others in occupation include daily laborers =3, on street small trade =2, housekeeping work =2; Others in ethnicity include Silte =6, Somale =5, Kafa =3, Wolayita =3, Hadiya =6, Shinasha =2, Berta =8. <sup>a</sup>Statistically significant at 95% CI,  $p < 0.05$ .

**Abbreviations:** ANC, antenatal care; ETB, Ethiopian birr; OR, odds ratio; PITC, provider-initiated HIV testing and counseling.

of the pregnant women knew that HIV could be prevented from passing on from mother to child by taking antiretroviral drugs during pregnancy, so could breastfeeding for the first 6 months and safe delivery.

The mean scores were moderate with regard to attitude toward perceived severity of HIV/AIDS, HIV/AIDS-related stigma, and perceived partner reactions toward positive HIV test result. A majority of the participants (61.9%) reported that they had no stigmatizing attitude toward people living with HIV. More than half of them (54%) had positive attitude

toward PITC. However, 73.5% reported that their partners would react negatively to positive HIV test result.

## Acceptance level of PITC

Of the total 441 study participants, 309 (70.1%) accepted PITC, while the rest 132 (29.9%) rejected it. Generally, PITC was accessible to this sample. Nearly 70% of the participants heard about PITC before, and 92.1% reported that they considered they would get benefits from an HIV test. A majority of the participants (81.4%) reported the health facility nearby



**Table 3** Institutional factors and their association with PITC acceptance (N=441)

Variable	Frequency (%)	PITC		$\chi^2$	p-value
		Acceptor	Non-acceptor		
<b>Availability of HIV testing and counseling service nearby</b>					
Yes	359 (81.4)	261	98	9.67	0.00 <sup>a</sup>
No	71 (16.1)	39	32		
Not sure	11 (2.5)	9	2		
<b>Access to transport services to visit health facility</b>					
Yes	378 (85.7)	287	91	48.30	0.00 <sup>a</sup>
No	54 (12.3)	16	38		
Not sure	9 (2.0)	6	3		
<b>Age preference of the counselor</b>					
Similar to my age	53 (12.0)	36	27	8.83	0.03 <sup>a</sup>
Younger than my age	10 (2.3)	5	5		
Older than my age	104 (23.6)	84	20		
No age preference	274 (62.1)	184	90		
<b>Gender preference of the counselor</b>					
Male	48 (10.9)	40	8	5.62	0.06
Female	102 (23.1)	74	28		
No gender preference	291 (66.0)	195	96		
<b>Perceived quality of PITC service</b>					
Poor	24 (5.4)	7	17	66.40	0.00 <sup>a</sup>
Fair	70 (15.9)	27	43		
Good	131 (29.7)	102	29		
Very good	159 (36.1)	127	32		
Excellent	57 (12.9)	46	11		

**Note:** <sup>a</sup>Statistical significance at 95% CI,  $p < 0.05$ .

**Abbreviations:** HIV, human immunodeficiency virus; PITC, provider-initiated HIV testing and counselling.

had PITC. Furthermore, 85.7% of the study participants had access to transportation to the nearby health center having skilled PITC counselors (Table 3). The women's preference for the counselor was also assessed. A total of 66% of the study participants accepted both genders as counselors. Similarly, 62.1% of the study participants responded that they had no preference for the age of a counselor. The percentages of the study participants reporting the quality of PITC services as good, very good, and excellent, were 30%, 36%, and 13%, respectively.

## Factors related to acceptance of PITC

Univariate analyses were performed to examine the correlation among acceptance of PITC and demographic factors, institutional factors, and HIV-related knowledge and attitude (Tables 3 and 4). In the demographic data, women's age ( $\chi^2=19.67$ ,  $p < 0.001$ ), residence ( $\chi^2=7.98$ ,  $p < 0.001$ ), educational status ( $\chi^2=20.59$ ,  $p < 0.001$ ), monthly income ( $\chi^2=4.42$ ,  $p < 0.04$ ), and number of antenatal care visits ( $\chi^2=34.77$ ,  $p < 0.001$ ) were significantly associated with PITC (Table 2). Among the institutional factors, availability of HIV testing and counseling nearby ( $\chi^2=9.67$ ,  $p < 0.001$ ), transportation access ( $\chi^2=48.3$ ,  $p < 0.001$ ), age preference of the counselor ( $\chi^2=8.83$ ,  $p < 0.001$ ), and perceived quality

of PITC service ( $\chi^2=66.4$ ,  $p < 0.001$ ), were all significantly associated with PITC. Moreover, HIV-related knowledge and attitude, level of knowledge on MTCT of HIV ( $\chi^2=57.08$ ,  $p < 0.001$ ), stigmatizing attitude toward PLWH ( $\chi^2=11.32$ ,  $p < 0.001$ ), and perceived partner reaction to positive result ( $\chi^2=34.61$ ,  $p < 0.001$ ), were all significantly associated with PITC.

Multivariate logistic regression analyses were performed with PITC acceptance as the dependent variable and then significant factors were taken from the univariate analyses as independent variables (Table 5). The results showed that women with more antenatal care visits (odds ratio [OR] = 2.59, 95% CI: 1.01–6.63), reported better quality of the PITC service (OR = 1.91, 95% CI: 1.19–3.08), and those with higher level of knowledge on MTCT (OR = 1.82, 95% CI: 1.03–3.20), were more likely to accept PITC, while women who were older in age (OR = 0.37, 95% CI: 0.19–0.74) and who perceived the negative partner attitude toward positive HIV result (OR = 0.31, 95% CI: 0.10–0.94) were less likely to accept PITC service (Table 6).

## Discussion

This study assessed PITC acceptance and associated factors among pregnant women attending antenatal care clinics in

**Table 4** HIV-related attitude/knowledge and its association with PITC acceptance (N=441)

Variable	Frequency (%)	PITC		OR (95% CI)	$\chi^2$	p-value
		Acceptor	Non-acceptor			
Attitude towards PITC						
Good	238 (54.0)	165	73	1.08 (0.72–1.63)	0.14	0.71
Poor	203 (46.0)	144	59			
Perception of the severity of HIV/AIDS						
Severe	243 (55.1)	164	79	0.76 (0.50–1.15)	1.72	0.19
Not severe	198 (44.9)	145	53			
Stigmatizing attitude toward PLWH						
Did not have	273 (61.9)	207	66	0.49 (0.33–0.75)	11.32	0.00 <sup>a</sup>
Have	168 (38.1)	102	66			
Perceived partner reaction to positive result						
Positive	117 (26.5)	57	60	3.68 (2.36–5.76)	34.61	0.00 <sup>a</sup>
Negative	324 (73.5)	252	72			
Basic knowledge on HIV transmission and prevention						
Poor	45 (10.2)	26	19	–	3.69	0.16
Moderate	241 (54.6)	171	70			
Good	155 (35.1)	112	43			
Knowledge on PMTCT						
Poor	74 (16.8)	55	19	–	5.07	0.08
Moderate	87 (19.7)	73	14			
Good	60 (13.6)	41	19			
Knowledge on MTCT of HIV						
Poor	92 (20.9)	35	57	–	57.08	0.00 <sup>a</sup>
Moderate	58 (13.2)	44	14			
Good	291 (66.0)	230	61			

**Note:** <sup>a</sup>Statistical significance at 95% CI,  $p < 0.05$ .

**Abbreviations:** AIDS, acquired-immunodeficiency syndrome; HIV, human immunodeficiency virus; PITC, provider-initiated HIV testing and counseling; PLWH, people living with HIV; MTCT, mother-to-child transmission; PMTCT, prevention of mother-to-child transmission.

**Table 5** Assignments for each potential associated factor of PITC acceptance in multivariate logistic regression

Variable	Symbol of variable	Assignment
Acceptance of PITC	Y	1= Yes, 0= No
Age (years)	X <sub>1</sub>	1= 15–24, 2= 25–34, 3= 35–49
Residence	X <sub>2</sub>	1= Urban, 2= Rural
Educational status	X <sub>3</sub>	1= Illiterate, 2= Grade 1–12, 3= College and above
Average monthly income	X <sub>4</sub>	1= >1,000 ETB, 2= ≤1,000 ETB
Number of ANC visits	X <sub>5</sub>	1= Once, 2= Twice or above
Availability of HIV testing and counseling service nearby	X <sub>61</sub>	Yes =0, No =0, Not sure =1
	X <sub>62</sub>	Yes =1, No =0, Not sure =0
Access to transport services to visit health facility	X <sub>71</sub>	Yes =0, No =0, Not sure =1
	X <sub>72</sub>	Yes =1, No =0, Not sure =0
Age preference of the counselor	X <sub>81</sub>	Similar to my age =0, Younger than my age =1, No age preference =0
	X <sub>82</sub>	Similar to my age =1, Younger than my age =0, No age preference =0
Gender preference of the counselor	X <sub>91</sub>	Male =0, Female =1, Either =0
	X <sub>92</sub>	Male =1, Female =0, Either =0
Perceived quality of PITC service	X <sub>10</sub>	1= Poor, 2= Fair, 3= Good, 4= Very good, 5= Excellent
Stigmatizing attitude towards PLWH/AIDS	X <sub>11</sub>	0= Not have stigma, 1= Have stigma
Perceived partner reaction to positive result	X <sub>12</sub>	0= Negative, 1= Positive
Knowledge on MTCT of HIV	X <sub>13</sub>	1= Poor, 2= Moderate, 4= Good

**Abbreviations:** AIDS, acquired immunodeficiency syndrome; ANC, antenatal care; ETB, Ethiopian birr; PITC, provider-initiated HIV testing and counseling; PLWH, people living with HIV; MTCT, mother-to-child transmission.

**Table 6** Multivariate logistic regression analysis of associated factors of PITC acceptance

Variable	Symbol of variable	$\beta$	SE	Wald $\chi^2$	OR (95% CI)	p-value
Age	$X_1$	-0.99	0.35	7.91	0.37 (0.19–0.74)	0.005
Number of ANC visits	$X_5$	0.95	0.48	3.94	2.59 (1.01–6.63)	0.047
Perceived quality of PITC service	$X_{10}$	0.65	0.24	7.18	1.91 (1.19–3.08)	0.007
Perceived partner reaction to positive result	$X_{12}$	-1.19	0.58	4.24	0.31 (0.10–0.94)	0.039
Knowledge on MTCT	$X_{13}$	0.60	0.29	4.27	1.82 (1.03–3.20)	0.039

**Abbreviations:** ANC, antenatal care; MTCT, mother-to-child transmission; PITC, provider-initiated HIV testing and counselling; SE, standard error of the mean.

Adama, Ethiopia. The acceptance level of 70.1% was higher than the HIV testing level of 60.1% as indicated by the national health survey of Ethiopia in 2011.<sup>14</sup> This indicates that the progress in scaling up of HIV testing services helps in increasing HIV testing level in Ethiopia. However, still nearly one-third of the study participants were not willing to accept PITC, which was worrisome. Rejecting or delaying HIV testing among the pregnant women suggests the need for intervention program to increase PITC acceptance, which reduces the transmission of HIV from mother to children.

Factors related to PITC acceptance include the age of pregnant women, number of antenatal care visits, perceived quality of PITC service, perceived partner reaction toward the positive result, and level of knowledge on MTCT. The findings are partly consistent with the previous studies.<sup>16,23–25</sup>

We found that younger pregnant women were less likely to accept PITC than older ones, which is similar to other studies in Ethiopia and Cameroon.<sup>16,26</sup> This is likely because the younger age group in the study participants fear the stigma and discrimination from the society. We also found that the number of antenatal care visits was positively associated with PITC acceptance. Pregnant women with more antenatal care visits tend to have more chances of receiving health education and counseling, which contributes to higher PITC acceptance.

Furthermore, knowledge of MTCT and its prevention was found to be positively associated with PITC acceptance. This finding is in line with 2 more studies in Ethiopia.<sup>23,27</sup> Women who have low level of knowledge of MTCT and its prevention method might not understand the value of PITC in preventing the transmission of the virus from mother to child, and consider PITC as an obligatory part of antenatal care service, which compromises their acceptance of PITC.

Perceived quality of PITC service was the core part of the program. We found a positive association between perceived quality of service and PITC acceptance, consistent with a similar study in Ethiopia.<sup>10</sup> Pregnant women who perceive a better quality of service are more likely to accept PITC since they are attracted by the good quality of service delivered by the health professionals or the health

professionals influence them to accept HIV testing as it is very important in preventing the transmission of the virus from mothers to children.

Considering the high HIV prevalence and despite the effective treatment available in this region, it is a matter of great concern that nearly one-third of the respondents refuse PITC. Based on our findings, interventions suggested to improve HIV detection and treatment among pregnant women are as follows: 1) pregnant women should be asked for HIV testing more than once during the antenatal care visits. Some women may not accept the HIV test at their first visit, but may change their minds at later visits; 2) younger women often have little experience and knowledge of PMTCT and need more support and instructions on PITC; 3) women's knowledge of MTCT and partner attitudes are related to women's acceptance of HIV testing. PMTCT education should be integrated into the routine antenatal care service. Meanwhile, persuading partners to involve themselves in counseling is strongly encouraged if applicable; 4) quality of PITC service should be improved in the future to promote the women's compliance with PITC. Strategies may include training counselors to improve their service capabilities, and provide culturally sensitive service according the ethnic background of pregnant women.

There are limitations in this study. First, it was a cross-sectional study in which causal relationship could not be assessed. Second, the interview was conducted based on the pregnant women's perspectives, which may not reflect the whole picture of PITC service. Therefore, provider characteristics and program information should be included and evaluated in the future study.

In conclusion, it is essential to increase PITC acceptance through establishing PMTCT service centers with fully equipped necessary facilities and qualified health providers. This study offers suggestions on who should be the target population. Novel interventions are needed, especially among the subgroups of women who are least likely to take HIV test. Given the effective treatment for PMTCT, it is paramount that every HIV-positive pregnant woman has access to it and the best chance to deliver a healthy baby.



## Disclosure

The authors report no conflicts of interest in this work.

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