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Prevalence, associated factors, barriers and facilitators for oral HIV self-testing among partners of pregnant women attending antenatal care clinics in Wakiso, Uganda

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Abstract

Background Oral HIV self-testing (HIVST) among men is relatively low and still inadequate in Sub-Saharan Africa. Delivering HIVST kits by pregnant women attending antenatal care to their partners is a promising strategy for increasing HIV testing among men. However, even amidst the HIV testing interventions, most men do not know their HIV status. This study, aimed to determine the proportion of partners who received and used oral HIVST kits delivered by pregnant women, associated factors, barriers, and facilitators for uptake.

Methods We conducted an exploratory sequential mixed methods study among 380 sampled partners. Lists of partners from HIVST logbooks whose women picked an HIVST kit were obtained and systematic sampling was done to recruit participants. Fourteen (14) male partners were purposively selected for in-depth interviews to identify barriers and facilitators. We used modified poison regression to determine factors associated with oral HIVST. We used an inductive thematic analysis for qualitative analysis.

Results Out of 380 participants, 260(68.4%) received an oral HIVST kit from their pregnant women, and 215(82.7%) used it for HIVST. Oral HIVST was associated with; Information Education and Communication like availability of HIVST guiding materials (aPR = 1.64, 95%CI: 1.48–1.82), being reached at home (aPR = 1.04, 95%CI 1.01–1.08), and being aware of the woman's HIV status (aPR = 1.04, 95%CI 0.99–1.09). In-depth results identified barriers to uptake as, lack of trust in the HIVST kit results, fear of test outcome in the presence of their partner and inclination that the HIV status of their women is the same as theirs; Facilitators included convenience, ease of use, prior awareness of their HIV status, and fear of relationship consequences and breakup.

Conclusion Delivery of oral HIVST kits to men through pregnant women reached a high number of men and achieved high uptake. Accessing information, education, communication and the kit's convenience were major reasons for uptake among men who received the kit as; trust issues affected its use among partners. Scaling up the

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delivery of oral HIVST kits at all departments of hospitals through women seeking health services is paramount to support HIV screening among men to reach the UNAIDS 95 strategy.

Keywords Oral HIV self-testing, Partners of women

Background

Globally, HIV remains a significant public health burden accounting for an estimated 40 million people in 2023, and approximately 5.5 million people were not aware that they had HIV and still needed access to HIV testing services [1]. The Sub-Saharan Africa (SSA) remains the most affected [2]. The Joint United Nations Programme (UNAIDS) set a 95-95-95 target to be reached by 2030 [3]; meaning that the global target for HIV status awareness is 95% where by reaching this cascade requires having more people tested for HIV. Uganda Population-based HIV Impact Assessment (UPHIA) Report 2020 indicated that the current prevalence of HIV among adults (15 to 49 years) in Uganda is 5.5% [4]; thus, with this prevalence, increasing access to HIV testing and early diagnosis is crucial for controlling further spread of the disease.

There are various approaches used for testing HIV but; for many settings, the World Health Organisation (WHO) recommends the use of rapid diagnostic tests (RDTs) to accelerate the uptake of HIV testing since they allow quicker provision of test results. With appropriate training, education (Information, Education and communication), support, and supervision, community health workers can use RDTs to perform HIV testing accurately and reliably [5]. In Uganda, HIVST has gained significant attention after being implemented and enrolled by the Ministry of Health in Antenatal Clinics (ANC) as one of the ways to have men tested for HIV [6, 7].

Determining the factors associated with oral HIV self-testing among men is essential for identifying categories that need targeted interventions and closing gaps in HIV testing coverage for this group. Implementation of HIVST in Uganda supported by MOH [6, 7] showed high acceptability and use of HIVST by partners of pregnant women. However, there remain key concerns by policymakers worldwide and in Uganda about using oral HIVST. These include; lack of policies and regulatory systems, quality of oral HIV self-test kits, ethical and human rights issues, lack of counselling that may increase suicidal cases and knowledge about HIVST kits before use [8, 9].

According to the World Health Organisation (WHO), oral HIV self-testing (HIVST) is defined as a process whereby someone collects his or her specimen (oral fluid) and then performs an HIV test and interprets the result, often in a private setting, either alone or with someone, he or she trusts [3, 5, 10]. Individuals test themselves for HIV privately and at their convenience, overcoming several structural, psychosocial, and health systems barriers to HIV testing. Where-as there is a rationale for improving the uptake of oral HIVST services and subsequently HIV testing as a gateway to accessing lifesaving ART and prevention strategies, results from studies that informed enrollment of the HIVST kits in ANC setting in Uganda revealed moderate uptake of HIVST at 76% [6, 7]. During ANC visits, pregnant women are taken through a mandatory HIV test together with their male partners. However, most men in Uganda do not escort their women during ANC visits [11]. Thus, using ANC women to deliver oral HIVST kits as a secondary delivery method in Uganda would reach a high number of men. This intervention supports reaching men who find it hard to escort their women and miss the opportunity to test for HIV. However, there is limited evidence-based research that has been carried out among men to evaluate the intervention since its implementation.

Evidence about its use by partners of pregnant women is important to inform necessary improvements and this study is timely to assess the actual delivery and uptake since there has not been any evaluation done since the intervention was rolled out. Most studies targeted pregnant women as a proxy measure for uptake of HIVST among their male partners. Thus, this study focused on male partners themselves to ascertain those who received and used the oral HIVST kits. Our study determined the actual delivery of HIVST kits, uptake by the partners who received the kits, the factors associated, barriers and facilitators for use of HIVST kits among partners of pregnant women attending Antenatal clinics in Uganda.

Methods

Study design

A sequential explanatory mixed methods design was used to assess uptake of HIVST among male partners of pregnant women seeking ANC. The quantitative component collected information using a Kobo Collect designed questionnaire and face-to-face with participants to determine the proportion that received an oral HIVST kit from their ANC-attending women; male partners that used it for HIV self-testing, and associated factors with uptake of oral HIVST. The qualitative component used in-depth interviews (IDI) to identify the facilitators and barriers to uptake of oral kits delivered by pregnant women. The questionnaire was pretested before data was collected by trained research assistants who held at least a bachelor's degree.

Study setting

The study was conducted at the Antenatal care clinic at Wakiso Health Centre IV (HCIV), a government health facility in Wakiso district. The HCIV provides free ANC services to women, serving up to 250 or more women daily. Wakiso district houses most of the residents working in Uganda's capital city and business centre, Kampala; with men who are often busy working, and unable to escort their women for ANC—an entry point where men could have an opportunity to be screened for HIV. The district is located in Central Uganda, a region with the highest HIV prevalence at 8.1% above the national adult prevalence of 5.8% [12].

Study population

The study was carried out among male partners of pregnant women attending ANC at Wakiso HCIV in Wakiso District. Male partners were targeted because the MOH rolled out HIVST at ANC clinics to have the partners of pregnant women tested for HIV at their convenience since they often had no time to accompany their pregnant women to ANC where they would have an opportunity to be tested minimizing the spread of HIV infections. The study excluded male partners whose telephone numbers were not provided in the HIVST distribution log book at the ANC by their pregnant woman before receiving the kit (See Fig. 1).

Sampling and sample size estimation

The sample size was determined based on the Kish Leslie (1965) formula $n = Z\alpha^2\ P(1\text{-}P)\ /\ \sigma^2$, with (n) for the study sample size for male partners whose women attended the antenatal clinic, Zα Standard normal deviate at 95% confidence interval (CI) corresponding to 1.96, P for the prevalence of HIV testing among men at 67% [13], 1–P for Probability of Partner's use of oral HIVST, and 5% as margin of error.

Study participants were selected using a systematic random sampling technique from the target population of ANC pregnant women visiting the ANC clinic. A total number of 380 partners to pregnant women who agreed to deliver HIVST kits were recruited to participate in the study. The HIVST distribution log at the ANC clinic was reviewed to ascertain the number of male participants. A list of all pregnant women who picked the kits for their male partners drawn from January 2021 to October 2022 was developed and used as the study sampling frame for selection. After obtaining lists, we calculated the total number of pregnant women who agreed to deliver oral HIVST kits to their partners which totaled 2520 for the study period. This was considered as the numerator. The total calculated sample size of 378 participants obtained using Kish Leslie was a denominator to attain the sampling interval (n^{th}) number which was every 6th person during the recruitment of participants. For every 6th Pregnant woman and their male partner's phone number was provided, we considered the participant eligible to participate in the study. For participants who fell under the 6th and their phone numbers were not reached, we considered the next participant without changing the 6th sampling interval. The total number of participants reached and interviewed during data collection was 380 males.

Study procedure

Individual male partners eligible were contacted and those willing to consent were scheduled for an interview. During the phone call to schedule an interview, we introduced to the male partner the purpose of the study "We are looking at every woman who received ANC services from our facility Wakiso HCIV" For male partners who were not willing to come to the study site for the face-to-face interviews, we scheduled to visit them in their community and collected data from them at their convenience place, we did not want to miss any opportunity to interview them.

Qualitative data was collected by trained research assistants using an in-depth interview guide. The IDIs were conducted among the partners of pregnant women who picked oral HIVST kits to deliver to their male partners for HIV testing at home and registered a valid partner's telephone number in the HIVST distribution log. An exploration of barriers and enablers to the use of kits among men was done through probing during IDIs. Questions asked to male partners of pregnant women were about the process of how the HIVST kit was delivered to them, what their pregnant women told them, the process of testing, actions after testing, what motivated them to use the HIVST kit and barriers related to none use of the oral HIVST kit. This helped to record the views of the men themselves on the barriers affecting uptake and reasons for the use of kits. All discussions and interviews were audio-recorded with permission from the participants. IDI lasted between 30 and 40 min.

Measures

The main outcome of interest was; **(i)** Receiving the oral HIVST kit **(ii)** Using the oral HIV self-testing kit. The primary outcome variable was measured with a set of questions asked from partners of pregnant women to determine those who received and used the HIVST. The questions were asked in a way that did not directly involve the pregnant women. This was done to reduce the risk of increasing domestic violence in homes (1) Are you aware of your HIV status? (2) when did you last test? (3) have you ever received an HIVST kit? (4) From whom did you receive the HIVST kit? (5) Did you use the received HIV self-testing kit to test yourself for HIV? (6) Were you

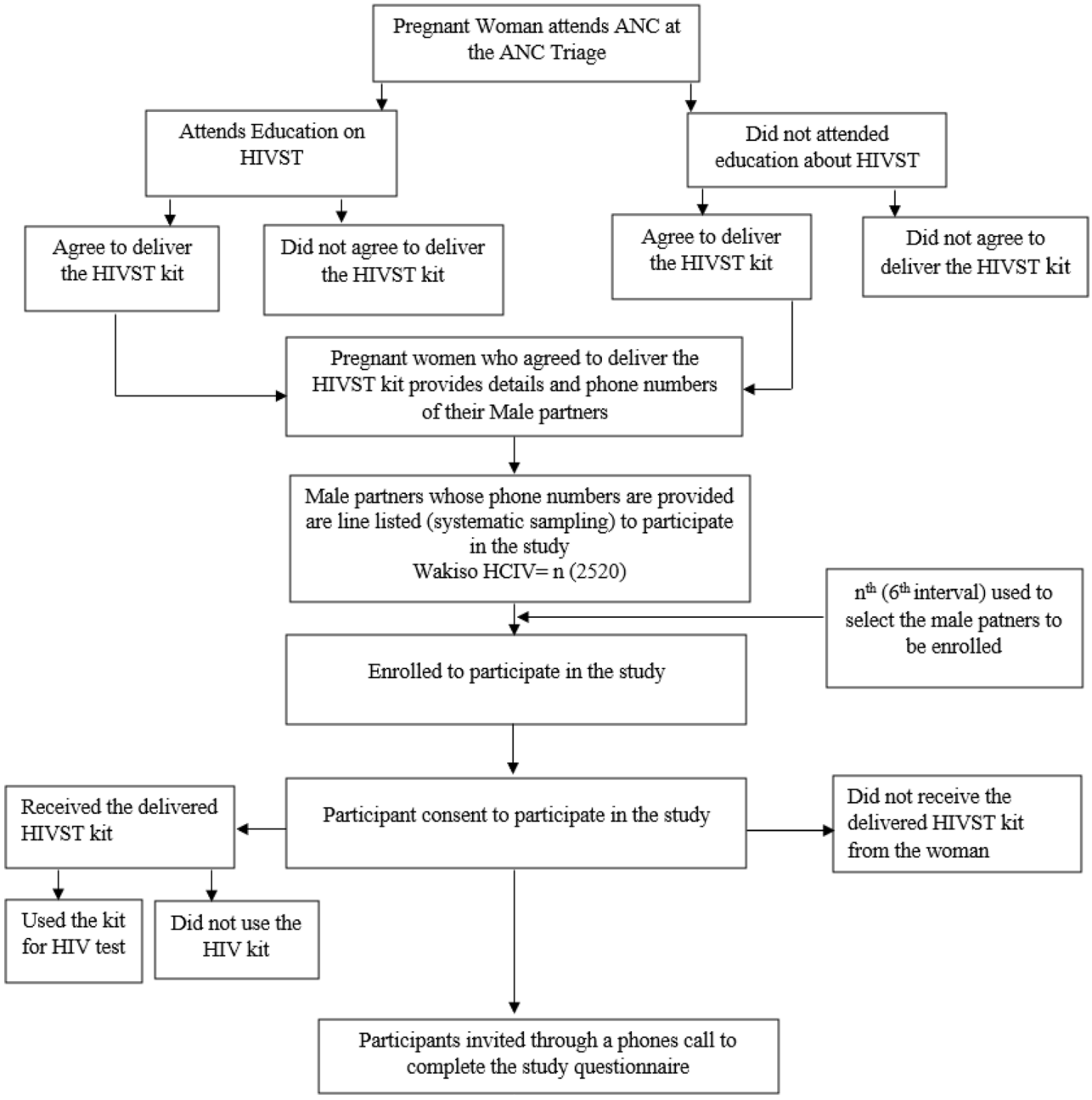

Fig. 1 Selection of partners for pregnant women attending ANC at Wakiso HCIV

able to obtain results after using the HIVST kit? Uptake of the oral HIVST was measured as a binary outcome if the participant responded "Yes" to the question or "No".

Data analysis

Quantitative data analysis was conducted using Stata-version 14.0. Analysis was conducted at three levels; univariable, bivariable, and multivariable analysis. In univariate analysis, the mean (standard deviation) of the age of respondents; frequencies and percentages were calculated for descriptive statistics including the number of partners that received the HIVST kits and the prevalence that used the kits for HIV self-testing. To determine the factors associated with the uptake of oral HIVST, modified Poisson regression was used to estimate prevalent ratios (PRs) [14].

Originally, unadjusted PRs were generated to select candidate variables for inclusion in the multivariable model where variables with a p-value ($P<0.25$) at bivariate analysis. Variables found significantly associated with the outcome in literature were also considered potential for the multivariable model. Multicollinearity was

assessed ($p<0.40$) and no variable was found to be co-linear to another thus none was eliminated.

Variables selected at bivariate were entered into a multivariable modified Poisson model to determine adjusted PRs. A stepwise procedure using the forward and backward elimination approach was used to select variables after considering significant variables at $p<0.05$. Interaction among the independent variables for the modified Poisson model was checked by considering the AIC values. The reduced model with the smallest AIC values was therefore considered.

This modelling strategy determined independent predictors of uptake of oral HIVST by partners to pregnant women attending ANC after controlling for confounding variables.

For the qualitative component, all audio-recorded interviews were transcribed verbatim and translated into English by experienced qualitative research assistants. These research assistants held at least a Bachelor's degree and were fluent in both Luganda, the commonly spoken language in central Uganda, and English. The transcribed and translated soft copies were printed into hard copies for review by the PI and two other independent qualitative researchers to assess accuracy and completeness. This helped in familiarization with the transcripts before analysis. All transcripts were imported into Dedoose software for analysis to identify codes and themes based on the primary objective of barriers and facilitators to oral HIVST among partners of pregnant women who received HIVST kits from the clinic. We used inductive thematic analysis to analyse qualitative data, and the results are presented as codes, subthemes and themes.

Table 1 Social demographic characteristics of participants

Variable (Categories)	Frequency ($n=380$)	Percentage (%)
Mean Age of Participants (SD) 30.1(6.2)		
Level of income per day Mean (SD) 18,554 (29239)		
Education level		
Primary	57	15
Secondary	252	66.3
Tertiary	71	18.7
Marital status		
Married	205	53.9
Cohabiting	175	46
Men with more than one spouse		
I have one spouse	367	96.6
I have more than one spouse	17	3.4
Number of sexual partners		
I don't have a sexual partner	173	45.5
I have at least one sexual partner	207	54.5
Place of residence		
Semi-Urban	72	18.9
Urban	308	81.1
Living with the partner		
Living with partner	339	89.2
Staying elsewhere	41	10.8
Employment		
Informal employment	212	55.8
Formal Employment	168	44.2
Religion		
Anglican	80	21.1
Catholic	144	37.9
Muslim	94	24.7
Other religion*	62	16.3

*Other religions included Seventh-day Adventist, Orthodox, and Pentecostal.
SD – standard deviation

Results

Socio-demographic characteristics of participants

We enrolled 380 participants with a mean age of 30.1 years (SD 6.2), 53.9% (205/380) were married, 46% (175/380) were cohabiting, 54.5% (207/380) had at least one sexual partner besides their spouse and the majority 66.3% (252/380) had secondary education. The majority of the participants were living with their partners 89.2% (339/380), and more than half were informally employed 55.8% (212/380), and mostly Catholics 37.9% (144/380) (Table 1).

Proportion of partners to ANC women who received oral HIV self-testing kits

Over half (68.4%; 260/380) of pregnant women who picked oral HIVST kits delivered them to their partners for HIV self-testing (Fig. 2).

Uptake of HIV self-testing kits

Self-reported uptake of oral HIVST kits by the male partners was 82.7% (215/260) (Fig. 3).

Factors associated with uptake of oral HIV self-testing among partners of pregnant women attending antenatal care

At multivariable analysis, we found that uptake of oral HIVST was significantly associated with having access to information education and communication about HIVST, being aware of a partner's HIV status and being reached at home with an HIV self-testing kit (Table 2).

Facilitators for oral HIV self-testing among partners of pregnant women who received the kit attending ANC at Wakiso HCIV

Among the facilitators for oral HIVST was partner testing because this helped the two know each other's status. Men revealed that they tested for HIV in the presence of their pregnant women which promoted partner testing.

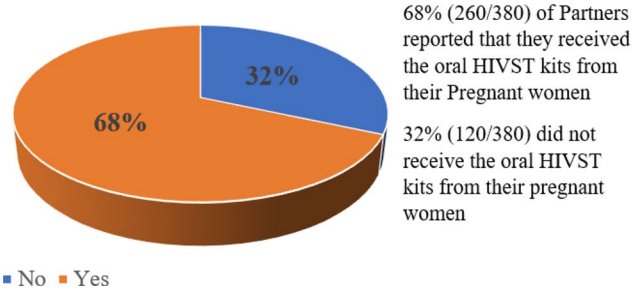

Fig. 2 Proportion of Male partners who received an HIVST kit from their pregnant partners

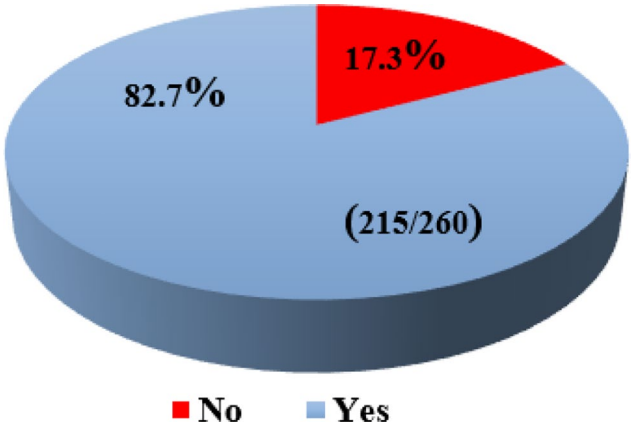

Fig. 3 Uptake of HIV oral self-testing among partners of pregnant women

Partners easily understood each other's status paving way for keeping safe when they test together.

> *……. Yes, she was there, after swabbing, she picked it from me and put it in the buffer, and showed me the control test" [IDI, 25years].*
> *……. we tested very well together, it was 7 pm, and that day I went home early, I tested at about 7:30 min and when each of us found that we were safe, each of us slept very well when we understood that each of us was HIV Negative" [IDI, 31years].*

HIVST is a convenient, easy, and harmless way of HIV testing

Men revealed that there was no waste of time moving to facilities since the kits were delivered to them at home and did not involve piercing to test for them themselves. One of the respondents reported that he was able to test for HIV because of the convenience of the HIVST kit delivered by his wife.

> *….I didn't have time because when the time approached to come there, she then told me they wanted us to go together for ANC then I said no because my job can't allow me to go there so, then she told me now, they have given me this, it is the thing to test HIV, I said it is okay, I can use it no problem…" [IDI, 28years].*

Men identified that using the kit was easy because of the instructions. Some noted that because they did not need to be pierced before being tested was an automatic yes for them to use the kit when their pregnant women brought it home.

> *….I haven't seen any barriers concerning the use of the HIVST kit, in my own point of view, it is actually very convenient and good, instructions are understandable, easy to use, and they don't prick you to obtain blood for the test; it's painless, doesn't vibrate, you don't have any fear of wounds" [IDI, 31years].*

Being aware of their HIV status before using the oral HIV self-testing kit as a facilitator for use of the kit

Male partners who knew their HIV status easily used the HIVST kit delivered by their pregnant partners. A respondent reported that using the HIVST kit was not a problem since he had tested and knew his status before using the kit their partner delivered

> *…… When my wife brought the kit, I did not use it immediately because I was not sure of my before so*

Table 2 Factors associated with uptake of oral HIV Self-Testing among partners of pregnant women

Variable	Uptake of HIVST	Bivariate analysis		Multivariate analysis	
	Yes *N* = 215	cPR (95%CI)	*P*-Value	aPR (95%CI)	*P*-Value
Age of Participants		0.99[0.99-1.00]	0.57		
Education					
Primary	34(15.8)	I			
Secondary Education	144(66.9)	0.99[0.93–1.07]	0.98		
Tertiary	37(17.3)	0.99[0.91–1.09]	0.93		
Marital status					
Cohabiting	99(46.1)	I		I	
Married	116(53.9)	1.8[1.01–1.11]	0.03	0.99[0.96–1.03]	0.72
Men with more than one spouse					
I have one spouse	207(96.3)	I			
I have more than one spouse	8(3.7)	0.91[0.77–1.07]	0.24		
Number of Sexual Partners					
I don't have a sexual partner	73(45)	I			
I have at least one sexual partner	118(54.9)	1.02[0.97–1.07]	0.73		
Living with the partner					
Staying elsewhere	7(3.3)	I		I	
Staying with partner	208(96.7)	1.19[1.00-1.40]	0.05	0.95[0.91–1.01]	0.11
Employment					
Informal employment	119(55.4)	I			
Formal Employment	96(44.7)	1.00[0.95–1.05]	0.98		
Religion					
Anglican	45(20.9)	I			
Catholic	75(34.9)	1.02[0.95–1.10]	0.51		
Muslim	59(27.4)	1.04[0.96–1.12]	0.25		
Other religion	36(16.7)	1.01[0.92–1.09]	0.89		
Received IEC and Education before use of HIVST					
No	7(3.3)	I		I	
Yes	208(96.7)	1.70[1.55–1.87]	0.001	1.64[1.48–1.82]	0.001
Source of information					
Friends	29(13.5)	I			
Radio	116(53.9)	1.03[0.94–1.11]	0.55		
Television	70(32.6)	1.03[095-1.12]	0.45		
Pre-HIV phone counselling					
No	199(92.6)	I		I	
Yes	16(7.4)	1.10[1.07–1.13]	0.001	1.01[0.99–1.03]	0.22
Place of HIV self-testing					
Facility	96(44.7)	I		I	
Self-testing	119(55.4)	1.18[1.12–1.23]	0.001	1.04[1.00-1.08]	0.01
Spouses' age					
15–24	108(50.2)	I			
25–34	98(45.6)	1.02[0.97–1.07]	0.47		
Above 35years	9(4.2)	0.93[0.79–1.08]	0.36		
Spouses' Education Level					
Primary Education	38(17.7)	I			
Secondary education	150(69.8)	1.04[0.96–1.12]			
Tertiary Education	27(12.6)	1.09[1.01–1.19]	0.01		
Aware of the woman`s HIV status					
No	21(9.8)	I			
Yes	194(90.2)	1.12[1.01–1.24]	0.03	1.04[1.00-1.09]	0.05
Level of Communication with the spouse					
Regularly	211(98.1)	I			

Table 2 (continued)

Variable	Uptake of HIVST	Bivariate analysis		Multivariate analysis	
	Yes *N* = 215	cPR (95%CI)	*P*-Value	aPR (95%CI)	*P*-Value
Unregular	4(1.86)	0.82[0.65–1.03]	0.08		
Awareness of HIV status before HIVST					
No	3(1.4)	I			
Yes	211(98.6)	1.34[1.05–1.71]	0.02		
Number of other sexual partners					
I don't have any other sexual partner besides my wife	97(45.1)	I			
I have at least one Sexual partner	118(54.9)	1.01[0.97–1.072]	0.46		
Number of children					
None	33(15.4)	I			
One child	82(38.1)	1.06[0.98–1.15]	0.16		
More than one child	100(46.5)	1.03[0.95–1.11	0.54		
Number of Antenatal visits					
At least 3 ANC	115(53.5)	I			
More-than 3 ANC	100(46.5)	1.01[0.96–1.07]	0.59		
Number of spouses					
Only one	207(96.3)	I			
More than one	8(3.7)	0.91[077-1.07]	0.25		
Perceived risk of contracting HIV					
High	189(87.9)	I			
Low risk	26(12.1)	1.08[1.04–1.13]	0.001		

cPR (crude prevalence ratio); aPR (adjusted prevalent ratios)

I went to a clinic. when the nurse checked me, I got the results, and I was negative She charged me 7000 shillings as service. When I reached home, I asked for the one my wife had brought and used it too [IDI, 31years].

Fear of negative relationship consequences

Some men revealed that they used the oral HIVST kit due to the fear they developed related to losing their women if they did not use the kit, pregnant women brought home.

……She threatened me to leave and, I didn't want to lose her and for the safety and health of our baby, I had to use the thing she has brought. [IDI, 25years]

Barriers to the Use of HIV self-testing kits by male partners

Concerns over the accuracy of the kit and fear of obtaining incorrect results

Participants raised concerns over the accuracy of kits and obtaining incorrect results that could cause violence. They revealed that however willing they would be to use the kits, they were uncomfortable with the results.

……. Personally, I still doubt how genuine the results turn out because what I know is; HIV is transmitted through blood, even if you give me 100, it's hard for me…" [IDI, 27years].

Male partners lacked the confidence to use the HIVST kits due to a lack of education and limited access to information about the kits that were availed to them, and their functionality.

……. [I had a lot of pressure] thinking I would not get the right results reason being that I had one friend of mine who went to a facility to test for HIV and he was told he had HIV and when he later tested again from another facility, he was told he was negative So that pressure of false results really discourages me from using the oral kit to test my-self. so, once I know my wife's results, I can also know how my status is hahaha. [IDI, 31years]

However, some respondents also raised concerns about how one could control himself in case he tested positive using the kit being that testing was done in the absence of trained personal.

……. What if a person used it and got positive results? Usually, such a person is given counselling. However, in such a scenario, you've given it [testing kit] to this person, when he has not asked for it. He does the test from his home and gets results yet there isn't any counseling. What could happen next

to such a person? How can you help such a person when you are not there with him? [IDI, 31years]

The male superiority complex and inclination that women's HIV status is the same as theirs

Some male partners expressed feelings that defined powers to make decisions unless they wanted to do so willingly. In Uganda, men are heads of the family and are respected by their women and children. They are decision-makers thus if they refused to use the kit nothing would go wrong, women in this case don't force their partners to use the oral HIVST kit. The men decide to use the kit on their own.

..... In the first place, I was not consulted that my wife was going to deliver an HIV testing material, this alone was a demotivation for me to use the testing kits she brought. If I used it like easily, that means she would start forcing me to do other things she felt she wanted" [IDI, 35years].

Some male partners also revealed that due to the stigma related to HIV testing, they consider themselves to have the same HIV status similar to that of their female partners. They claimed that if their woman tested for HIV, they did not need to retest for HIV as they considered the outcome of females as theirs too.

..... Most times I take my spouse's results, once I know her results, then I can conclude what my results could be..." [IDI, 31years].

Discussion

The study determined the actual delivery and uptake of oral HIVST and associated factors, barriers and facilitators for the use among partners of pregnant women attending Antenatal care clinics in Wakiso, Uganda. We found that 68.4% of partners received the oral HIVST kits from their ANC women attending antenatal care at a public health facility for HIV testing and uptake of a service was at 82.7%. The variable factors associated with uptake were; having access to information education and communication about HIVST, being aware of a partner's HIV status, and being reached at home. This indicates that the strategy of delivering HIVST kits through pregnant women attending antenatal care has the potential to reach a significant portion of men who may not have otherwise accessed HIV testing services.

Besides, our findings indicated that not all ANC women who picked an oral HIVST kit to deliver to their partners delivered it to the partner hence this limits the cascading of the HIV testing strategy. This percentage distributed is lower compared to a study which found that 91% of ANC attendees reported successfully distributing HIVST kits to their male partners, which facilitated couples testing [15]. The percentage of women who did not deliver the oral HIV kits was relatively high given the purpose of the intervention which intends to reach all men of ANC attending women. Irregular communication among partners is one of the challenges for the non-delivery of the kits to the male partners [16], and some women never deliver the HIVST kits due to fear of their partners' reactions [16]. Our study revealed that some women used the oral HIVST kits on other family members and by the time the partner came back home, the oral HIVST kit was already used, other women had misplaced the kits and did not know where the kit was at the time of testing among other reasons. These results suggest the need to strengthen strategies that will ensure women deliver oral HIV self-testing kits to the intended population. Studies can be done to explore why women pick the kits to deliver them but end up not giving them to the target persons.

The uptake of HIVST among partners of pregnant women was 82.7%. Results from the study are slightly higher than those of a randomized trial whose uptake was 76% [7]. The high uptake in this study is a significant achievement in addressing the longstanding challenge of low HIV testing rates among men, particularly in Uganda and sub-Saharan Africa. The results indicate that once men have access to the kits, they are generally willing to self-test for HIV. However results from our study are slightly lower than those from similar studies whose uptake was high at 86% and 97.7% respectively [17, 18]; but higher than that of the study among men in Zambia whose uptake was at 24% respectively [19, 20].

This may be attributed to the convenience and accessibility; the trust and influence women hold as they are perceived to be good caregivers and knowledgeable individuals regarding health matters in families. This also shows that the confidentiality created through this unique delivery approach has collectively contributed to a high number of male partners accessing HIV testing services using the oral HIVST kits delivered by their pregnant partners at home.

The modified factors that were associated with the uptake of oral HIV self-testing among partners of pregnant women were information, education, and communication (IEC) that is materials that had information on the use of the kits, access to HIVST information, place of HIV self-testing, and being aware of the woman's HIV status. Access to IEC and materials helped partners easily understand how to use the oral HIVST kits. The association between oral HIVST and IEC has been well-documented in previous studies [21, 22]. This highlights the importance of effective communication and education

campaigns through media like televisions, social media, radios, and health education targeted at promoting awareness and knowledge about HIVST to empower individuals with the necessary information to make informed decisions.

From the in-depth interviews, male partners attributed the smooth explanation of how to use the HIVST kits to the education level of their pregnant partners. It is possible that women with a high education level were able to explain the processes of HIV testing as directed by the health workers. These findings suggest that comprehensive education campaigns provide accurate information and address potential concerns surrounding HIVST. These campaigns can help increase awareness and knowledge of oral HIVST, especially among this group. This is in line with other studies [16, 23], which recommend the need to intensify health education and communication through various media oral HIVST, as this approach is to reach more men and convince them to test for HIV using the delivered HIVST kits by their pregnant women. The gaps in the IEC strategy about the HIVST include limited access to oral HIVST information, affecting participants to perform self-testing due to a lack of knowledge and awareness on how to use the kit. There is a need to intensify awareness about HIVST use and education on its use among the communities to ensure the secondary delivery of kits yields the best results intended ultimately contributing to better prevention and early detection of HIV in this population.

Our findings indicated that more male partners tested when reached at home. The preference for delivered oral HIV self-testing, as demonstrated in this study, is in line with existing evidence [24, 25]. The findings of this study indicate that the secondary delivery of HIVST kits could improve male partner HIV testing due to the convenience and time issues. The flexibility of this model addresses barriers associated with facility-based testing, such as stigma and time constraints. Scaling up the secondary delivery of oral kits to all departments of the hospitals into a routine distribution through women attending all departments could help address the low testing rate currently in this population [26, 27]. These results suggest that by making testing more accessible, secondary delivery of oral HIVST can potentially reach a larger population and improve overall testing rates.

In addition, the convenience and ease of use were a major facilitator of oral HIVST use. Participants expressed appreciation for the simplicity and accessibility of the self-testing kits through their women without necessarily moving to the facility themselves. This has also been highlighted in previous studies [28–30], because the secondary delivery of oral HIVST kits addresses barriers such as transportation costs and time constraints, enabling men to test for HIV at their convenience. However, it was important to note that fear of relationship consequences facilitated use of the kit from our In-depth discussions with men. Some men highlighted concerns about potential negative impacts on their relationships if they did not use the HIVST kit delivered by their pregnant partners. This forced this category of men to test so that they could save their relationships from being broken.

This however echoes stigma in the process. Previous studies have found similar reasons as barriers to oral HIVST among men [31–33]. However, our study findings showed that Prior awareness of one's HIV Status encouraged male partners to do an HIV Self-test. This suggests that oral self-testing serves as a means of regular monitoring for individuals already aware or even engaged in HIV care/prevention programs. Similar findings were reported in a previous study [15].

More interestingly, most participants revealed that they were motivated to use the HIVST kit because it helped them understand each other's HIV status as a couple. This emerged as a significant motivation for oral self-testing by male partners. Similar findings are in line with other research carried out [34]. These findings indicate that testing together as partners allows for shared responsibility, open communication, and support in maintaining a healthy relationship.

While oral HIVST was found to be convenient and used by the majority, a common view among male partners pointed out during in-depth interviews for failure to use the kit was due to concerns and fear of obtaining incorrect results. Participants expressed concerns about the accuracy of HIVST kits and the fear of obtaining incorrect results in the presence of their partners. This fear could have been raised from concerns about potential consequences within the relationship, being stigmatized, blamed, or even bringing about violence. According to previous studies, this is a well-known barrier highlighting the psychological issues related to obtaining inaccurate results [17, 35–37]. Given the study, there is a need to address these concerns through awareness campaigns, information, and educational and communication materials, with clear instructions on kit usage and interpreting results. This can help eliminate doubts, ensure confidence, be user-friendly, trust and encourage uptake of oral HIV self-testing by this population. Promoting pre/post-HIVST partner counselling either through phone, or confidentiality, can help address such concerns among this population.

Interestingly, some of the participants revealed that they did not need to test for HIV because their partner's status was the same as theirs. Participants had an assumption that a woman's HIV status is the same as theirs, leading to a decreased perceived need for the individual using the delivered kit to test themselves.

Similar findings were reported in a previous study [38]. Such misconceptions likely are caused by a lack of communication and understanding about the dynamics of HIV transmission. Given the findings, providing accurate information about HIV transmission, the importance of individual testing, and the potential for serodiscordant relationships can help demystify the misconception and encourage individuals to carry out HIV testing. Pregnant women attending ANC are given one HIVST kit for their partners hence if the kit is misplaced, partners miss the opportunity of being tested. Participants during in-depth interviews mentioned instances where the kit was misplaced, used by someone else, or not readily available having been used by another family member. This logistical barrier can be addressed through improved distribution strategies, ensuring sufficient availability, promoting proper storage and safeguarding kits within households when given for delivery. Leveraging these strategies is feasible in a resource-limited setting like Uganda, provides a major opportunity to strengthen and cascade HIV screening, an entry to HIV care and prevention among this population.

The study had some limitations. Uptake of HIVST was partners self-reported and participants' responses were unfortunately not confirmed elsewhere in the study. This could have possibly allowed misreporting and may also have been subject to desirable responses.

Another limitation was, to better understand the differences in men who received the test kits, it could have been important to explore the demographic and contextual factors associated with the HIVST kits like variations in age, education, income, or geographical location among men who receive the kits compared to those who don't. This could help provide insights into which subgroups of men more likely benefit from this intervention and guide targeted strategies for improvement; the detailed nature our study did not do, and lastly the study enrolled male participants who were willing to come to the facility when we invited them, a sense that these participants were motivated and could easily test for HIV thus affecting generalizability.

However, a strength of our study was the ability to reach to men and get first-hand information about the oral HIVST kits they receive through secondary delivery strategy especially since there has not been any follow-up since its implementation in ANC clinics across the country. The findings from our study are important to inform practice, policy, and the Ministry of Health in designing male engagement strategies regarding oral HIVST services.

Conclusion

HIVST kits delivered through pregnant women reached a high proportion 68.4% men who received the HIVST kits, and uptake was at 82.7% some of whom had never tested to know their HIV status. Factors associated with a high uptake were access to HIVST Information, Education and Communication, being reached at home, and being aware of the partner's HIV status. The facilitators for use were being convenient and easy to use, fear of negative relationship consequences like breakup, knowing each other's HIV status as a couple, while barriers like lack of trust in the kit and fear of obtaining incorrect results, an inclination that a woman's HIV status is the same as theirs affected oral HIVST uptake. Secondary delivery of oral HIVST offers an advantage over the standard facility HIV testing. If scaled up, it can contribute to closing the gap towards the first 95 UNAIDS track target; hence having more men tested, given low HIV testing coverage in this population. We recommend integrating the secondary distribution of HIVST kits at all departments in the Hospital in alignment with policies to promote male engagement primarily through women seeking healthcare, provide accurate Information, education, and awareness about HIVST through various channels, social marketing and local media channels promoting HIVST to reach a wider population.

Abbreviations

HIVST	HIV Self-Testing
ANC	Antenatal care
IEC	Information Education and Communication
MOH	Ministry of Education
HTS	HIV Testing Services
HCIV	Health Centre IV

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Author contributions

LN, JN1, JNM, JN4 designed and developed the study protocol. LN, DM, PAI, BO, supervised data collection and performed the statistical analyses with oversight from FCS, JN1, JNM, AK. LN, JN4, AK wrote the manuscript with input from all the authors. All the authors reviewed the manuscript and approved the final version.

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Data availability

Data are available upon request from the corresponding author.

Declarations

Human ethics and consent to participate

Informed consent for all participants was obtained before being interviewed. Information about the study procedures, benefits and risks were explained to them. There was no anticipated harm to the participants during this study

except for their time during data collection. The study protocol was approved by Makerere University School of Public Health (MakSPH-REC 063). Permission was sought from the District Health Officer of Wakiso District to conduct the study within the district. All principles of research involving human subjects outlined in the Declaration of Helsinki were adhered to.

Consent for publication
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Competing interests
The authors declare no competing interests.

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