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## High acceptability of assisted partner notification services among HIV-positive females in Kenya: Results from an ongoing implementation study

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### Abstract

**Background:** Assisted partner services (aPS) involves notification and HIV testing for sexual partners of persons diagnosed HIV-positive (index clients). Since the impact of aPS is contingent on high acceptance, we assessed characteristics and reasons for non-enrollment among female index clients in an ongoing scale-up project.

**Methods:** We analyzed data from HIV-positive females offered aPS in 31 facilities from 5/2018–8/2019. We compared socio-demographic characteristics by aPS enrollment (accepted, refused, ineligible) and used multivariate binomial regression to assess associations between demographics and refusal.

**Results:** 24,418 females received HIV testing and 1,050 (4.3%) tested HIV-positive; 839 females enrolled in aPS (80%), 59 refused (6%) and 152 were ineligible (14%). APS uptake did not differ by age, testing history or testing type (provider vs. client-initiated). Females refusing aPS were more likely to have completed secondary school (adjusted relative risk [aRR] 2.03, 95% CI: 1.13–2.82) and be divorced/separated (aRR: 3.09, 95% CI 1.39–6.86) or single (2.66 95% CI: 1.31–5.42) compared to married/cohabitating. Reasons for refusing aPS included not feeling

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**AUTHOR'S ROLES:**

MS, EK (Edward Kariithi), SM, and CF conceived of the analysis. EK (Emily Kemunto), GO, CO, PM, RB, MM, HL, and BW conducted data collection and management. MS conducted the analysis and wrote the first draft of the paper. All authors critically revised the manuscript and approved the final version.

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emotionally ready (31%) and reporting no sexual partners in past 3 years (22%). Reasons for ineligibility included fear or risk of intimate partner violence (9%), previous HIV diagnosis (9%) or insufficient time for aPS provision (3%).

**Conclusion:** APS has high acceptability among HIV-positive females regardless of age or testing history. More counseling may be needed to increase uptake among females with higher education and those who are separated/single. Follow-up for females not emotionally ready or who had insufficient time for aPS in their clinic visit can improve coverage.

### Keywords

HIV counseling and testing; sub-Saharan Africa; partner notification; partner services; women

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## INTRODUCTION

HIV continues to cause significant morbidity and mortality, disproportionately impacting sub-Saharan Africa (SSA) where over 70% of the world's new HIV infections occur.(1) Globally, only 75% of persons living with HIV know their status, indicating that expanded testing strategies are needed to achieve the first 95 of UNAIDS' ambitious testing, treatment and viral suppression targets.(2) Potential funding shortages have increased policymakers' demand for efficient testing approaches with high yield for detecting HIV-positive persons. (3) Assisted partner services (aPS) involves notification and HIV testing for sexual partners of persons diagnosed HIV-positive (index clients) and is recommended by the World Health Organization (WHO) as a targeted strategy to identify new HIV cases.(4) Types of aPS include: 1) provider notification: providers contact partners directly and offer testing, and 2) contract referral—index cases are given a set amount of time to notify partners, after which providers conduct notification, and 3) dual referral: both index clients and providers contact partners and providers often conduct couples HIV testing. (5) In practice, aPS is often implemented as a mix of these options and all forms of aPS require voluntary consent from index clients. APS clinical trials and demonstration projects in SSA have found high positivity rates of 30–63% among sexual partners of index clients and high CD4 median counts, indicating that individuals are identified earlier in their disease course compared to clinic testing.(6–10) Early case detection and linkage can improve clinical outcomes and reduce onward transmission.(7, 11, 12) Mathematical modeling analyses indicate that aPS is a cost-effective strategy to reduce HIV burden in SSA.(13)

Further, aPS is an effective method to reach HIV-exposed men through their HIV-positive female partners, since women test for HIV at higher rates than men. Men in SSA are more likely to start antiretroviral therapy (ART) at advanced disease stages and have worse clinical outcomes compared to women.(14, 15) Low male testing and treatment rates also increase HIV transmission to female partners. However, the impact of aPS on the HIV epidemic is contingent on high acceptance rates among index clients who provide contact information for their sexual partners for partner tracing and notification. Assessing the demographics of females who refuse aPS and their reasons for non-enrollment may help target counseling messages and improve uptake. We sought to assess aPS acceptability, reasons and predictors of non-enrollment among females in an ongoing implementation project of aPS scale-up in western Kenya, a region with high HIV prevalence (15%). (16)

## METHODS

### aPS scale-up project

This analysis was performed using data from an ongoing aPS scale-up project in western Kenya, a collaboration between the University of Washington, PATH: a non-governmental organization, and the Ministry of Health in Kenya. The overall goal of aPS scale-up is to implement and evaluate aPS integration into health facilities in western Kenya using government-employed healthcare workers who perform aPS as part of their routine clinic duties. Although, aPS is being offered to both male and female index clients, we only collect program data on female indexes and their male partners. HIV testing services (HTS) counselors assess eligibility among individuals at participating clinics and offer aPS to those who are eligible at the time of HIV diagnosis. Females testing HIV-positive are eligible for aPS if they are ≥ 15 years of age, not at risk of intimate partner violence (IPV), not pregnant, newly diagnosed HIV-positive, and report at least one sexual partner within the last 3 years. Consenting females are asked to provide names and contact information for all sexual partners in the last 3 years. Index clients are offered aPS via contract referral, provider referral or dual referral approaches according to WHO guidelines. Only one reason for refusal or ineligibility was documented per index client. HTS counselors contact sexual partners *via* phone or physical tracing to notify them of their potential exposure and offer HIV testing. Partners are told that they may have been exposed to HIV but are not provided details regarding the exposure nor any identifying information regarding the index client. Both female indexes and HIV-positive male partners are followed up at 6 weeks, 6 months, and 12 months post-enrollment to assess linkage to antiretroviral therapy (ART), intimate partner violence (IPV), and relationship dissolution. Additionally, viral load testing is conducted at 12 months. To date, aPS has been integrated into 31 healthcare facilities in western Kenya; 16 in Kisumu County and 15 in Homa Bay County. The healthcare facilities selected are largely government-run clinics and hospitals providing HIV care services supported by the Kenya Ministry of Health and implementing partners including PATH. Two of the 31 facilities included are private clinics. All facilities provide routine healthcare services in addition to HIV care. aPS implementation began in Kisumu County in May 2018 and was later scaled up to Homa Bay in November 2018. Study data are collected on tablets using the open-source Open Data Kit (ODK) platform developed at the University of Washington (UW)(17). All data are encrypted for storage on the devices and transferred immediately over an encrypted connection to a secure server at the Kenya Ministry of Health. De-identified data are transferred nightly to a secure server at UW.

### Study population and statistical analysis

We analyzed data from HIV-positive females (age ≥ 15 years) in 31 health facilities offering aPS in western Kenya from May 2018 to August 2019. Socio-demographics of females were compared by aPS enrollment status (accepted, refused, ineligible) and reasons for refusal and ineligibility were tabulated. We used multivariate binomial regression with robust standard errors to assess the association between female demographics and aPS refusal. Demographics that were statistically significant in univariate regression ( $p < 0.05$ ) and improved model fit were included in the multivariate model; age was included as an a priori confounder. Income was collected as a dichotomous variable ( ≥ 10,000 shillings vs <10,000

schillings/month) We also visually assessed trends in aPS refusal and over time by county and used a chi-squared test to evaluate differences in refusal rates by scale-up year. Analyses were conducted using Stata Software(18).

## RESULTS

Across facilities, 24,418 females received HIV testing and 1,050 (4.3%) tested HIV-positive. The average age of HIV-positive females was 29 years range (15–74) and history of prior HIV testing was high (86% had tested for HIV in their lifetime). The majority of females were married or cohabitating with their partners (54%) with an additional 8% reporting being in polygamous marriages. Females generally had low levels of education: 70% had a primary school education or lower, and 83% earned less than 10,000 shillings (\$96 USD) per month. The primary modality of HIV testing was provider-initiated (71%) rather than client-initiated. Most females were identified in clinics in Kisumu County (66%) due to earlier aPS rollout compared to Homa Bay County. Female index participants enrolled in aPS reported an average of 1.7 sexual partners (data not shown).

APS coverage rates were high; overall 839 females enrolled in aPS (80%), 59 refused (6%) and 152 were ineligible (14%) (Table 1). APS uptake did not differ by age, testing history or testing type (provider vs. client initiated). Additionally, aPS uptake among adolescents and young adults (age 15–24 years), who comprised 35% of the sample, were similar to those of older women (data not shown). APS refusal rates increased with higher levels of education. For example, 28% of females who accepted aPS completed some primary school as their highest level of education compared to 20% of those who refused. In contrast, 15% of females accepting aPS had completed some secondary school as their highest education level vs to 25% of those who refused. Females refusing aPS were more likely to be divorced/separated, never married, or widowed. Similar to refusal patterns, ineligibility for aPS did not differ by age, testing modality, or testing history. Females who were ineligible for aPS were more likely to be divorced/separated, never married, or widowed compared to women enrolled in aPS.

Table 2 shows the testing outcomes among male partners elicited by enrolled female index clients by county. Overall 77% of male partners named by females index clients were traced and tested for HIV by aPS providers; 44% were HIV positive and 17% were newly diagnosed HIV-positive. Of partners who were known HIV-positive at time of tracing, the vast majority self-reported to be on ART (97%). At 6 weeks post aPS enrollment, 93% of index clients and 91% of male partners were reached via phone and self-reported to be on ART; 1.9% of female indexes reported relationship dissolution and 0.7% reported intimate partner violence at 6 weeks post-enrollment (data not shown).

Table 3a displays the reasons for aPS refusal reported by female index clients. The most common reason for refusing aPS was not being emotionally ready (31%), followed by reporting not to have any sexual partners in the last three years (22%). Fear of intimate partner violence (IPV) or fear their partner will find out was cited by 12% and 3% of females, respectively. Having sex partners who lived outside of the catchment region (10%) or outside the country (3%) were also reported as reasons for refusal. Seven percent of

females reported that they did not have sufficient contact information for their sexual partners while 3% refused to provide contact information.

Table 3b shows the reasons for aPS ineligibility as determined by healthcare workers. Approximately half of females listed as ineligible for aPS did not have a reason listed. Among reasons reported, pregnancy was the most common (14%) followed by risk of intimate partner violence (9%), only having one partner who is known HIV-positive (7%) or being a widow with no recent partners (7%). Couples testing was conducted in 9% of cases and healthcare workers reported not have enough time to provided aPS in 3% of cases.

In multivariate regression, females who refused aPS were more likely to have completed secondary school (adjusted relative risk (aRR) 2.03, 95% CI: 1.13 – 2.82) and be divorced/separated (aRR: 3.09, 95% CI: 1.39 – 6.86), single (aRR: 2.66 95% CI: 1.31 – 5.42), or widowed (aRR: 4.41, 95% CI: 2.18 – 8.96) compared to married/cohabitating (Table 4). Income was not statistically significantly associated with aPS refusal after controlling for education and other relevant covariates. Age was not associated with aPS refusal.

Figure 1 displays the proportion of HIV-positive index clients that refused aPS over time across facilities in Kisumu and Homa Bay County. Refusal rates were higher in the first 6 months of aPS implementation compared to the later months; for example the average refusal rate in Kisumu was 13% during May-Oct 2018 compared to just 5% during Nov 2018-August 2019. Refusal rates were lower in Homa Bay compared to Kisumu overall (2% vs. 8%). Chi-squared tests demonstrated that aPS refusal was statistically significantly higher in 2018 compared to 2019 for both Kisumu ( $P = 0.001$ ) and Homa Bay ( $P = 0.01$ ). However, we do not incorporate data on time trends and therefore cannot infer causality. APS ineligibility did not show clear patterns over time or by county (data not shown).

## DISCUSSION

We assessed the real-world acceptability of aPS in a large-scale implementation program across 31 facilities in western Kenya. Overall, aPS had high uptake among HIV-positive female index clients regardless of age or previous HIV testing history. Similarly, uptake did not vary by testing modality, indicating that females identified through provider-initiated testing were equally likely to accept aPS as those who sought out HIV testing (client-initiated). Further, aPS had high coverage in adolescents and young adults, a WHO priority population, who may be less likely to accept HIV interventions due to distrust of healthcare workers or concerns about disclosure to parents/caregivers.(19) In Addition, aPS refusal rates declined over time with program scale-up, suggesting healthcare workers developed improved messaging strategies that increased aPS acceptability.

However, due to the high positivity rates among HIV-exposed sexual partners (30–50%), even small increases in aPS acceptability among female index clients can have clinical benefits in identifying new HIV cases and preventing transmission(6–10). We found that females who were divorced, separated, or single were two to three times more likely to refuse aPS compared to those who were married or cohabitating, after controlling for participant demographics. Additionally, women with higher education had two-fold higher

aPS refusal rates. Targeted counseling strategies may be needed to address the distinct concerns of these women. It is possible that females who are no longer together with their partner have less motivation to protect their former partner's health. They also may be less likely to have contact information for former partners. Future qualitative research can improve our understanding of the barriers to aPS acceptance among women with higher education or those who are not married/cohabitating.

Almost one third of females who refused aPS reported not feeling emotionally ready. An HIV diagnosis can take time to process, therefore following-up with females after several weeks regarding aPS enrollment can increase uptake. Further research on effective approaches to increase uptake among these women is needed, including evaluating strategies such as HIV-self testing or couples HIV counseling and testing. Similarly, females who report not having contact information for their sexual partners can benefit from follow-up if they are given time to locate this information. Almost 25% of females who refused aPS cited not having any sexual partners in the last 3 years. However, since a new HIV diagnosis is often associated with recent sexual activity and this group excludes widows, it is possible that some of the females reporting no sexual activity did not want to disclose their partners. Healthcare worker follow-up may encourage aPS uptake among these women. Having sexual partners that live outside the catchment area was another reason for aPS non-enrollment. Migration for employment is common in many regions of Kenya; as aPS is scaled-up case referrals between counties can increase program coverage. Further, providing aPS at a subsequent visit for clients when there was not enough time to for aPS can increase coverage. Healthcare facilities are often busy and understaffed so this may become a common barrier to aPS with scale-up. Finally, couples testing was a commonly cited reason for not providing aPS. Couples testing and disclosure is associated with increased condom use in serodiscordant relationships and increased ART adherence and should be encouraged. (20) However, it is possible that persons testing HIV positive through couples testing may have partners outside of their primary relationship. Separately following up with index clients to offer aPS can identify additional HIV-exposed partners.

IPV was identified as a barrier to aPS uptake, both due to females refusing aPS because of fear of IPV or healthcare worker assessment that females were at moderate or high IPV risk and therefore ineligible to receive aPS. IPV is highly prevalent in SSA; according to the Kenya Demographic Health Survey, 40% of ever married women in Kenya had experienced IPV.(21) In addition, IPV is more commonly reported among HIV-positive women and may increase HIV acquisition through limited safe sex negotiation, forced sex, or increased risk taking behavior.(22, 23) Additionally IPV is associated with poorer ART adherence and therefore increased transmission to partners and poorer clinical outcomes.(24) Behavioral interventions to address IPV are important for the success of HIV prevention programs including aPS as well as the overall well-being of women in SSA. It is worthwhile to note that aPS provision is shown to be safe and effective among females with a history of lifetime IPV and aPS is associated with a low risk of social harms.(25, 26) Therefore, aPS can be safely scaled-up in SSA to achieve high coverage among female index clients.

Our analysis has several limitations. Since we utilized programmatic data, the quality was not as robust as that of a clinical trial. For example, reasons for aPS ineligibility was missing

in 51% of cases, which might result in drivers of ineligibility that we could not explore. However, we conducted extensive data cleaning and followed-up with facilities to obtain data that were missing or verify that values were coded correctly. Further, reasons for refusals were well characterized with only 8% missing. Additionally, there is some overlap between refusals and ineligibility as some females refused for reasons that may make them ineligible. Also, only one reason for refusal/ineligibility was collected per female, who may have had multiple reasons for non-enrollment in aPS. Despite testing a large number of women across facilities and identifying over 1,000 HIV-positive females, our sample size for refusal was small (N=59). Although we were able to assess the association of demographics with aPS refusal, we did not have sufficient power to assess refusal patterns by geographic location or facility size. As more program data are collected with aPS scale-up, studies evaluating heterogeneity in aPS acceptability can identify important differences that impact aPS coverage. Further, since the program collected limited demographic data, we could not assess the impact of other covariates (sexual behavior, socio-economic status, and mental health) on aPS acceptability. Additionally, since the aPS scale-up study is only collecting data on female index clients, we cannot report reasons for refusal among men. However, aPS implementation studies in SSA show that the majority of index clients are female (>70%) since they are more likely than men to seek out HIV testing.<sup>(9)</sup> Further their male partners are more likely to have undiagnosed HIV compared to female partners of male indexes, since men present later in the course of their HIV disease and their female partners are more likely to have been tested. However, future studies investigating aPS uptake and reasons for non-enrollment among male index clients can increase program acceptability. Additionally, although some pregnant women receive aPS outside of clinic settings, it is not offered within the facilities, thus cannot assess acceptability in this population. Overall, there are a lack of data on aPS safety and effectiveness among pregnant women as they have generally been excluded from aPS clinical trials. However, male partners of pregnant women can also benefit from aPS and linkage to care if HIV-positive, which can protect their health and enable them to continue providing for their growing families. Future studies assessing aPS in pregnant women can maximize the health impact of this intervention. Similarly, we evaluate aPS acceptability among females newly diagnosed with HIV. However, females who are known positive but not yet linked to care or virally suppressed likely have sexual partners at high risk of HIV. The population of persons living with HIV who are not virally suppressed is likely larger than that of newly diagnosed persons so evaluating the outcomes of expanding aPS coverage to known positive persons is an important priority for future research.

The strengths of our study include the ability to analyze data from a large-scale implementation study to assess aPS acceptability outside a clinical trial. Healthcare facilities in our sample include urban and rural regions and a range of clinic sizes that are representative of facilities in western Kenya. Our findings of high real-world acceptability suggest that aPS scale-up has the potential to increase testing coverage to reach the first 95 of UNAIDS ambitious testing and treatment targets and strengthen the HIV care cascade in SSA.<sup>(2)</sup>

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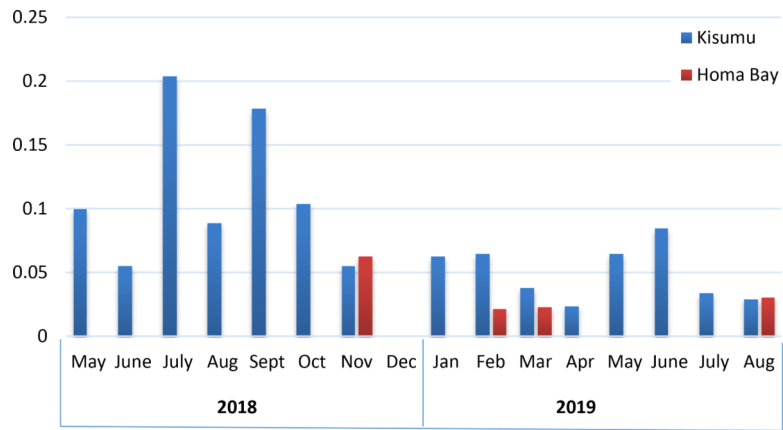


Figure 1: Proportion of female indexes refusing aPS over time

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**Table 1:**

Characteristics of female index clients by aPS enrollment status from 31 health facilities in western Kenya\*

	Accepted APS (N = 839)	Refused APS (N = 59)	Ineligible for APS (N = 152)
Age (mean, IQR)	28 (27–29)	31 (29–34)	31 (29–32)
Education			
Post-secondary	50 (6)	7 (12)	6 (4)
Completed secondary	129 (15)	15 (25)	34 (22)
Some secondary	168 (20)	11 (19)	34 (22)
Completed primary	228 (27)	14 (24)	41 (27)
Some primary	236 (28)	12 (20)	34 (22)
Never attended school	28 (3)	0 (0)	3 (2)
Monthly income 10,000 Kenyan shillings (\$96 USD)	709 (85)	42 (71)	29 (81)
Marital status			
Married monogamous/cohabitating	493 (59)	19 (32)	53 (35)
Married polygamous	70 (8)	3 (5)	9 (6)
Divorced/separated	68 (8)	8 (14)	29 (19)
Single, never married	153 (18)	16 (27)	29 (19)
Widow	55 (7)	13 (22)	32 (21)
Ever tested	721 (86)	48 (81)	129 (85)
Testing type			
Provider initiated	604 (72)	42 (71)	110 (72)
Client initiated	235 (28)	17 (29)	42 (28)
County			
Kisumu	526 (63)	56 (95)	115 (76)
Homa Bay	313 (37)	3 (5)	37 (24)

\* Percentages are listed in brackets

IQR: interquartile range

**Table 2:**

Testing outcomes among male partners elicited by female index clients

<b>Male partner outcomes</b>	<b>Homa Bay</b>	<b>Kisumu</b>	<b>Total</b>
Partners elicited	666	1114	1780
Partners HIV tested (/total elicited)	515 (77%)	779 (70%)	1294 (73%)
Partners tested HIV-positive (/total tested)	230 (45%)	344 (44%)	574 (44%)
Partners newly diagnosed HIV-positive (/total tested)	91 (18%)	132 (17%)	223 (17%)
Partners on ART at baseline (/known positive)	136 (97%)	206 (97%)	342 (97%)

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**Table 3:**

Reasons for refusal or ineligibility among aPS among female index clients

<b>3a) Reasons for refusal (N=59)</b>	<b>N</b>	<b>(%)</b>
Not emotionally ready	18	31%
Reported to not have any sexual partners	13	22%
Fear of intimate partner violence	7	12%
All sex partners live outside catchment region	6	10%
Index did not have sufficient contact info for sex partners	4	7%
All sex partners live outside country	2	3%
Fear that partner will find out	2	3%
Refused to provide info for sex partners	2	3%
Reason not specified	5	8%
Total	59	100%
<b>3b) Reasons for ineligibility (N=152)</b>	<b>N</b>	<b>%</b>
No reason listed	78	51%
Couples testing	13	9%
Risk of intimate partner violence	13	9%
Female is known HIV positive	2	1%
Not able to provide informed consent	1	1%
Not enough time	4	3%
Index has only one partner who is known HIV-positive	10	7%
Pregnant	21	14%
Widow, no additional partners	10	7%
Total	152	100%

**Table 4:**Association between aPS refusal and demographics of female index clients in Kenya<sup>§</sup>

	RR (95% CI)	aRR (95% CI)
Age (years)	1.04 (1.00 – 1.06)	1.03 (0.99 – 1.06)
Ever HIV tested	0.73 (0.39 – 1.37)	-
Provider initiated testing (vs client initiated)	0.96 (.56 – 1.66)	-
Completed secondary school	2.06 (1.24 – 3.41)	2.03 (1.13 – 2.82)
Monthly income > 10,000 Kenyan shillings (\$96 USD)	2.07 (1.21 – 3.53)	1.56 (0.86 – 2.81)
Marital status		
Married monogamous/cohabitating	Ref.	Ref.
Married polygamous	1.11 (0.34 – 3.65)	1.08 (0.33 – 3.51)
Divorced/separated	2.83 (1.29 – 6.25)	3.09 (1.39 – 6.86)
Single, never married	2.55 (1.34 – 4.84)	2.66 (1.31 – 5.42)
Widow	5.15 (2.67 – 9.96)	4.41 (2.18 – 8.96)

<sup>§</sup>Ref: Reference, RR: relative risk, aRR: adjusted relative risk