

Identifying individuals living with HIV in need of care and treatment: investigating real world implementation of HIV testing interventions in East Africa

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Abstract

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Globally, an estimated 6.1 million people living with HIV do not know their HIV status. In sub-Saharan Africa (SSA), which continues to be disproportionately affected by HIV, people living with HIV are generally identified through facility-based HIV testing; however, testing coverage has been insufficient to curb the epidemic, particularly in men and key populations. Finding undiagnosed individuals, getting them tested, and getting them linked to care is critical to achieving the UNAIDS 95-95-95 objectives by 2025. Assisted partner services (APS) is an important public health strategy aimed to prevent the spread of sexually transmitted infections, including HIV, by identifying, testing, and treating sexual partners of newly diagnosed individuals.

Additionally, the use of HIV self-testing (HIVST) kits has been shown to be a safe, accurate, and convenient alternative to facility-based testing in SSA that has the potential to overcome barriers associated with facility-based HIV. We aimed to understand the effectiveness, barriers, and facilitators for pragmatic implementation of these methods. We used data from an APS scale-up project, a hybrid type II implementation science study, conducted in western Kenya, and qualitative data from a study of pregnant women and male partners investigating perceptions of secondary distribution and use of HIV self-testing kits in Uganda. The specific dissertation aims included: (1) evaluating the real-world impact of scaling up APS in Kenya; (2) defining acceptability of APS among female clients and male partners in Kenya; and (3) determining relationship factors impacting HIV self-testing distribution and use among pregnant women and male partners in Uganda. From the APS scale-up project, we found evidence demonstrating that APS is a safe, acceptable, and effective strategy to identify men living with HIV who are unaware of their status and to link them to care. Our results are an important finding from a real-world implementation context, and can inform programmatic decisions regarding APS scale up in Kenya and similar settings. We also found that the real-world APS scale-up project demonstrates acceptability of APS as an important strategy to reach HIV-exposed male partners, while also highlighting the nuances and priorities to the acceptability of intervention. With the HIVST study, we found that HIV-negative women in relationships with positive predisposing factors may be the most likely to deliver HIVST to their partners, and to leverage interdependent coping behaviors. Interdependent relationship factors can influence and motivate distribution and uptake of HIVST, and subsequent health-enhancing behaviors, among pregnant women and their male partners, which can inform recommendations as HIVST continues to be scaled up. Ultimately, our research provided evidence on the implementation, perceptions, and importance of APS and HIVST

integration, and our findings provide opportunities to inform recommendations for further scale-up both for APS and for HIVST.

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Chapter 1: Introduction

Background

Globally, approximately 38 million people are living with HIV, and an estimated 6.1 million do not know their status¹. In sub-Saharan Africa (SSA), HIV continues to be a disproportionate cause of morbidity and mortality, accounting for over 70% of new HIV infections globally². Strategies to reach undiagnosed individuals with HIV testing services (HTS) are crucial to increase linkage to lifesaving antiretroviral therapy (ART) to prevent morbidity, mortality, and onward HIV transmission³. In SSA, HIV-positive individuals are generally identified through facility-based HIV testing; however, testing coverage has been insufficient to curb the epidemic, particularly in men and key populations⁴.

Assisted partner services (APS) is an efficient strategy to reach HIV-exposed individuals with testing and to link them to care. APS involves notification and HIV testing for sexual partners of persons diagnosed HIV positive (index clients). Types of APS include (1) provider notification: providers contact partners and offer testing; (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. APS is generally implemented as mix of these options to meet clients' needs.

The use of HIV self-testing (HIVST) kits has been shown to be a safe, accurate, and convenient alternative to facility-based testing in SSA that has the potential to overcome barriers associated with facility-based HIV. However, there are several implementation and social challenges that can limit scale-up⁵⁻⁹. A particularly promising HIVST delivery strategy is secondary distribution, where pregnant women in antenatal care (ANC) are given an HIVST kit by a healthcare provider to deliver to their male partners^{5,10}. This delivery strategy has been shown

to increase HIV testing among men, couples testing, linkage to care, and mutual disclosure of HIV status, although not consistently¹¹⁻¹⁵, and further research is needed to understand effective scaleup of this approach.

Given the intractable challenge of diagnosing at least 95% of those living with HIV, it is critical that policymakers and health care workers are able to leverage a comprehensive suite of testing modalities, and have the evidence required to nimbly adapt them to varying contexts and populations. Since the WHO recommended that APS and HIVST should be offered as part of a comprehensive package of testing and care offered to people with HIV¹⁶ in 2016, health care workers have led the way in studying how best to utilize and scale these methods. This work aims to support their priorities, and provide evidence of early outcomes of APS while integrated into national health systems, of acceptability of APS, and of important relationship factors that could impact secondary distribution of HIVST.

Assisted Partner Services

APS clinical trials and demonstration projects in SSA have found APS to be safe and effective in identifying high HIV positivity rates (30-63%) and high CD4 median counts among sexual partners of index cases, indicating that individuals are identified earlier in their disease course compared to clinic testing¹⁷⁻²². Specifically, a cluster-randomized clinical trial (RCT) in Kenya showed that APS significantly increased partner HIV testing, identification of previously undiagnosed partners with HIV infections, the number of partners with HIV infections linked to care, and first-time partner HIV testing¹⁹. A recent cross-sectional study in Kenya investigating APS found that out of 216 sexual partners, 77% were reached and tested, and 32% of the sexual partners that were elicited and traced, tested HIV positive²². These findings of safety and

efficaciousness within clinical trials and demonstration projects are promising, but roll-out of APS at scale will be challenging.

The Kenya Ministry of Health and National AIDS and STI Control Program (NASCO) have identified APS as a key strategy for achieving national HIV testing and treatment goals, and have affirmed their commitment to scaling up APS within HIV testing programs. Following the cluster-randomized trial mentioned above, the University of Washington, PATH, and the Kenya Ministry of Health recently collaborated on an APS scale-up project, implementing and evaluating APS integration into health facilities in western Kenya. This effort evaluating initial APS outcomes can be seen as a critically important next step in bringing APS to scale at a national and regional level across Kenya and sub-Saharan Africa.

We aim here to evaluate early outcomes of integrated APS at six weeks in Homa Bay and Kisumu, two Kenyan counties with the highest HIV prevalence in the country (25.7% and 19.3% respectively²³). In general, as men are significantly less likely to test and link to care if infected²⁴, both throughout the region but also in Kenya, this study prioritized identifying HIV-positive men. In 2014, only 45% of men in Kenya reported that they had tested in the last year compared to more than 53% of women²⁴. It is important to generate evidence that will provide key programmatic insights on identifying HIV-positive men, with the eventual goal of leveraging APS to support these efforts.

While investigating the real-world implementation of APS within a national health system remains critical to understanding the facilitators and barriers of this method, decision-makers need more than evidence of promising outcomes to inform intervention adoption, implementation, and scale-up. There is qualitative and mixed-method evidence regionally that has found APS to be generally acceptable, although significant challenges were identified, including lack of trust and

gender-specific challenges to successful referral²⁵⁻³¹. Studies within clinical trials have found promising results when quantifying acceptability of APS in Kenya, including with 67% acceptability in a cluster RCT¹⁹, and 89% in a recent cross-sectional study²². Other qualitative studies nested within RCTs in Kenya have identified challenges with awareness and lack of trust in health care providers³², and the need for increased training and sensitization on customizing APS to diverse clients³³. This evidence is informative; but in Kenya, there remains a need to understand the acceptability of APS from the client perspective when APS is integrated into the national health system, and not within in controlled studies. To complement an understanding of the six-week outcomes of APS, we aimed to qualitatively investigate acceptability of integrated APS, and to identify suggested interventions from both the female and male client perspectives to further inform opportunities to strengthen scale-up of APS.

HIV Self-Testing

HIVST has been found to be a safe, accurate, and convenient alternative to facility-based testing in SSA that has the potential to overcome barriers associated with facility-based HIV, although considerable implementation and social challenges limit scale-up⁵⁻⁹. In a community-based trial in Malawi, HIVST was reported as the preferred option for future HIV testing, and achieved 76% testing coverage among men⁵. A particularly promising HIVST delivery strategy is secondary distribution, where pregnant women in antenatal care are given an HIVST kit by a healthcare provider to deliver to their male partners^{5,10}. This delivery strategy has been shown to increase HIV testing among men, couples testing, linkage to care, and mutual disclosure of HIV status, although not consistently¹¹⁻¹⁵.

With secondary distribution, the role of the couple is an important lens, in that studies have shown significant couples-related barriers including trust, disclosure, gender roles and relationship dynamics^{12,34-37}. In a study in Kenya in which pregnant women were offered self-tests to distribute to their partners, over half accepted self-tests for partner testing, but clarity into the couples dynamic for acceptance and non-acceptance remained a critical gap³⁸. In Uganda, there have been no studies that elucidate the impact that couples perspectives and concerns have on secondary distribution, nor any focused on this lens within ANC care. We aimed to analyze findings of pregnant women's and male partners' perceptions of HIV self-testing in Uganda, leveraging the Interdependence Model of Communal Coping and Health Behavior Change³⁹ to generate findings and insights with the goal of identifying opportunities for strengthening clinical guidelines of HIVST. Studies in South Africa⁴⁰, Kenya⁴¹ and Uganda/Zambia⁴² have leveraged this Model to investigate HIV testing and treatment from the context of couples, but this effort is a novel utilization of the model studying the couples component of HIVST.

Specific Aims

We aimed to understand the effectiveness, acceptability, barriers, and facilitators for pragmatic implementation of APS and HIVST. Two countries in East Africa are the focus for this work: Kenya and Uganda. Although policy-wise, culturally, and demographically distinct, both experience similar challenges regarding HIV testing, with adult HIV prevalence of 4.5% and 5.8% respectively, and an estimated 10% and 11% respectively of individuals living with HIV unaware of their infection^{43,44}. The goal of this work was to provide evidence for policymakers and health workers regarding the use of these testing interventions to increase HIV testing coverage through three specific aims:

Aim 1. Evaluate effectiveness of APS when integrated within an existing Kenya Ministry of Health initiative. Using data from an ongoing APS scale-up project in western Kenya, we analyzed outcomes of APS for female index clients and their male partners at six-weeks of follow-up, and used log-binomial generalized estimated equations (GEE) models to assess the association between female index client characteristics and facility site characteristics with the identification of newly diagnosed HIV-positive male partners. We also calculated ratios for the number of female index clients needed to be interviewed/enrolled (NNTI) to elicit a newly diagnosed male partner.

Aim 2. Define acceptability of integrated APS among women testing HIV-positive and their partners. Using data from in-depth interviews conducted in the APS scale-up project, we conducted inductive thematic analyses to qualitatively investigate acceptability of APS from both the female and male client perspectives, and applied the Theoretical Framework of Acceptability to our findings for further insights of acceptability with an implementation lens.

Aim 3. Determine relationship factors that impact secondary distribution and use of HIV self-testing kits among pregnant women and male partners in Uganda. We utilized data from a qualitative study of pregnant women and male partners investigating perceptions of secondary distribution and use of HIV self-testing kits in Uganda. We employed an adaptation of the Interdependence Model of Communal Coping and Health Behavior Change to organize findings from the perspective of the couple, and applied the model constructs to the interview data to understand complementary perspectives of both sexes, their concerns of joint testing and disclosure in the context of HIVST, and also identified suggestions for strengthening secondary HIVST delivery.

Innovation

Each of the proposed aims was fulfilled by leveraging data from existing implementation projects in East Africa, building on the evidence yielded from RCTs and demonstration projects. Insights that were generated on early outcomes of integrated APS, on client acceptability of integrated APS, and on how relationship factors impact secondary HIV self-testing each addressed specific gaps in the research of real-world implementation.

This work is particularly innovative in a few ways. For Aim 1, we evaluated effectiveness of an APS intervention that is fully embedded into the national health system, uniquely generating rigorous evidence of real-world implementation. Several aspects of the study design were innovative, including leveraging the work of government-employed staff who were embedded in facilities, and the fact that this work advances the current knowledge of APS integration, which is primarily currently limited to findings from randomized controlled trials and small demonstration projects. Additionally, this study of integrated APS was designed and implemented by a unique partnership across government (Kenya Ministry of Health), a non-governmental organization (PATH), and academia (UW). As this study has been led by the Ministry of Health under real-world settings, with support of diverse expertise from PATH and UW, the findings are uniquely and directly applicable to government stakeholders, policy-makers, and health care workers.

Aim 2 builds further on the innovation in Aim 1 by defining the acceptability of the integrated intervention from the perspective of the clients themselves. Not only is the study of acceptability of APS integrated into – and led by – a national health system novel, but much of the current research has focused on the providers' acceptability of offering APS. Additionally, the field of implementation science has historically been under-served by frameworks for

acceptability⁴⁵, and this study included the unique application of the comparatively new Theoretical Framework of Acceptability to the APS intervention. Rigorously understanding the views and opinions of the clients who are experiencing APS in a real-world setting, integrated into their standard care, may prove valuable to key stakeholders looking to adapt and scale APS in an integrated way across health systems.

For Aim 3, relationship factors have not previously been studied in the context of HIV self-testing in Uganda. While previous studies have investigated secondary distribution with pregnant women in other countries, primary outcomes have been male partner linkage to care within the context of an RCT⁴⁶, or were demonstration studies without real-world applicability, such as door-to-door individual promotion of HIVST^{34,35}. Furthermore, while the Interdependence Model of Communal Coping and Health Behavior Change has been applied to HIV-related interventions⁴¹, it has never been applied to study factors impacting HIVST, or been applied to the Ugandan context. This study fills a gap in the literature by studying the impact of couple interdependence on the use of HIVST in Uganda.

By generating evidence from multiple settings and multiple testing methodologies, we hoped to better understand pragmatic implementation of promising HIV testing interventions, and to inform programmatic decisions around the scale up of these methods nationally.

Chapter 2: Real world impact of scaling up HIV Assisted Partner Services in Kenya: Intervention uptake and linkage to care outcomes

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Abstract

Background:

Despite high HIV prevalence in Kenya, a substantial proportion of people living with HIV (PLWH) are not aware of their status. Assisted partner services (APS), or notification for sexual partners of persons diagnosed with HIV, is a high-yield testing strategy to identify persons with HIV and is recommended by the World Health Organization. We assessed the effectiveness of APS when integrated into HIV clinics in Kenya.

Methods:

Starting in May 2018, APS was implemented in 31 health facilities in Kisumu and Homa Bay counties. We recruited consenting females testing positive for HIV (index clients) and provided APS. Sexual partners were elicited and traced by phone and/or in-person and offered HIV testing services (HTS). Index clients and male partners with HIV were followed up six weeks post HIV testing to assess linkage to care and antiretroviral treatment (ART) initiation. Log-binomial generalized estimated equations models were used to assess the association between female index client characteristics and facility site characteristics with the identification of newly diagnosed HIV-positive male partners. We also calculated ratios for the number of female index clients needing to be interviewed/enrolled to identify newly diagnosed HIV-positive male partners.

Results:

Across facilities, 32,722 females received HTS and 1,910 (5.8%) tested HIV-positive, of whom 1,724 accepted APS (90.3% uptake). Overall, 5,137 male partners were elicited and 4,222 (82%) of these accepted APS and enrolled in the study. Of enrolled male partners, 524 (12%) were newly

diagnosed with HIV and 1,292 (31%) reported a prior HIV diagnosis. At 6-week follow-up, most female index clients and newly diagnosed male partners were linked to HIV care (95% and 91%, respectively) and taking ART (94% and 90%, respectively). Only 1% of all participants reported relationship dissolution and 0.6% reported intimate partner violence (IPV) at six weeks post-enrollment. To identify one newly diagnosed male partner, 3.3 female index clients needed to be interviewed and offered APS.

Discussion:

Evidence from this real-world APS scale-up project demonstrates that APS is a safe, acceptable, and effective strategy to identify male partners living with HIV and link them to care. Linkage to care and initiation of ART after APS were high, and this can inform programmatic decisions regarding APS scale up in Kenya and similar settings.

Introduction

Globally, approximately 38 million people are living with HIV, and an estimated 6.1 million (16%) do not know their status¹. In sub-Saharan Africa (SSA), HIV continues to be a significant cause of morbidity and mortality, accounting for over 70% of new HIV infections globally and the proportion of PLWH who do not know their status is even higher, ranging from 10%-33%^{2,47}. Strategies to reach undiagnosed individuals with HIV testing services (HTS) are crucial to increase linkage to lifesaving antiretroviral therapy (ART) to prevent morbidity, mortality, and onward HIV transmission³. In SSA, individuals testing HIV-positive are generally identified through facility-based HIV testing; however, testing coverage has been insufficient to curb the epidemic, particularly in men and key populations⁴.

Clinical trials and demonstration projects in SSA have shown assisted partner services (APS) to be a safe, efficient, and effective strategy to reach HIV-exposed individuals with testing and to link them to care¹⁷⁻²². APS involves notification and HIV testing for sexual partners of persons diagnosed HIV positive (index clients). Types of APS include (1) provider notification: providers contact partners and offer testing; (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. APS is generally implemented as mix of these options to meet clients' needs. In Kenya, a cluster-randomized clinical trial found that APS resulted in higher rates of partner HIV testing, identification of newly diagnosed HIV-positive cases, linkage to care, and first-time partner HIV testing compared to passive referral¹⁹. In 2015, The World Health Organization recommended that APS should be offered as part of a routine HIV services¹⁶. In response, APS is increasingly implemented across SSA, though it has only been relatively

recently fully integrated into national health systems. However, evidence from real-world programs of APS integrated into national health systems and data on long-term outcomes such as linkage to care and adverse events is limited.

In this APS scale-up implementation study in western Kenya, we sought to assess the real-world performance of APS at six weeks, when integrated into 31 facilities within the national health system. We assessed demographics, APS uptake, and linkage to HIV care among female index clients and their male partners. This study yields some of the most extensive evidence of real-world implementation of integrated APS in sub-Saharan Africa and is among the first to provide linkage to care outcomes for partners in Kenya.

Methods

Study Design

The APS Scale-up Project was a hybrid type II implementation science study⁴⁸ conducted in western Kenya, an area with high HIV prevalence (15%)²³. The implementation team consisted of collaborators from the University of Washington, PATH (a non-governmental organization), and the Kenya Ministry of Health. The study protocol has been previously published⁴⁹. Briefly, the objective was to implement and evaluate APS when integrated into health facilities in Kenya using government health care workers who perform APS as part of their routine clinic duties. Starting in May 2018, APS was implemented in 31 health facilities, 16 in Kisumu county and 15 in Homa Bay county, with a mix of low and high-volume facilities and ranging from primary to tertiary care. APS implementation began in Kisumu County in May 2018 and in Homa Bay in November 2018.

Study Procedures

While APS was offered to both male and female individuals who were diagnosed positive for HIV (index clients), we collected program data only for female index clients and their male partners who tested HIV positive as part of APS. Healthcare workers offered APS to eligible females at participating clinics and offered APS at the time of HIV diagnosis. Females were eligible for APS if they were ≥ 18 years of age (or an emancipated minor ≥ 15), at low risk of intimate partner violence (IPV), not pregnant, newly diagnosed HIV-positive, not on ART, and reporting at least one sexual partner within the last three years. Adolescent girls and women reporting IPV within the past month were excluded from participation. Consenting females were asked to provide names and contact information for all partners in the last 3 years. Male partners were eligible for APS if they were ≥ 18 years of age (or an emancipated minor ≥ 15), and tested positive for HIV.

Healthcare workers contacted male partners via phone or in-person tracing to notify them of their potential exposure and offer HTS. Partners were told that they may have been exposed to HIV but were not provided details regarding the exposure nor any identifying information about the index client. Partners testing HIV positive were supported to link to care with confirmatory testing at a comprehensive care clinic. Female index clients and all male partners with HIV (both newly diagnosed or known positive) were followed up at 6 weeks after enrollment by phone or in-person to assess linkage to care, initiation of ART, IPV, and the status of relationship with sexual partners.

Study population

The present analysis includes baseline and six-week follow-up data from female index clients who were enrolled from the start of the study until March 31, 2020 and male partners elicited from these female index clients. The end date for the analysis was chosen to exclude program data impacted by the COVID-19 pandemic.

Data analysis

The effectiveness outcomes included (1) male partners who are newly diagnosed with HIV, and (2) linkage to care and initiation of ART by six weeks for female index clients and male partners. We also monitored adverse events, including IPV and relationship dissolution. We summarized continuous variables using median and interquartile range (IQR) and categorical variables using percentages.

We used univariate log binomial generalized estimated equations (GEE) models to examine the associations between female individual characteristics and facility characteristics, and identification of newly diagnosed HIV-positive male partners. Exchangeable correlation structure was used as patient outcomes from the same facility were correlated, but were independent from patient outcomes in different facilities, and we used robust standard errors to account for facility and participant correlation. Log-binomial GEE models were used to produce an unbiased estimate of the adjusted relative risks. We used multivariate log binomial GEE to simultaneously evaluate whether key *a priori*-defined demographic and facility factors were associated with identification of newly diagnosed HIV-positive male partners. Any additional variables in the univariate analyses with a significance level ($P < 0.05$) were also entered into the multivariate analyses. Analyses were conducted using Stata Software BE Version 17⁵⁰.

We also calculated ratios for the number of female index clients needed to be interviewed/enrolled (NNTI) to identify 1 male HIV-positive partner, and 1 newly diagnosed HIV-positive male partner.

Ethical reviews

The study was approved by the Kenyatta National Hospital Ethics and Research Committee (ERC; P465/052017) and the University of Washington Institutional Review Board (IRB; STUDY00002420), and the PATH Institutional Review Board.

Results

Participant characteristics and APS outcomes

Across 31 facilities, 32,722 females received HIV testing, 1,910 tested HIV-positive (5.8%), and 1,724 enrolled in APS (90.3% uptake among females testing positive for HIV). The median age of female index clients was 28 years (IQR 23-33) (**Table 1**). Most females (59%) were married monogamously and 6.8% were in polygamous marriages; 18.3% were single. The majority of females completed at least primary school (71.5%), and most were employed (84.4%), either formally or self-employed. Females generally had low household incomes, with 81.3% reporting less than 10,000 Kenyan shillings KSh (87 US dollars) a month. A small percent of female clients (1.6%) reported any lifetime history of intimate partner violence (IPV), and the median number of sexual partners in the past three years was three (IQR of 2-4).

Overall, 5,137 male partners were elicited from female index clients, of whom 4,222 (82.2%) enrolled in APS. The median age of enrolled male partners was 36 years (IQR 30-41

years). Similar to female index clients, 79.2% of male partners were in monogamous marriages, 5.7% in polygamous marriages, and 13% were single. Most male partners had a primary school education or higher (82.8%), and 90% were employed, of whom 52% were self-employed. More male partners reported higher household incomes than female index clients, with 59.7% of male partners reporting less than 10,000 KSh (87 USD) a month and 38.8% reporting between 10,000 KSh to 50,000 KSh (435 USD) a month. The median number of sexual partners in the past three years was two (IQR 1-3).

Approximately half of female index clients and male partners reported no sexual risk behaviors (49.8% and 57.4% respectively). The most common risk behavior among both female index clients and male partners was inconsistent or no condom use (20.6% and 14% respectively). Overall, 83.5% of female index clients and 88.1% of male partners reported having tested for HIV prior to enrollment. The majority of male partners were tested in the community (65.7%), although all HIV tests done in the community were linked to a facility, and verification of the test results was completed at the facility’s comprehensive care clinic (CCC) before enrollment to care and treatment. Very few participants reported transactional sex (females: 0.4%; males: 0.2%) or injection drug use (females: 0.1%; males: 0.1%).

Table 1. Demographics, sexual behavior, and HIV testing outcomes of female index clients and enrolled male partners receiving assisted partner services from 31 health facilities in western Kenya

Participant demographics	Female Index Clients	Male Partners
	N=1,724	N=4222
	Median (IQR) or Number (%)	
Age	28 (23-33)	36 (30-41)
Marital status		

	Single/never married	315 (18%)	574 (13%)
	Married monogamous	1,017 (59%)	3,368 (79%)
	Married polygamous	118 (7%)	252 (6%)
	Cohabiting	10 (1%)	14 (0.3%)
	Divorced/separated	134 (8%)	160 (4%)
	Widowed	130 (8%)	54 (1%)
Highest Education Completed			
	Did not complete primary school	491 (29%)	763 (17%)
	Completed primary school	826 (48%)	1,794 (41%)
	Completed secondary school	291 (17%)	1,295 (29%)
	Post-secondary school	116 (7%)	570 (13%)
Occupation			
	Employed	725 (42%)	1,707 (39%)
	Self-employed	730 (42%)	2,301 (52%)
	Unemployed	156 (9%)	319 (7%)
	Student	113 (7%)	95 (2%)
Monthly household income			
	0 to 10,000 KSh	1,402 (81%)	2,640 (60%)
	10,000 to 50,000 KSh	312 (18%)	1,714 (39%)
	50,000 to 100,000 KSh	10 (1%)	68 (2%)
Have experienced IPV			
	Yes	27 (2%)	0 (0%)
	No	1,697 (98%)	4,222 (100%)
County			
	Homa Bay	774 (45%)	2584 (58%)
	Kisumu	950 (55%)	1838 (42%)
Risk behaviors last 12 months			

	Inconsistent condom use	355 (21%)	621 (14%)
	No condom in last sex	252 (15%)	566 (13%)
	Ever used PrEP	1 (0.1%)	27 (1%)
	IDU sharing needle	1 (0.1%)	4 (0.1%)
	Recent STI	13 (1%)	27 (1%)
	Recurrent PEP use	2 (0.1%)	6 (0.1%)
	Sex under influence of drugs	9 (1%)	17 (0.4%)
	Multiple sexual partners	109 (6%)	326 (7%)
	High HIV risk sexual partners	78 (5%)	32 (1%)
	HIV positive sexual partner	39 (2%)	249 (6%)
	Transactional sex	7 (0.4%)	7 (0.2%)
	None	858 (50%)	2,540 (57%)
	Sexual partners in the past 3 years	3 (2-4)	2 (1-3)
HIV testing history			
Ever had HIV test	Yes	1,439 (84%)	3,896 (88%)
Result of last HIV test	Do not know	9 (1%)	12 (0.3%)
	Negative	1,421 (82%)	2,637 (60%)
	Positive	9 (1%)	1,247 (28%)
	NA	285 (17%)	526 (12%)
HIV self-test in the last 12 months	Yes	80 (5%)	418 (10%)
Tested as a couple during APS enrollment	Individual	1,635 (95%)	3,010 (68%)
	Couple	89 (5%)	103 (2%)
	Not specified	0 (0%)	1,309 (30%)

HIV testing location for APS			
	Non-facility based ^a	352 (20%)	2,906 (66%)
	Facility based	1,372 (80%)	1,516 (34%)

^a All HIV tests done in the community were linked to a facility, and verification of the test results was completed at the facility's comprehensive care clinic (CCC) before enrollment to care and treatment.

Six-week outcomes of the APS cascade

Acceptance of APS was high among both males and females; 90.3% of the 1,910 females testing HIV-positive and 82.2% of 5,137 elicited male partners accepted APS (**Table 2**). Overall, 12.4% of enrolled male partners were newly diagnosed HIV-positive and 30.6% of enrolled male partners reported a prior HIV diagnosis (of whom 94% self-reported being in HIV care at baseline). (**Figure 1 and Supplemental Figure 1**). At six weeks of follow up, most female index clients and newly diagnosed male partners were linked to HIV care (95% and 91% of those enrolled, respectively) and taking ART (94% and 90% of those enrolled, respectively). Reported IPV was low (0.3% of females and 0.1% of males) and relationship dissolution was reported by 1.2% of females and 0.1% of males.

Table 2. APS testing cascade and six-week outcomes among female index clients and male partners

2a. Female Index Clients			
APS cascade			
Tested for HIV		32,722	
HIV-positive		1,910	<i>(6% of those tested for HIV)</i>
Enrolled in APS		1,724	<i>(90% of 1,910 positive)</i>

Attended six-week follow up	1,703	<i>(99% of 1,724 enrolled)</i>
Six-week outcomes		
Enrolled in HIV care at six-week visit	1,632	<i>(95% of 1,724 enrolled in APS)</i>
Currently taking ART at six-week visit	1,625	<i>(94% of 1,724 enrolled in APS)</i>
Relationship ended since APS enrollment	21	<i>(1% of 1,724 enrolled in APS)</i>
Experienced intimate partner violence since APS enrollment	5	<i>(0.3% of 1,724 enrolled in APS)</i>
2b. Male Partners		
APS cascade		
Elicited	5,137	
Enrolled in APS	4,222	<i>(82% of 5,137 elicited)</i>
Total HIV positive	1,816	<i>(43% of 4,222 enrolled)</i>
Partners with a prior HIV diagnosis	1,292	<i>(31% of 4,222 enrolled)</i>
Linked to care at APS enrollment	1,211	<i>(94% of 1,292 known positive)</i>
Currently taking ART at APS enrollment	1,212	<i>(94% of 1,292 known positive)</i>
Newly diagnosed HIV positive	524	<i>(12% of 4,222 enrolled)</i>
Six-week outcomes		
Overall		
Attended six-week follow up	1,790	<i>(99% of 1,816 positive)</i>
Linked to HIV care at six-week follow up	1,744	<i>(97% of 1,790 six-week follow-up)</i>
Relationship ended since APS enrollment	2	<i>(0.1% of 1,790 six-week follow-up)</i>
Experienced intimate partner violence since APS enrollment	2	<i>(0.1% of 1,790 six-week follow-up)</i>
Male partners with a prior HIV diagnosis	<i>N=1,292</i>	
Linked to HIV care at six-week visit	1,267	<i>(98% of 1,292 known positive)</i>
Currently taking ART at six-week visit	1,262	<i>(98% of 1,292 known positive)</i>
Newly diagnosed HIV-positive male partners	<i>N=524</i>	

Linked to HIV care at six-week visit	477	<i>(91% of 524 new positive)</i>
Currently taking ART at six-week visit	470	<i>(90% of 524 new positive)</i>

Figure 1a. APS cascade – Female Index Clients

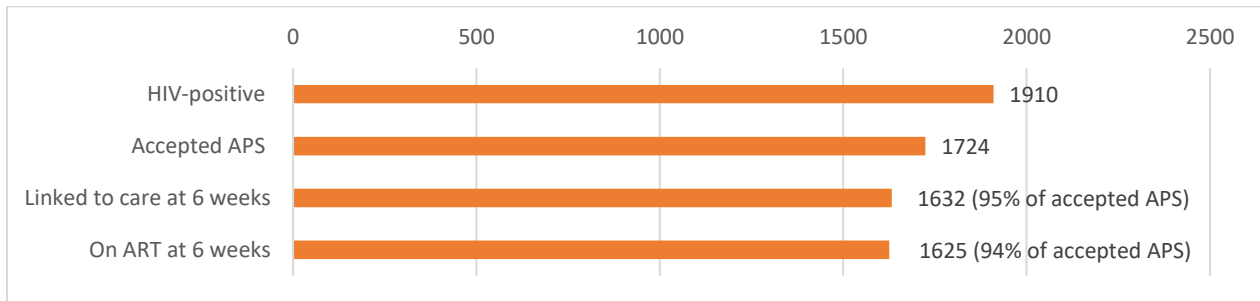
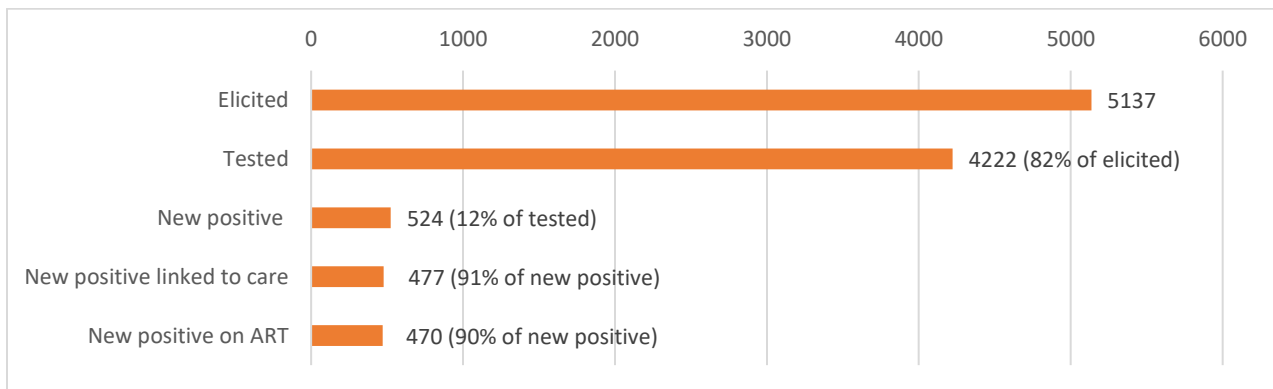


Figure 1b. APS Cascade – Male Partners (overall)



Overall, 3.3 female index clients were interviewed to identify one newly diagnosed HIV-positive male partner (**Table 3**), and 3.4 female index clients to identify a newly diagnosed male HIV-positive partner who attended six-week follow-up. For nearly every female index client, a male partner who was HIV-positive was identified, with 0.9 female index clients needed to enroll to identify one HIV-positive male partner. Overall, contact tracing information needed to be elicited for 9.8 male partners to identify one newly diagnosed HIV-positive male partner, and 8.1 male partners needed to be successfully traced and tested. In comparison, at the facility 5.8% of

women tested positive; thus approximately 20 women needed to be tested to identify one woman living with HIV who was unaware of her positive status.

Table 3. Number Needed to Interview (NNTI) ratios

	NNTI Ratio
Overall female index client APS engagement	
Female index client (N=1724) per male HIV-positive partner (N=1816)	0.9
Female index client (N=1724) t per newly diagnosed male HIV-positive partner (N=524)	3.3
Overall male partners identified per new HIV-positive diagnosis	
Elicited male partners (N=5137) per new HIV-positive diagnosis (N=524)	9.8
Enrolled male partners (N=4222) per new HIV-positive diagnosis (N=524)	8.1

Factors associated with identifying a newly diagnosed HIV-positive male partner

In multivariate regressions, female index clients who reported two or more sexual partners in the past three years (2-5 sexual partners (adjusted relative risk [aRR] 1.65, p-value: <0.001; 5+ sexual partners, aRR 1.90, p-value 0.001) or who were in the highest household income category (50,000-100,000 KSH, aRR 1.57, p-value 0.001) were significantly more likely to have a newly diagnosed HIV-positive male partner (**Table 4**). In a separate model, facilities classified as low APS performing facilities, defined by the number of male partners enrolled per female index client, were significantly associated with a lower likelihood of identifying newly diagnosed HIV-positive male partners (aRR 0.77, p-value: 0.013). No other associations between female index client or site characteristics were significantly associated with identifying a newly diagnosed HIV-positive male partner.

Table 4. Associations between female and facility characteristics and identifying a newly positive male partner

4a. Female index client characteristics	Proportion	Univariate model			Multivariate model		
		Relative Risk	95% Confidence Interval	P value	Adjusted Relative Risk	95% Confidence Interval	P value
Age^a							
<20	10.1%		Ref			Ref	
20-29	49.6%	0.95	(0.71,1.29)	0.752	0.94	(0.68,1.128)	0.679
30-39	28.1%	0.93	(0.64,1.35)	0.710	0.90	(0.59,1.36)	0.613
40plus	12.2%	0.85	(0.58,1.22)	0.374	0.83	(0.58,1.19)	0.315
Education^a							
Did not complete primary	28.5%		Ref			Ref	
Completed primary	47.9%	0.91	(0.76,1.10)	0.327	0.87	(0.74,1.03)	0.114
Completed secondary	16.9%	0.97	(0.77,1.22)	0.774	0.90	(0.72,1.13)	0.368
Post-secondary	6.7%	1.06	(0.78,1.44)	0.727	0.97	(0.72,1.30)	0.840
Monthly household income^a							
0 to 10,000 KSh	81.3%		Ref			Ref	
10,000 to 50,000 KSh	18.1%	1.14	(0.94,1.39)	0.191	1.15	(0.96,1.38)	0.124
50,000 to 100,000 KSh	0.6%	1.66	(1.00,2.75)	0.051	1.57	(0.95,2.62)	0.001
Marital status							
Single/never married	18.3%		Ref				
Married	59.6%						
monogamous/cohabitating		1.14	(0.89,1.45)	0.300			
Married polygamous	6.8%	1.14	(0.87,1.49)	0.360			
Divorced/separated/widowed	15.3%	0.95	(0.67,1.34)	0.780			
Risk behaviors							
Risk behaviors ¹	49.8%	0.90	(0.76,1.07)	0.216			
No risk behaviors	50.2%		Ref				
Number of sexual partners^b							
<2	20.4%		Ref			Ref	
2 to 4	61.7%	1.67	(1.36,2.06)	0.000	1.65	(1.33,2.04)	0.000
5+	17.9%	1.89	(1.32,2.71)	0.001	1.90	(1.32,2.73)	0.001
History of IPV							
Yes	1.6%	1.162	(0.726,1.864)	0.531			
No	98.4%		Ref				
Employment							
Self employed	42.3%	0.99	(0.83,1.67)	0.872			
Unemployed	9.1%	0.87	(0.63,1.20)	0.383			
Student	6.6%	1.05	(0.63,1.76)	0.856			
Employed	41.1%		Ref				

3b. Facility characteristics		Relative Risk	95% Confidence Interval	P value	Adjusted Relative Risk	95% Confidence Interval	P value
County^a							
Kisumu	55.1%	0.85	(0.85,0.98)	0.158	0.91	(0.74,1.10)	0.322
Homa Bay	44.9%		Ref			Ref	
Location^a							
Rural facility	65.2%	0.88	(0.68,1.15)	0.364	0.90	(0.72,1.12)	0.347
Urban facility	34.8%		Ref			Ref	
APS Performance^{a,2}							
Low performing	46.1%	0.76	(0.60,0.95)	0.016	0.77	(0.63,0.95)	0.013
High performing	53.9%		Ref			Ref	

^a Variables defined a priori for inclusion in adjusted model

^b Significant ($P < 0.05$) variable included in adjusted model

¹Including inconsistent or no condom use; no condom in last sex; ever used PrEP; IDU sharing needle; recent STI; recurrent PEP use; sex under influence of drugs; multiple sexual partners; high HIV risk sexual partners; HIV-positive sexual partner; transactional sex

²Performance defined as the number of male partners enrolled per female index client

Discussion

We assessed the real-world performance of APS in a large-scale implementation program in western Kenya, and evaluated APS integration within routine clinic settings and assessed linkage to care outcomes at six weeks post HIV testing. We found that integrated APS is a safe, effective, and high-yield strategy to reach potentially HIV-exposed male partners with testing and linkage to care. Our most notable finding was that integrated APS yielded high uptake among female index clients and their male partners, and was effective in helping to identify PLWH, particularly men, who did not know their status.

The APS uptake rates observed in our program, 90.3% for females and 82.2% for males, were similar to those of previous APS demonstration projects and pilot projects. In Cameroon, 71.5% of sexual partners accepted and received HIV testing services²¹, and in Malawi, the

acceptance rate of partners for testing was 97%¹⁷. A small pilot study in Mozambique found that 99% of index patients accepted APS, but only 31% of elicited partners accepted³¹.

Our results also showed high rates linkage to ART by six weeks, with 94% of females on ART at follow-up, 98% of males who knew they were positive (up from 94% at baseline), and 90% of males who were newly diagnosed positive. This indicates considerable effectiveness of APS when embedded in a routine health system. These results have not previously been evaluated in other studies of real-world APS, and demonstrate that APS can effectively be used to link male partners to care and treatment. Our finding of 12% new positivity among enrolled male partners is slightly lower than that of previous studies examining new positivity found in their APS programs. In Cameroon, 20% of sexual contacts tested were newly HIV-positive²¹, and in Malawi, 50% of partners tested were newly HIV-positive, although only 35% of elicited partners were tested in that study¹⁷. In a cluster-randomized controlled trial of APS in central and western Kenya in 2015 by Cherutich *et al.*, 23% of partners were identified as newly positive¹⁹. Our findings may differ in part because knowledge of HIV status among individuals has increased over time, with 47% of persons living with HIV were aware of their status in Kenya in 2012⁵¹, and 80% of all the adults who tested positive for HIV in the 2018 KENPHIA survey were aware of their status⁵².

Additionally, we found that the majority of male partners were tested in the community (65.7%). This is an important benefit of APS, where males can be notified via phone, and then have the option to access community-based testing. Previous research shows that men experience barriers in accessing facility-based testing including time and transport costs and lack of healthcare access^{24,53}. Community-based testing for HIV-exposed individuals has the potential to overcome these barriers without the substantial costs associated with widespread community-based testing.

As knowledge of HIV status increases in SSA, targeted strategies such as APS are increasingly necessary to identify persons at high risk of HIV.

Compared to the Cherutich *et al.* study, our findings also indicated a reduced number of index clients needed to interview/enroll (NNTI). The randomized trial found 5.1 female index clients were needed to identify a newly positive male partner¹⁹, while our implementation study found that 3.3 female clients were needed for the same outcome. A large demonstration study of APS in Cameroon found that the NNTI to identify one sexual partner with an HIV infection was 3.9, although NNTI numbers reported included all HIV-positive sexual partners, both new diagnoses and people who may have been previously tested and not yet linked to ART²¹. A pilot program of APS in rural Uganda found the NNTI in order to identify one HIV-positive partner equal to 7.6, also inclusive of all new diagnoses and known infections⁵⁴. It is important to note that the NNTI is dependent on the prevalence of HIV in the region being investigated, and an NNTI to identify new HIV infections would be lower and more likely to be effective in high-HIV burden settings. The settings for our study have high HIV prevalence, but nonetheless, our findings reflect real-world outcomes within this high prevalence setting.

We found that female index clients' age, marital status, and reported risk behaviors were not associated with the identification of a newly diagnosed HIV-positive male partner. We did find an association between females reporting the highest income category and multiple partners having a greater likelihood of identifying a newly diagnosed HIV-positive male partner. However, only a small number of women reported the highest income category (0.6%). Overall, this indicates that APS should likely be universally offered to women testing HIV-positive and prioritizing APS delivery based on female characteristics is unlikely to increase the yield of new HIV cases identified.

Similar to previous randomized trials and demonstration project^{19,21,31,55}, we find low rates of IPV and relationship dissolution among persons receiving APS. However, in our study, we excluded individuals at high risk of IPV, so we are unable to evaluate outcomes of APS on this population. In general, APS provision has been shown to be safe and effective among females with a history of IPV and is associated with a low risk of social harms^{30,56}. However, research has also shown that IPV is a barrier to APS uptake, both due to females refusing APS because of fear of IPV, or healthcare worker assessments that females were at moderate or high IPV risk and therefore ineligible for APS⁵⁷. To continue to understand these challenges and the impact that IPV may have on APS uptake and implementation, policymakers should continue to support IPV screening and monitoring for APS scale-up.

Strengths of this study include the design and implementation by a partnership across government (Kenya Ministry of Health), a non-governmental organization (PATH), and academia (University of Washington). APS was conducted by government-employed healthcare workers who also provided general HIV care services at the facilities enabling a real-world assessment of APS scale up outside of trial settings. Additionally, APS providers were trained on APS and were certified HIV testing and counseling providers.

There are also several limitations to the study. First, we used programmatic data, and the quality was not as robust as that of a clinical trial. Further, we only collected program data on female index clients and their male partners so we cannot assess the performance of APS among male index clients or female partners. Additionally, although APS is being offered to pregnant women programmatically, our study excluded pregnant women; thus we cannot evaluate APS' impact in this population. The vast majority of participants were heterosexual with low representation from key populations (female sex workers, men who have sex with men, fisher folk)

which limits generalizability to these groups. We also excluded females at high risk of IPV. Additionally, HIV risk behaviors were self-reported and may be subject to social desirability bias.

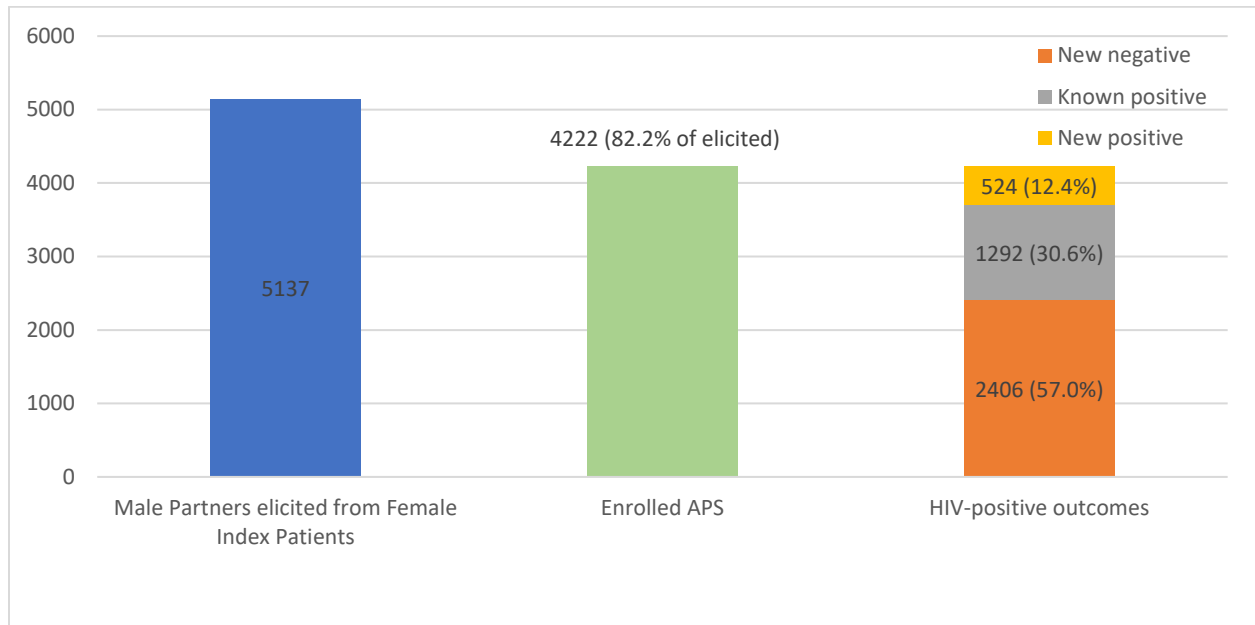
Kenya guidelines for HIV testing recommend voluntary APS implementation as part of routine HIV testing services, but APS is a resource-intensive intervention, requiring counselors to conduct community-based tracing of partners and provision of HIV testing. In settings with a shortage of healthcare workers and a limited budget, APS implementation may present challenges⁵⁸. Previous research in Kenya has shown that average facility costs will increase when integrating APS into HIV clinics, with incremental costs largely driven by personnel and transport⁵⁹. Future research is needed to understand the impact that these higher costs and resources have on APS scale-up, effectiveness, participant barriers to APS uptake, and counselor's ability in finding and enrolling partners. Further, in Kenya, the COVID-19 pandemic has impacted stocks of HIV drugs⁶⁰ and resulted in changing operational guidance on HIV testing and treatment⁶¹. The COVID-19 pandemic may also have resulted in reduced numbers of participants presenting to the clinic for HIV testing, thereby reducing the number of index clients available for APS services. The impact of the pandemic on APS scale-up should be evaluated in future research.

Conclusion

We find real-world integrated APS to be a safe, acceptable, and effective method to identify newly diagnosed HIV-positive men and link them to care in Kenya. Results can inform programmatic decisions regarding the scale up of APS in Kenya and similar settings.

Supplement

Supplement Figure 1. Male partner cascade and outcomes



Chapter 3: “I feel good because I have saved their lives”: Acceptability of assisted partner services among female index clients and male sexual partners in Kenya

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Abstract

Background

Assisted partner services (APS), or notification for sexual partners of persons diagnosed with HIV, is an efficient, effective, and high yield strategy to identify persons with HIV and is recommended by the World Health Organization (WHO). However, there remains a need to further understand the acceptability of APS qualitatively from a client lens, particularly when APS is integrated into the national health system. We investigated acceptability of APS when integrated into HIV services in Kenya.

Methods:

Starting in May 2018, APS was implemented in 31 health facilities in Kisumu and Homa Bay counties in western Kenya. From January to December 2019, we conducted in-depth interviews (IDIs) with female index clients (n=16) and male sexual partners (n=17) in 10 facilities participating in an APS scale up study. Interviews assessed APS satisfaction, perceived benefits of the intervention, and challenges that may affect delivery or uptake. We applied the Theoretical Framework of Acceptability as a guide to organize our findings.

Results:

We find that views of APS are often guided by an individual's trust in the intervention's design and implementation, and an interest to preserve one's health and that of one's family and children. There were strong and consistent acceptable views of APS as "doing good" and "saving a life" and as a means of showing love towards one's partner(s). The initial acceptability framing of individuals engaging with APS was predicated either on a feeling of comfort with the intervention, or a wariness of divulging sex partner personal information. Health care workers (HCWs) were

seen to play an important role in mitigating participant fears linked with the intervention, particularly around the sensitive nature of HIV disclosure and sexual partners. Clients noted considerable challenges that affected acceptability, including the risk to the relationship of disclosing one's HIV status, and the risk of intimate partner violence.

Discussion:

We find that APS is acceptable as a strategy to reach male sexual partners of females diagnosed with HIV, and these findings provide opportunities to inform recommendations for further scale-up, including focusing on intervention confidentiality and appropriate counseling, potentially excluding female clients at risk of IPV from this intervention, and in highlighting the altruistic benefits of APS to potential clients. Understanding the perspectives of clients receiving APS in a real-world setting may be valuable to policy-makers and stakeholders interested in scaling up or enhancing APS within health systems.

Background

Globally, an estimated 6.1 million people living with HIV do not know their HIV status¹. In sub-Saharan Africa (SSA), which continues to be disproportionately affected by HIV as a cause of morbidity and mortality², people living with HIV (PLWH) are generally diagnosed through facility-based HIV testing. However, testing coverage has been insufficient to curb the epidemic, particularly in men and key populations⁴. Reaching undiagnosed individuals, getting them tested, and linked to care is critical to achieving the UNAIDS 95-95-95 objectives by 2025⁶². Assisted partner services (APS) is an important public health strategy aimed to prevent the spread of sexually transmitted infections, including HIV, by identifying, testing, and treating sexual partners of individuals diagnosed with HIV¹⁶. The process generally includes a health worker eliciting partners from consenting individuals testing positive for HIV (index clients), then assisting the client with notifying their partners.

Randomized controlled trials and demonstration projects in SSA have found APS to be safe and effective in testing potentially HIV-exposed partners, and in finding high HIV positivity (30-63%) and high CD4 median counts among partners, indicating that individuals are identified earlier in their disease course compared to clinic testing¹⁷⁻²². In 2016, the World Health Organization released testing guidelines recommending offering APS as part of a comprehensive package of testing and care to all PLWH¹⁶. APS is increasingly being implemented across SSA. Kenya guidelines for HIV testing now recommend APS implementation as part of routine HIV testing services (HTS), but there are still challenges for the implementation and scale-up of APS nationwide, including with human and financial resources⁵⁸. In general, APS are under-utilized in the country, and a need exists to further understand the coverage and implementation gaps²².

Acceptability of healthcare interventions is an important measure of the perception among stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory⁶³. Acceptability of APS, however, has primarily been assessed in APS trials and demonstration projects and been assessed quantitatively with proxy measures, such as the percentage of those who enroll in APS when offered and/or test for HIV when approached as an elicited partner^{19,22,25–33,57}. In these controlled studies, APS has been found generally acceptable, with high acceptance rates in Kenya, including with 67% uptake in a cluster-randomized controlled trial (RCT)¹⁹ and 89% in a cross-sectional facility-based study undertaken in five health facilities²². However, there remains a need to further understand the acceptability of APS qualitatively from a client lens, particularly when APS is integrated into the national health system.

In this qualitative study, we explored the acceptability of integrated APS from the perspective of female index clients (FIC) and male sexual partners (MP) receiving APS in Homa Bay and Kisumu Counties, two Kenyan counties with the highest HIV prevalence in the country (25.7% and 19.3% respectively⁴³). Our study findings present an investigation of acceptability of integrated APS in SSA and suggest opportunities to strengthen scale-up of integrated APS.

Methods

This qualitative study was conducted within the APS scale-up study, a hybrid type II implementation science study⁴⁸, a collaboration between the University of Washington, PATH (a non-governmental organization), and the Ministry of Health in Kenya. Conducted from May 2018 to March 2021, the study aimed to determine the effectiveness of APS when integrated into existing routine HIV testing, prevention, and care programs, and to evaluate the implementation of APS in these settings, including the integration, implementation fidelity, acceptability, demand,

and costs of the intervention. This analysis investigated the acceptability of APS from the perspective of FICs and MPs.

Study sites, participants

From January to December 2019, we conducted in-depth interviews (IDIs) in 10 facilities participating in the APS scale-up project. Facilities were chosen to maximally represent a range of facility types, including both APS high-performing and low-performing facilities (performance defined as the number of MPs enrolled per FIC) and geographic location/size including a range of facility levels from small rural outposts to high-volume urban clinics.

From each facility, we purposively selected one FIC who named ≤ 2 MPs, and one FIC who named >2 MPs. Eligibility for FICs in this analysis included being enrolled in the APS scale-up project. Two MPs were recruited from each facility. Eligibility for MPs included testing positive for HIV, and themselves subsequently having received APS for their female partners.

Study procedures and data collection

FICs and MPs at these facilities who enrolled in APS were invited to participate in phone or in-person IDIs with a qualified qualitative interviewer. Those interested were screened for eligibility and provided informed consent. The IDIs were conducted in Kiswahili, Luo, or English, based on the language preference of the client. The interviews took place at a study facility or another safe and private location chosen by the participant. The interviewer used a semi-structured interview guide, which addressed APS satisfaction, perceived benefits of the intervention, and challenges that may affect APS delivery or uptake. The interview guides for FICs and MPs were similar; the male guide included perspectives on how males felt being contacted by a routine HTS

provider and being informed that they were exposed to HIV. Interviews were audio-recorded and transcribed verbatim.

Data analysis

An inductive thematic analysis was conducted to identify new emerging themes and after reading the transcripts multiple times, two researchers (BN and MO) independently open-coded the data line by line, and then reached a consensus on the codebook through discussion. After the codebook was tested with two transcripts, the two researchers coded all the transcripts independently and discussed findings. Similar codes were aggregated to form categories, which were then classified as themes and subthemes. Themes directly derived from the research questions and those newly emerged from the data were identified and discussed. The entire interview was the unit of analysis.

We then applied the theoretical framework of acceptability (TFA) proposed by Sekhon *et al.*⁴⁵ to guide our presentation of findings. The TFA was developed as a multi-construct theoretical framework of acceptability of healthcare interventions that can be applied to assess acceptability from the perspective of both intervention deliverers and recipients⁴⁵. This framework has been utilized in a number of complex health intervention studies⁶⁴⁻⁶⁶, and leveraged regionally in SSA⁶⁷⁻⁶⁹. Final themes were mapped onto six of the dimensions of the TFA: affective attitude, burden, effectiveness, self-efficacy, ethicality, and intervention coherence. In the analysis, it emerged that participants did not distinguish opportunity costs from burdens or perceived effectiveness; therefore, we did not retain the construct in our analysis. Data were analyzed in ATLAS.ti version 8.4.4, and the findings of this study are reported according to the consolidated criteria for reporting qualitative studies (COREQ)⁷⁰.

Ethical approval

The study was approved by the Kenyatta National Hospital Ethics and Research Committee (P465/052017) and the University of Washington Institutional Review Board (STUDY00002420).

Results

We conducted 33 IDIs, 16 with FICs and 17 with MPs with approximately equal representation from Homa Bay and Kisumu counties. FICs were between 15-36 years old, and MPs ages ranged from 23-52 years old (Table 1). Most FICs (75%) and MPs (94%) had completed at least primary school.

Table 1. Characteristics of the participants (n = 33)

Characteristics	Female clients (n=16) N (%)	index Male sexual partners (n=17) N (%)
Age (years)	15-36	23-52
Study site		
Kisumu	8 (50%)	9 (53%)
Homa Bay	8 (50%)	8 (47%)
Level of education completed		
Some primary school	4 (25%)	1 (6%)
Completed primary school	6 (37%)	5 (29%)
Some secondary education	2 (13%)	3 (18%)
Completed secondary education	3 (19%)	7 (41%)
Post-secondary education	1 (6%)	1 (6%)

The findings present the acceptability of APS from the client perspective, adapted from the TFA. The framework was adapted to better align to the APS context, including with refined constructs and visual evidence of linkages between constructs, particularly between burden, intervention coherence, and perceived effectiveness, as well as between perceived effectiveness and self-efficacy. (Figure 1).

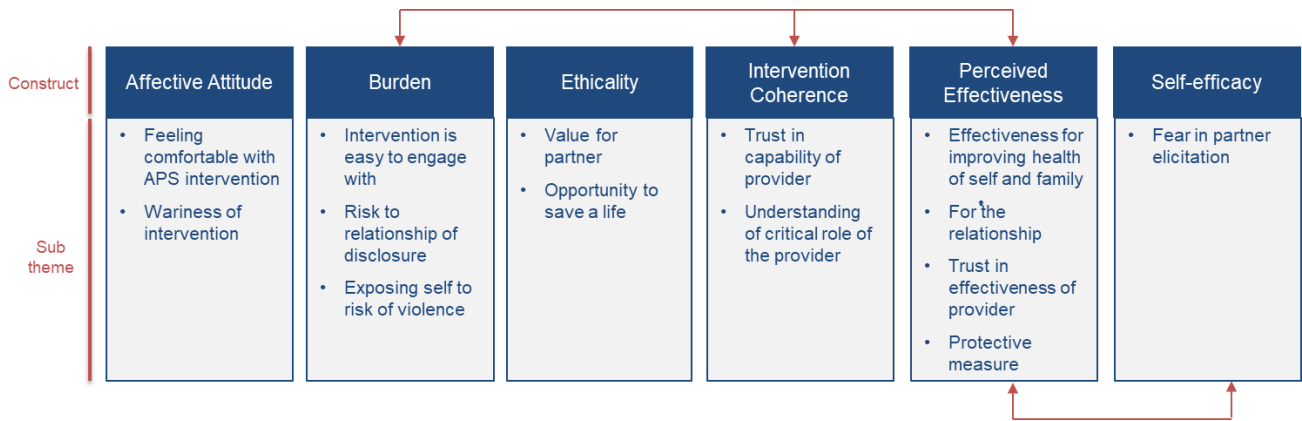


Figure 1. APS Acceptability Framework, adapted from Sekhon et al⁴⁵. Note: The red arrows reflect evidence of linkage between the constructs found in the analysis, with responses from FICs and MPs describing similarities and/or interdependencies amongst specific constructs in their perceptions of acceptability.

Affective attitude

Affective attitude is defined as how an individual feels about an intervention⁴⁵. Participants expressed a wide range of feelings regarding the APS intervention, from comfort with to wariness of APS. For clients conveying comfort with the intervention, the supportive roles of the health care workers in both counseling and notifying sexual partners were highlighted as important facilitators.

Interviewer: Did you have fears or you were just comfortable to give their contacts?

Client: I did not have any fear and that is why I was giving out their contact.

Interviewer: You were just comfortable, why were you comfortable? Client:

Because I had been counselled and taught and so I also wanted to help others as well. (IDI 036, FIC)

Because of the approach they [health care workers] gave me, they were open with me and I was also open with them and didn't feel uncomfortable about anything.

(IDI 035, MP)

Notable discomfort and wariness of naming and notifying partners was expressed as well. Some clients explained that “there are some private matters that feel awkward when someone asks you about and is not easy to speak up,” and reflected they were thinking to themselves “how do I start explaining such a thing to someone else.” The role that the healthcare workers played was seen as mitigating these fears and wariness, but this challenge was reflected consistently.

Although when she [healthcare provider] first mentioned it to me, I was worried how I was going to approach my sexual partners but then she told me I should leave that to her because that is now her job. (KII 038, MP)

Burden

Burden refers to the perceived amount of effort that is required to participate in an intervention⁴⁵. The sub-themes identified included the technical ease of engaging with the intervention, but also the risk to the relationship of disclosing one's status, and the risk of a woman being exposed to interpersonal violence.

The low burden of engaging with the intervention was noted routinely as “easy” and “without any fear,” particularly with the benefit of “helping me and my partners,” and one’s children. However, the consistent detracting burden noted for APS acceptability was the risk and fear of repercussions of having one’s status disclosed. Clients explained that partners “might leave them” if partners find out about their HIV status during the APS process. MPs relayed concern about the risk of disclosing multiple sexual partners, particularly in exposing those non-primary partners with whom they are in “secret” relationships.

The difficulty was the part where I was expected to expose my sexual partners. This is someone we have been having sex with in secret and now I was about to expose her and tell this provider who they are and the things we have done together. I was scared that she could find out that I was the one who shared their details with the provider. However, because of the kind of teachings I got from the provider, I opened up because I wanted all of us to get help. (IDI 055, MP)

FICs expressed similar sentiments, but often with the elevated risk of their MPs “leaving them,” dissolution of their relationships, and often the corresponding loss of access to financial resources and housing. These burdens of APS escalated to the risks of intimate partner violence (IPV) against the FICs if the sexual partners could somehow find out about having been named to healthcare staff.

Sometimes they think they can be tracked and the husband will find out that they are the ones who gave out the contact. And if they find out then sometimes they can be beaten thoroughly. You can even be sent away from the home. (IDI 061, FIC)

MPs also highlighted IPV as a concern that their female partners, or any FIC, would be considering in the acceptability of APS, in that any resulting disclosure of HIV status would be dangerous.

The reason why the women will fear is that –you know some of us men are very arrogant and some of the men when they will hear about this then they will not take it lightly. They will be very harsh and they can even become violent and the woman can be beaten (IDI 064, MP)

Ethicality

According to the TFA, ethicality is the extent to which the intervention is a good fit with an individual’s value system⁴⁵. Interestingly, though the interview questions did not explicitly ask about value systems or ethics of this intervention, two sub-themes were repeated in the IDIs: value for the partner, and the opportunity for this intervention to save lives. Clients expressed that only those who “didn’t value their relationships” or “didn’t love each other” would not accept APS, and that if they truly “loved someone you wouldn’t want to harm them” by not naming partners to be notified.

Clients suggested that their perspectives on the acceptability of APS were influenced by strong motivations to “do good” and “save a life,” and this was noted across male and female interviews.

I feel good because I have saved their lives somehow by helping them get tested and enrolled into care. I have saved their lives and now each one of us can now take good care of their lives and enroll into care. (IDI 048, FIC)

This facilitating factor i.e., “to help their partners and family,” was consistently identified as playing a motivating role for the intervention’s acceptability.

I didn’t find it bad because I wanted to help my life and that of the other partners as well. I wanted them to be reached and talked to so that if they also find it good they can also enroll into care. (IDI 067, FIC)

Intervention coherence

The next theme in Sekhon *et al.*’s framework is intervention coherence, which denotes the extent to which the participant understands the intervention and how it works⁴⁵. In our study, we found that aspects regarding the acceptability of APS were not only expressed in terms of ‘understanding’ the intervention and how it works, but also in awareness of and understanding in the role of trust in the intervention design. Clients consistently intimated that the acceptability of APS was predicated on trusting “the provider not to reveal their identity to their sexual partners,” as there was a prevailing risk that “the provider can easily mention their names,” but noting that “they are not allowed to do that”.

The reason some people would refuse to give the contact details, let me start from there, is because she/he knows that at the end of the day the partner would want to know who gave out his/her contacts and will go back to her/him and ask why they gave out their contacts. That is why some people don’t like doing that. (IDI 035, MP)

Finally, FICs and MPs explained that an important component of APS was in understanding design of the intervention, with a health care provider playing a critical role in counseling and reaching out to partners instead of the client having to do it themselves. FICs

explained how their MPs were more willing to listen to a health care worker than their female partners, where “if he hears it from someone else then he might take it seriously,” and “it is better if the provider just contacts them and notifies them.” Both female and male clients “found it hard to go and talk to them [sexual partners] myself,” and that APS was effective in doing so instead.

It was not easy for me to make that decision because I felt she would breach the confidentiality and disclose my status to my sexual partners. But with time, after I saw her experience and the way she managed to counsel me and convince me to get tested and enroll into care, I then said let me just let her reach out to my sexual partners because I felt she was the only one who could help me with it successfully.
(IDI 055, MP)

Perceived effectiveness

Sekhon *et al.* defines the perceived effectiveness construct as the extent to which an intervention is expected to achieve its purpose from the participant’s perspective⁴⁵. Clients distinguished their framing of effectiveness in the context of acceptability across several sub-themes, including effectiveness of improving health, of impact on their relationship with their partner, and the importance to the success of the intervention which was the role of the health care provider eliciting and notifying partners.

Clients expressed favorable benefits of participating in APS in that they understood their own HIV status, and that of their partner. Clients felt that they had more information about themselves due to APS, and one FIC explained that she is “aware of many things which I didn’t know before,” in regard to her own status. Though the APS intervention is designed for confidentiality and does not allow for disclosure unless the client requested for partner support or

to be tested with the partner, clients felt that engaging in the intervention supported their male sexual partners in finding out their own statuses, and to be offered care and treatment if needed, which ultimately could protect the health of the FIC. One FIC explained why the effectiveness of APS was important, in that “I wanted [my partners] to be reached and talked to so that if they also find it good they can also enroll into care.”

Though FICs expressed the motivating role of protecting partners and family more than did MPs, some MPs expressed similar urgency to engage with the intervention from the lens of perceived effectiveness.

You see I was considering that if I kept quiet then I would have died and my children would remain alone without a father. So I got courage and decided that let me just be open up so that both of us could be helped. (IDI 050, MP)

Clients also explained how APS supported their relationships by facilitating more openness and communication by leveraging provider-initiated contact for HIV testing.

So if I give out his contact information in secret and then he is traced and found that he is also on care then that would make us to be open to each other. (IDI 061, FIC)

This experience was a good one because at least it saved us from the chaos that would have erupted if I was the one who went home and told my wife about my status. When you go home and tell your wife about it, she will be shocked and it will create problems in the house and cause a lot of blame games on who brought it to the other. However, because the results came back when we were both

together, we went back and talked about it and sorted everything out amicably without causing chaos or problems in our marriage. (IDI 055, MP)

Trust in the confidentiality of the intervention was thus important, but there were also reflections that clients, particularly male clients, trusted the health care providers to be more successful in ensuring linkage to care of their partners than they could on their own.

The reason I chose her to do it on my behalf is because she is more knowledgeable on how to handle this issues than myself. She really challenged me and I trusted her to do a better job getting my wife and sexual partners on my behalf, counsel, test, and enroll them into care. So this is the reason why I decided to share their contacts with the provider because I don't have the experience of counselling anyone...That is why I chose her to go and approach my sexual partners to handle the difficult parts. (IDI 055, MP)

MPs additionally critically noted that APS was effective in reaching them for HIV testing, and that they otherwise would not have known their status.

I did not know my HIV status but being that I was called and got tested made me know my status. I can say that it has really helped me up to now because I am still alive and I am continuing with my business. If it were not for the program, I would have died a longtime ago. (IDI 049, MP)

Finally, some FICs also explained how this risk of IPV motivated the engagement with APS and framed its perceived effectiveness, in that the role of the assisted notification served as a potential protective measure for themselves.

Interviewer: So it is fear that makes most women chose provider referral. Client: Yes, it is mostly because of fear. Women would think about how their spouse or partner usually reacts to things and say they cannot dare face him. Some of them change when things happen and they become very wild like a lion or burn like fire and are very mad. So they will just think that if this guy reacts very badly to simple things, will he not kill me when he hears this? (IDI 067, FIC)

Self-efficacy

The self-efficacy construct is defined as the participant's confidence that they can perform the behaviors required to participate in the intervention⁴⁵. This links closely with the perceived effectiveness expressed above, with respondents framing their ability to engage with the intervention often in the context of how well the intervention would work in preserving confidentiality and in helping oneself and one's partner. The primary sub-theme for self-efficacy was the fear of partner elicitation, due to barriers including stigma and the burden and risks of disclosure, including relationship dissolution and violence. Participants noted that their initial hesitation and lack of confidence in the intervention's requirement to name partners affected their views of the acceptability of APS.

When you have someone you want to get married to, you will start thinking, 'What if he is invited to the hospital and he finds out that I am the one who gave out his contacts. Will he leave me?' So this is where the fear comes in. What will happen to me when he leaves me? (IDI 056, FIC)

Discussion

In this study, we aimed to qualitatively understand the acceptability of APS from clients who choose to engage with APS while it was being integrated into existing routine HIV testing, prevention, and care programs. We find that views of APS are often guided by an individual's trust in the intervention's design and implementation, and an interest to preserve one's health and that of one's family and children. There was a strong and consistent acceptable view of APS as “doing good” and “saving a life,” and as a means of showing love towards one's partner(s). These perspectives provide important insight into the perceptions of individuals who accept APS and may inform recommendations for further scale-up of integrated APS.

Our findings in the real-world setting of HIV services are consistent with those obtained in studies nested within randomized controlled trials. Qualitative studies nested within two recent APS RCTs in Kenya have identified both challenges with awareness and lack of trust in health care providers, and have similarly identified the importance of appropriate health provider training and sensitization for APS clients^{32,33}. Other research has found similar challenges to the intervention, including lack of trust in the health system and gender-specific challenges as inhibitory to partner elicitation²⁵⁻³¹.

Guided by the framing of Sekhon *et al.*'s TFA, we found alignment but also important distinctions that helped to further elucidate acceptability in the context of APS. We found that the affective attitude of individuals engaging with APS was primarily predicated either on a feeling of comfort with the intervention, or a considerable wariness of the personal information required to proceed with naming partners. The importance of the health care workers (HCWs) was critical to shape the affective attitude of clients, including well-trained HCWs who counseled in a clear, open manner, and explained the role they would play in notifying the client's partners. HCWs played

an important role in mitigating fears of the intervention, particularly around the sensitive nature of HIV disclosure and sexual partners. The criticality of well-trained providers for APS is in line with similar research^{29,32,71}, and will continue to serve an important role as APS programs expand.

We found that acceptance was viewed by the clients from the lens of either a low or a significant burden, with a low initial burden of engaging with an “easy” intervention, but with considerable risks that impacted acceptability, including the risk to the relationship of disclosing one’s status, and the risk of a woman being exposed to intimate partner violence. When understanding the acceptability of APS as it is being scaled up, understanding the perspective of clients who are assessing the intervention from a perspective of its burden could be useful for HCWs to mitigate these fears. Improvements of APS delivery could include an early targeted counseling session focused the prevention of perceived risks of APS and redirecting of those at risk of IPV towards other related services.

The individual assessments of burden that clients undertake when viewing the acceptability of APS is closely related the importance of intervention coherence, with trust required in the capability of the HCWs, and in understanding the critical role that the provider plays throughout the intervention. This is also closely associated with the perceived effectiveness of the intervention, specifically the trust required that the provider can effectively implement the intervention. Respondents spoke of these constructs in a holistic manner, particularly regarding trust. Mistrust in HCWs and fears about lack of confidentiality have been found to be barriers to APS in other settings as well^{32,72,73}, and the fear of stigma created by broken confidentiality is consistent with those found in other settings^{72,74–78}. Client trust in the different facets of APS is critical to acceptability and comfort with the intervention, and HCWs play an important role in building and maintaining that trust. As APS is being scaled to new facilities, focus on HCW expertise in

delivering a confidential service and in maintaining that trust with clients will need to continue to be prioritized.

The self-efficacy and perceived effectiveness constructs were also related, in that respondents framed their ability to engage in part based on their perceived effectiveness of the intervention's components, such as confidentiality and impact. Participants noted that their initial hesitation and lack of confidence in the intervention impacted their views of the acceptability of APS, but when overcome, they were able to distinguish their framing of effectiveness in the context of acceptability across a number of sub-themes, including effectiveness of improving health, of impact on their relationship with their partner, and the importance to the success of the intervention of the role of the health care provider eliciting and notifying sexual partners. Importantly, we found that clients explained that the most effective component of APS was due to the design of the program, in that a health care provider played a critical role in counseling and reaching out to partners instead of the client having to do it themselves. This is in close alignment with the findings on trust in HCWs as well. This also had an important gender aspect, as FICs found that their view of acceptability of APS was impacted by how their MPs were more willing to listen to a health care worker than to themselves as females. Policy-makers and stakeholders will need to support the sustainability of the effectiveness of this intervention as APS scales up, and evidence showing improvements to health, and to relationships, may prove helpful for recruiting additional clients going forward.

Finally, the perspectives on ethicality of APS are in line with similar research. The WHO has noted the role that social responsibility plays with APS, with both personal and public health benefits of identifying people with HIV, linking them to care and treatment, and preventing further HIV transmission⁷⁹. Quinn *et al.* highlighted the altruistic benefits of partner notification in

enabling a partner's awareness of their exposure to HIV and allowing them to know their status and access treatment early⁸⁰, and Njizing *et al.* discussed how the motivation to notify one's sexual partners is influenced by the patients' ethical responsibility and concern for the partners' health⁸¹. Our results also suggest that ethicality affects acceptability of APS. We found that there was a strong and consistent acceptable view of APS “doing good” and “saving a life,” and a means to show love towards one's partner(s). These findings could prove valuable for helping to frame APS when enrolling clients. Applying these findings in practice may include highlighting the altruistic benefits of APS in community sensitization campaigns, and/or in recruiting individuals clients at facilities.

This study contained several strengths. APS acceptability was evaluated within real-world settings, with the APS intervention integrated into the standard of care at the site facilities. Client perspectives were directly investigated, as opposed to using proxy measures to infer acceptability. These aspects give a realistic view of the perspectives of acceptability for planning APS scale-up nationwide. Additionally, both male and female perspectives were incorporated, and these perspectives were drawn from facilities with varying client volumes and APS performance levels. Additionally, the field of implementation science has historically been under-served by frameworks for acceptability⁴⁵, and this study uniquely applies the comparatively new TFA to the APS intervention.

We also had limitations. Importantly, our study only captured individuals who accepted the intervention themselves – this selection bias prevented us from learning about the perspectives of individuals who refused APS, and who may have found APS unacceptable. Previous research has however investigated reasons for declining APS⁵⁷, and the perspectives on acceptability of those who do engage with the intervention do provide important insight for intervention scale-up.

Further research should investigate these barriers to accept APS. Secondly, the interview guides were not formed according to the TFA constructs, which may have limited application of the TFA to the data, and/or result in constructs not being fully contextualized. However, by applying the TFA to the data collected, the interview guides were not constrained by a preconceived framework, and may reflect a more comprehensive perspective of acceptability. There is additionally variable, similar, utilization of the TFA in the literature, and studies have used and applied the TFA in different ways, including applying the TFA after data collection, resulting in informative findings^{69,82}. Finally, this study may be limited in generalizability, as this focused exclusively on heterosexual partnerships in western Kenya, and APS acceptability may differ in additional types of partnerships and/or vary regionally.

Conclusion

These findings provide opportunities to inform recommendations for further scale-up, including of ensuring that APS providers are well-trained to deliver the intervention confidentially and with appropriate counseling, to potentially excluding female clients at risk of IPV from this intervention, and in highlighting the altruistic benefits of APS in community sensitization campaigns, and/or in recruiting individuals clients at facilities. Understanding these perspectives of clients receiving APS in a real-world setting may be valuable to policy-makers and stakeholders interested in scaling up or enhancing APS within health systems.

Chapter 4: “If there is joy...I think it can work well” – Investigating relationship factors impacting HIV self-testing acceptability among pregnant women and male partners in Uganda

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Abstract

Background: Secondary distribution of HIV self-test (HIVST) kits from pregnant women attending antenatal care (ANC) to their male partners is shown to increase HIV couples testing and disclosure, and is being scaled up across sub-Saharan Africa. Understanding couple-level barriers and facilitators influencing HIVST uptake is critical to designing strategies to optimize coverage.

Methods: We conducted gender-stratified focus group discussions (N=14) and in-depth interviews (N=10) with pregnant women living with and without HIV and attending ANC, and male partners of pregnant women (N=122 participants). Interview topics included HIVST interest and acceptability of HIVSTs, as well as perspectives on HIV status disclosure to partners and gender roles. Transcripts were analyzed thematically, and the Interdependence Model of Communal Coping and Health Behavior Change was adapted to explore factors impacting HIVST acceptability.

Results: Participants felt that predisposing factors in relationships would be influential in impacting whether women would deliver HIVST kits to their partners, and would impact communal coping behaviors such as couples HIV self-testing and disclosure. Pregnancy was described as a critical motivator for men's uptake of self-testing, while HIV status of the pregnant woman was influential in couples communal coping and health-enhancing behaviors. Generally, participants felt HIV-negative women would be more likely to deliver HIVST to their partners, while women living with HIV would be more hesitant particularly due to concerns about navigating discordant relationships and disclosure without a counselor.

Conclusion: HIV-negative women in relationships with positive predisposing factors may be the most likely to deliver HIVST to their partners, and to leverage interdependent coping behaviors. Women with HIV or those in relationships with negative predisposing factors may benefit from targeted counseling and disclosure support before and after HIVST distribution. Results can help support policy guidelines regarding HIV self-testing of pregnant women and their partners, and recommendations for counseling support.

Introduction

Addressing the gender gap in HIV testing is crucial to achieving Joint United Nations Programme on HIV/AIDS (UNAIDS) 95-95-95 targets in sub-Saharan Africa (SSA)⁶². Men in SSA have lower HIV testing rates than women, leading to poorer clinical outcomes and onward HIV transmission⁸³. Facility-based HIV testing has achieved limited coverage among men, who face structural barriers including travel distance, wait times, lost wages, and social barriers including confidentiality concerns, stigma, and beliefs that clinics are places for women and children^{18,83-85}. HIV self-testing (HIVST) is a convenient and discreet strategy which is shown to overcome barriers associated with facility-based testing and achieve high coverage among men in SSA^{5,86,87}.

A promising HIVST delivery strategy is secondary distribution, which entails healthcare providers giving HIVST kits to pregnant women attending antenatal care (ANC) to deliver to their male partners^{5,10}. High fertility rates in SSA coupled with high ANC attendance (93% in Uganda) result in the majority of women attending clinics for HIV testing in their lifetime⁸⁸. Distributing HIVST to pregnant women may leverage social support from men's primary partners to encourage testing and linkage⁸⁹. Secondary distribution can increase men's HIV testing and linkage to care^{12,13,38,89-91}, and has been shown to promote couples testing and disclosure which is shown to increase women's retention in ART and prevention of mother-to-child transmission (PMTCT) programs⁹². The World Health Organization (WHO) has recommended scale-up of HIVST secondary distribution and several countries in SSA have started national rollout¹⁶.

Designing safe and effective strategies to optimize uptake of secondary distribution requires an understanding of couple's dynamics influencing HIVST delivery and use. Successful HIVST secondary distribution requires pregnant women to feel comfortable distributing HIVST

kits to their male partners and male partners feeling comfortable in using HIVST. Prior studies have found that secondary distribution has been shown to increase testing in male partners, couples testing, and mutual disclosure of HIV status^{11–15}. However, there are several implementation and social challenges impacting couples that can limit scale-up^{5–9,93}. Research has identified couples-related barriers to HIVST, including trust, disclosure, gender roles, and relationship dynamics^{12,34–37}. There are however limited qualitative data on pregnant women’s and men’s perspectives on HIVST secondary distribution, particularly couples dynamics impacting distribution and uptake. Further, there are a lack of data assessing perspectives of pregnant women with HIV, who face unique barriers to HIVST distribution including fear of HIV status disclosure to their partners³⁸.

We evaluated pregnant women’s and male partners’ perceptions of HIVST secondary distribution in Uganda, leveraging the Interdependence Model of Communal Coping and Health Behavior Change³⁹ to investigate the couple’s experience. Prior studies in South Africa⁴⁰, Kenya⁴¹, and Uganda/Zambia⁴² have leveraged this model to investigate HIV testing and treatment from the context of couples, but this effort is a novel application of the model to assess the couples component of HIVST. Our findings can inform policies to strengthening clinical guidelines for HIVST distribution.

Methods

Study Design and Participant Recruitment

Between April 2019 – February 2020, we conducted gender-stratified focus group discussions (FGDs) and in-depth interviews (IDIs) with pregnant women, and male partners of pregnant women in Kampala, Uganda. Women who reported not knowing the HIV status of their male partners were recruited from two public ANC clinics, and a subset of women (not necessarily

those invited to participate in FGDs and IDIs) were asked to provide phone numbers for their male partners. A male qualitative researcher telephoned male partners of consenting women to invite them to participate in FGDs and IDIs. Eligibility criteria for all participants included being ≥ 18 years of age and willing and able to provide informed consent. Eligibility criteria for women including being currently pregnant, not aware of their male partner's HIV status, not attending ANC with their partner, and at low risk for intimate partner violence (IPV). Women were screened for potential for IPV and excluded if they are determined to be at risk for violence as a result of providing contact information to staff for their male partners. Eligibility criteria for men included being in a partnership with a pregnant woman attending ANC, and having a working phone.

Participants in FGDs were purposively sampled with the goal of having 8-12 participants per group. The sample size was chosen to allow saturation of themes including couples dynamics impacting HIVST use. Among pregnant women, FGDs were stratified by HIV status, aside from one FGD with women of mixed HIV status. We purposively sampled for three focus groups consisting of only women with HIV to provide a safe space for conversation, and to understand how their perspectives differed from HIV-negative women. IDIs were conducted with men and women who had not participated in FGDs to further explore personal narratives regarding relationship dynamics.

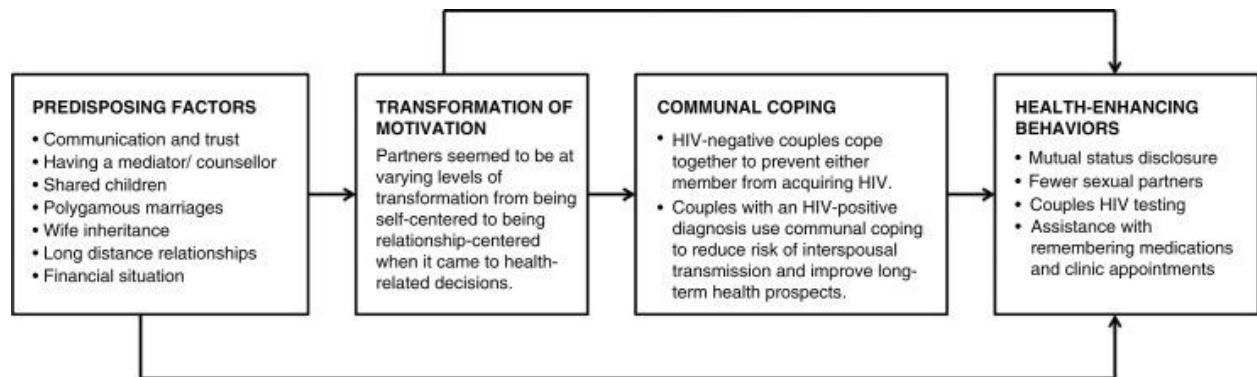
Data Collection and Analysis

We designed semi-structured interview guides based on the literature and our experiences with HIVST distribution^{46,94} Topics included HIV risk perception; masculinity; barriers and facilitators of and HIVST use; couples testing and disclosure; and couples factors related to HIVST

distribution and use. FGDs and IDIs were conducted by a trained Ugandan qualitative researcher (JM). Participants were first asked about their awareness of HIVST and then provided an explanation of HIVST kits before completion of the remaining topics. IDIs and FGDs were held in discreet and convenient locations, audio-recorded, and lasted approximately 90 minutes. Participants were reimbursed 8 USD for their time and transport as recommended by the local IRB.

Recordings were transcribed and translated by JM from Luganda to English, imported into NVivo 12 Software (QSR International, Burlington, MA), and coded by MB, BN, and MS. An inductive thematic analysis was conducted to identify new emerging themes and after reading the transcripts multiple times, two researchers (BN and MB) independently openly-coded the data line by line, and then reached a consensus on the codebook through discussion. We double-coded 20% of transcripts to assess inter-coder reliability and resolved through disagreements through discussion. We adapted the Interdependence Model of Communal Coping and Health Behavior Change⁴¹ (Figure 1) to organize findings from the couple perspective and applied model constructs to themes related to HIVST. This integrative model considers dyadic processes as determinants of couple behavior³⁹. The four-part model suggests that predisposing factors of couples influence individual motivations to interpret health events as meaningful to the relationship, and then a relationship-centered motivation activates communal coping and ultimately the likelihood of adopting and maintaining health-enhancing behaviors⁴¹.

Figure 1. The interdependence model of communal coping and health behavior change, adapted from Lewis et al.^{39,41}



Ethical reviews

This study was approved by the University of Washington (STUDY00006094), the Mildmay Uganda Research Ethics Committee (#REC REF 0112-2018) and the Uganda National Council for Science and Technology (HS391ES). Participants provided written informed consent.

Results

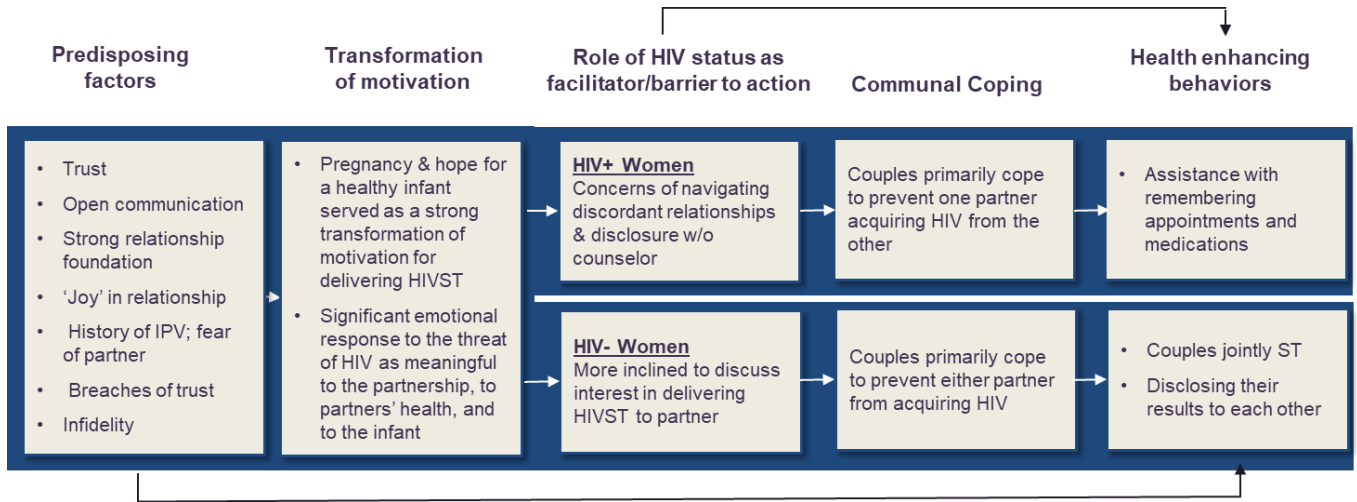
We conducted 14 FGDs (9 with men, 3 with people living with HIV (PLHIV), 1 with HIV-negative pregnant women, and 1 with pregnant women of mixed HIV status) and 10 IDIs (5 with males and 5 with females), (N=122 participants overall) (Table 1). Men (N=64) had a median age of 30 years (interquartile range [IQR] 22-54) and women (N=58) had a median age of 27 years (IQR 19-41). The majority of women (approximately 53%) and a small percentage of men (6.3%) self-reported living with HIV.

Table 1. Characteristics of male and female participants

	Men (N = 64)	Women (N = 58)	Overall (N = 122)
	<i>n (%) or median (IQR)</i>		
Self-reported HIV status			
HIV-positive	4 (6.3)	31 (53.5)	35 (28.7)
HIV-negative	57 (89.0)	26 (44.8)	83 (68.0)
Don't know	3 (4.7)	1 (1.7)	4 (3.3)
Marital status			
Married	12 (18.7)	2 (3.45)	14 (11.5)
Cohabiting	52 (81.3)	54 (93.1)	106 (86.9)
Not living together	0 (0.00)	2 (3.5)	2 (1.6)
Median age (years)	30 (27-35)	27 (24-30)	28 (25-32)
Median number of children	2 (1-4)	1 (0-2)	2 (1-3)

Findings are organized utilizing the interdependence model of communal coping and health behavior change for secondary distribution of HIVSTs, adapted to align to the context of HIVST distribution, with an added construct of 'role of HIV status as facilitator/barrier to action' to address the different pathways for couples depending on HIV status (Figure 2).

Figure 2. Adapted interdependence model of communal coping and health behavior change for HIVST secondary distribution



Predisposing factors

Trust, open communication, and a strong relationship foundation

Participants felt that relationships characterized as having facilitating predisposing factors, such as trust and open communication, would have a higher likelihood of women delivering HIVST kits to their partners and subsequently exhibiting communal coping behaviors such as couples HIV self-testing and status disclosure. Trust, in particular, appeared to play an important role, with both pregnant women having trust in their male partners responding positively upon being presented a HIVST kit, and trust between women and men that ‘binds the two of you’ in a strong enough relationship to withstand potentially challenging news of HIV infection.

You start to feel how to approach him, he may ask you, why did you bring me this kit? Don't you trust me, it needs brave[ry] to take him the kit but with God's grace, he may accept it and don't ask you so many questions. The woman also needs to be

counseled on how to handle the man so that he is likely to accept it. – HIV-positive pregnant woman, IDI

A ‘mutual understanding’ of trust from a strong foundation in the relationship was mentioned by pregnant women and male partners as an influential predisposing factor to the distribution and use of HIVSTs.

It depends on the mutual understanding between you and your partner because not every person with a wife at home are in good terms, you can be with a partner at home but when you are not friends so she finds it very hard to persuade you to use the kit but if you are in good terms, it is more easier for her because she will just explain it to you and you get to understand it. – Male partner, FGD

That kit would be given to a woman to bring it to a man because if you have mutual understandings with your wife, it can help both of you to stay healthy. – Male partner, FGD

‘Joy’ in relationship

Participants mentioned the importance of joy and pride in a relationship, which serves a foundational role to HIVST distribution and utilization. Individuals in relationships that were characterized as having ‘joy’ were likely to discuss accepting and utilizing the HIVSTs, and they discussed a keen interest in knowing their partner’s status, and that doing so ‘pleases me a lot to

get it and take it to my partner'. In contrast, participants mentioned that relationships characterized by strife or discord would be less likely to distribute or use HIVST due to insecurity in the stability of the relationship.

Women have to deliver this kit to us when there is joy or happiness in a home but not in the situations when you are not talking to each other, definitely a man will just look at it and leave it there. But if there is joy, mutual relationship, I think it can work well. - Male Partner, FGD

Negative predisposing factors: Intimate partner violence (IPV), breaches of trust, infidelity, and fear of partner

Participants mentioned that those in relationships with breaches of trust, infidelity, or IPV would be less likely to distribute/use HIVST. In these situations, participants felt that HIVST distribution or HIV status disclosure could lead to negative consequences including arguments, violence, or relationship dissolution. Both men and women described how men in such relationships may be suspicious of being given an HIVST kit. Negative consequences were felt to be particularly acute in relationships described as 'on the verge' of breaking up.

If a woman brings me the HIV self test kit, I will not use it unless she comes with a health worker who has given it to her because if she compels me to use it, we may fight and if she brings it to me, it shows that she doesn't trust me. – Male Partner, FGD

Potential for violence associated with HIVST distribution was mentioned by both men and women, particularly resulting from men's negative reaction to being given an HIVST kit from

their female partners. Women described that distributing HIVSTs would be difficult if they ‘feared their husbands’. A salient concern was the lack of support from a counselor when a pregnant woman distributed the HIVST kit, which participants felt could increase risk of IPV. Participants mentioned the benefits of having a counselor available to explain the use of HIVST kits to male partners, provide counseling during delivery of results, and encourage linkage to care in the event of a positive result. Counseling was especially valued in the event of discovering serodifference, in order to prevent relationship dissolution. Women who feared their partners described feeling more comfortable in a clinic setting with counselors to support the HIV testing process and mitigate their risk of IPV.

That kit is not good because no one can counsel the other but if you go together to the hospital, they can counsel both of you and explain to you that you can continue staying together as a couple when one is HIV negative and the other is HIV positive but if you self-test at home, it can result into domestic violence because if you self-test positive and he is negative, you just move out of the house. – HIV-positive pregnant woman, FGD

If you find a man who is big headed, he can beat you, he can ask you, who are you to give it to me and where did you get it from and what does it treat, how do you explain it to him. – HIV-positive pregnant woman, FGD

Transformation of motivation

Pregnancy as a motivator

According to interdependence theory, transformation of motivation occurs when individuals in couples “cognitively and emotionally ascribe health events as meaningful for the relationship”, and change behavior from primarily a “self-centered orientation to one that is more pro-relationship and health enhancing”³⁹. In our analysis, pregnancy was described as a strong motivator for HIVST distribution and testing uptake. Both women and men expressed interest in using HIVST both to protect the baby from HIV acquisition, and to maintain their own health to care for their growing family by linking to ART if they are positive. Respondents who exhibited both predisposing and negative factors in relationships mentioned that pregnancy plays an influential role in HIVST uptake.

It is going to save the unborn baby because the baby can be delivered when she is HIV negative but if the mother is not tested, the baby can get infected through breast feeding but if both of you are tested, the baby can survive. – Male partner, FGD

Emotional perspective of meaningfulness of the threat of HIV

Regardless of the strength of the relationship, respondents noted the role of HIVST distribution in being able ‘save the life’ of their partner. In relationships with mutual understanding, participants saw HIVST as providing an opportunity to keep partners healthy for the good of the relationship as opposed to solely for an individual’s benefit. Some women stated that even if they experienced negative consequences from HIVST distribution, it was the right thing to do, since knowing one’s status can facilitate linking to ART. Men also mentioned the added benefit of being able to take ownership of their testing in the privacy of their home.

That kit would be given to a woman to bring it to a man because if you have mutual understandings with your wife, it can help both of you to stay healthy.

– Male partner, FGD

That HIVST kit will save someone who appropriately takes his or her HIV drugs and that person is not worried when he/she ... self-tests, he is not worried

– HIV-positive pregnant woman, FGD

Role of HIV Status as a facilitator/barrier to action

Generally, HIV-negative women expressed greater interest in bringing HIVSTs to their partners, while women with HIV expressed more hesitation.

Pregnant women with HIV

Women with HIV expressed concerns about distributing HIVST to their partners, particularly in disclosing their HIV status, navigating potential discovery of serodifference, and fearing blame for infidelity or bringing HIV to the relationship. Participants mentioned that these concerns could lead to arguments, violence and even relationship dissolution, which could lead to loss of financial support for themselves and their babies during an especially vulnerable time of pregnancy.

If a woman tested HIV positive but hasn't disclosed her status to her male partner, she will not be in position to deliver the kit to her partner because inside me, I am

aware that if he comes to know my status, it is going to bring misunderstandings like loss of marriage... he will chase me out

– HIV-positive pregnant woman, IDI

Men mentioned that they would leave their partners if they discovered she was HIV-positive and he was negative.

The fact is, if she is HIV positive, I have nothing to do apart from disowning her.

– Male partner, FGD

However, a few men shared experiences of staying in serodifferent relationships, particularly with the use of HIV pre-exposure prophylaxis (PrEP).

If am HIV negative and my wife is positive, I cannot abandon her because we have been together for awhile but I can ask the health worker what preventive measures can I use so that we remain staying together but not at risk. – Male partner, FGD

In strong relationships with ‘mutual understandings’, women with HIV felt more comfortable bringing an HIVST kit to their partners and expressed confidence that their connection with their partner could serve as an influencing factor for HIVST utilization.

It depends on the mutual understandings amongst you at home...you may have tested positive so when you are delivering this kit, you have to handle him properly and plead to him or else you can take two kits and ask him to test together such that we come to know our status so that we are able to bring up our children well. – HIV-positive woman, FGD

However, the risk of IPV remained a recurring theme among respondents, with women noting that regardless of relationship strength, there was a risk of violence with delivering HIVST kits. Women described ‘fearing’ their partner’s response to their own HIV-positive status, and instead often preferred to ‘persuade him to go to the hospital [rather] than self-testing’.

I was saying if both of you self-test at home and results show that the man is negative and the woman is positive, do you see the woman’s dead body being moved out of the house, for me, I cannot take it. – HIV-positive pregnant woman, FGD

HIV-negative women

HIV-negative women expressed greater interest in delivering HIVSTs to their partners. Awareness of their own negative status empowered them to request their partner to use the kit, which subsequently framed their future actions, such encouraging their partner to link to confirmatory testing and ART if positive, pre-exposure prophylaxis (PrEP) if serodifference is discovered, or to jointly test together in the future if they are both HIV-negative. Men also agreed that they expected their female partners to be more comfortable delivering HIVST kits if they are HIV-negative.

...If she knows that she is HIV negative, she will hurry to give it to you so that she come to know your status but if she knows that she is HIV positive, she will not hurry to give it to you because she will be fearing the man to know her status ... - Male Partner, FGD

Communal coping

The interdependence model posits that communal coping is a process in which couples “share an understanding about the health threat that they are facing and the courses of action required to manage the threat, and recognize the utility of a joint response”^{39,41}. Men and women who characterized their relationships as having predisposing facilitators such as trust and open communication were more likely express desire for engaging in communal coping, including identifying ways to prevent transmission in discordant partnerships, or to continuing to prevent both partners getting HIV if found negative. Communal coping processes, such as jointly working together for a partner to be healthy regardless of HIV status and mutual ‘pride’ in determining each other’s health status were associated with desire to use HIVST.

For women with HIV, ‘mutual understanding’ continued to be a foundational component of communal coping, leading to minimizing blame and instead focusing on a future together. Strong relationships can prioritize taking HIV medications and caring for the family as the joint goal. In the event that both partners were HIV-positive, participants stated that they could cope together and remind each other to take ART to remain strong for their family.

There, the relationship can be sustained because each one will be comforting the other or reminding each other to take the medicine. – Male partner, FGD

Participants described that the largest threat to a relationship’s interdependence was the discovery of serodifference, which may change the ‘love’ in relationship even if the couple remains together. Some participants reported they would stay with their partner but “living as brother and sister” to avoid transmitting HIV while continuing to care for their children. However, a few men shared experiences of staying in a serodifferent relationship, particularly with the use of HIV pre-

exposure prophylaxis (PrEP). Participants stressed the importance of counseling in situations of serodifference.

It is all about the man's heart to get to know that his wife is HIV positive and if they are counseled in the hospital and advised on some of the preventive measures, a man can be patient and continue staying together, but I think, they can stay for a long time, when they are together, it is very difficult to stay as a discordant couple unless when he loves his wife so much but still the love will not be the same as it was before. – HIV-positive pregnant woman, IDI

If both partners test HIV positive, in most cases, it reduces mutual understanding between the two so it is upon the health workers counseling, otherwise couples normally separate due to blaming each other for bringing the virus so emphasis should be put in counseling before even disclosing to you the truth. – Male partner, FGD

HIV-negative women described coping as a couple by working together to prevent HIV acquisition in the partnership (if the male partner tests HIV-negative) or preventing transmission (if the male partner tests HIV-positive).

If I take it to him...I have to convince him to use it in my presence because I have to know his status. But if results come out and he is positive, remember I am carrying a child, I can't run away from him but instead put him on great counseling and he starts taking drugs such that we can give birth to a healthy baby and life

moves on because he is not the first to be positive and not the last. – HIV-negative pregnant woman, FGD

Health enhancing behaviors

Finally, according to the Rogers et al. framework, the ability to rely on each other for support “impacts the likelihood of adopting and maintaining health-enhancing behaviors, thus influencing health outcomes”⁴¹. Women with positive or negative HIV diagnoses exhibited different health-enhancing behaviors.

Women with HIV

When one or both of the partners is diagnosed with HIV, health-enhancing behaviors included reminding each other of doctors’ appointments and medication schedules. This interdependent component was described as dually reinforcing each other’s health as a means to ‘boost the relationship’ and allow for couples to be ‘be more open with each other’.

If both of you come to know that you are HIV positive, it is better to be on medication and remind one another to swallow medicine and you can give birth to negative children as long as you adhere to the health care workers advice, counseling should be got from the hospital, love one another while at home, don’t exchange bitter words, respect one another and the HIV drug doesn’t kill but it is going to help you stay longer. – Male partner, IDI

HIV-negative women

Women who were HIV-negative also described positive health-enhancing behaviors including using HIVST distribution as an opportunity to self-test together, disclose results, and encourage linkage to care if male partners tested HIV-positive to maintain his health and prevent transmission to female partners.

That HIVST kit, it is good and it is going to help in reducing on new infections because you can self-test each other and prevent from getting infected. – Male partner, FGD

You can bring him to the facility and they counsel him on how to live without getting infected and avail him with the drugs which can help him stay negative – HIV-positive pregnant women, FGD

Discussion

Our qualitative analysis assessed couple-level factors influencing HIVST distribution and uptake among pregnant women and male partners in Uganda. Overall, participants reported that HIV-negative women would be more likely to give HIVST kits to their partners than women with HIV, who would have concerns, particularly regarding navigating discordant relationships and disclosure without a counselor. Participants felt that relationships with predisposing factors, such as trust and open communication, would have a higher likelihood of women delivering HIVST kits to their partners, and subsequently exhibited communal coping behaviors such as couples self-testing and disclosure. Conversely, participants mentioned that relationships with breaches of trust, infidelity, or intimate partner violence would be more likely to experience negative consequences

of disclosure, such as violence and/or relationship dissolution, and would be hesitant to distribute/use HIVST. Pregnancy was described as a critical motivator for self-testing, while gender dynamics limited HIVST acceptability, such as fear of IPV and relationship dissolution. Our key finding is that interdependent relationship factors can influence and motivate distribution and uptake of HIVST, and subsequent health-enhancing behaviors, among pregnant women and their male partners, which can inform recommendations as HIVST continues to be scaled up.

Our findings underscore the importance and influence that relationship factors have on HIVST distribution and uptake. Although we find that women with HIV express more concerns related to HIVST distribution, negative impacts can be buffered by strong relationships with trust and mutual understanding. Participants expressed strong interest in leveraging HIVSTs to protect the health of their partners and infants, and to maintain their ability to care for their family. Couples that reframed the situation from self-interested motivation to other- and couple-centered motivation described engaging in communal coping strategies that lead to health-enhancing behaviors. These findings provide opportunities to improve HIVST delivery, including provision of targeted counseling for women with HIV and those in unstable partnerships. Counseling messages that emphasize HIV testing to protect their partners health and enable couples to care for their family can be effective in motivating HIVST distribution and use. Participants also expressed a desire for counseling availability to help explain and interpret HIVST kits as well as encourage partners to link to care in the event of a positive test.

The risk of IPV from HIVST distribution was commonly mentioned by participants. In some partnerships, particularly those with IPV risk, HIVST distribution may not be appropriate. Providing men alternative avenues for accessing HIV testing, voluntary medical male circumcision services or sexually transmitted infections clinics, can avoid the burden placed on pregnant women

of being responsible for HIVST distribution. Other research evaluating attitudes toward IPV has shown concerning evidence of IPV as a potential barrier for HIVST usage⁹⁵, although other research has shown low prevalence of IPV related to HIVST^{93,96,97}. Pregnancy is a particularly high-risk time for women in SSA since relationship dissolution could lead to economic vulnerability and inability to care for themselves and their children. Participants in our study emphasized the need for available counselors at the clinic to directly engage with male partners and provide counseling and testing.

Our findings are consistent with previous studies showing that secondary distribution is generally acceptable for pregnant women and their male partners^{36,38,46,98}, and is influenced by couples-related factors including trust, gender roles, and relationship dynamics^{12,34-37}, as well as significant discomfort with distributing kits to male partners⁹⁹, and concerns of abuse and economic hardship⁹³. Research in Uganda has shown a dramatic increase in partner and couple HIV testing when HIVST was available at home; but importantly, did not provide insight into the role of a couples' relationship in this outcome, or show that men testing positive through HIVST were as likely to link to care in comparison to men who tested positive at a clinic¹⁰⁰. Additional research on secondary distribution in Uganda found that women initially expressed anxiety about their male partners' reactions to being given an HIVST, but that the majority of the women did end up delivering the kits to their male partners³⁶. However, a gap identified in this study was in understanding *how* and *which* men were convinced to test for HIV and to accept HIV self-tests delivered by their partners, and whether characteristics of their female partners or their relationships played a role³⁶. Overall, insights into the relationship factors that impact which couples test together and disclose their status are nascent^{12,91}, and the relationship dynamics that

impact acceptance and non-acceptance remain a critical knowledge gap³⁸ that our findings aim to address.

Our findings relate with Lewis's model of interdependence and communal coping as a means to understanding health behavior change³⁹, but with distinct differences for this context. In Lewis' original model, transformation of motivation led directly to couples engaging in communal coping, which involves the couple working together to address the health threat as advantageous to the relationship. In our study, we found that couples engage in communal coping and health-enhancing behaviors in different ways based on the HIV status of the woman. Both HIV-positive and HIV-negative women embraced HIVSTs as an opportunity to support their partner's health, but HIV-positive women were far more hesitant to engage unless they were in what they believed to be strong relationships that could withstand discordance, disclosure, and would not expect violence. With this, we see that interpersonal characteristics of couples may influence the causal pathways between an intervention and the adoption of health-enhancing behaviors. These results differ from previous research utilizing Lewis' theory to assess communal coping among HIV-positive or discordant couples^{42,101} in not identifying wholly different pathways based on HIV status, but are in alignment with a qualitative analysis in Kenya that did find that pregnant women and their partners experienced differing interdependence pathways based on HIV status⁴¹.

Our study has several limitations. Men were not necessarily the partners of the participating pregnant women, which may have provided stronger evidence of the male and female perspectives of a couple. The men were, however, in partnership with a pregnant woman in ANC, so we feel confident that the couples lens remains appropriate to investigate. We also only reached women and men who agreed to participate in IDIs and FGDs, who may have different perspectives on HIVST and couples testing than men who did not agree to participate. Additionally, participants

were purposefully sampled, and may have representative views for all pregnant women and male partners. Experiences, acceptance, and views of HIVST were discussed hypothetically, and actual experience with HIVST may differ.

There were a number of strengths for our study. First, men were recruited who were not accompanying their partners to ANC and thus capture a broad perspectives of HIVST distribution. Second, women with HIV were oversampled to evaluate differences in perspectives by HIV status. Overall, we find that relationship factors play an important role secondary HIVST distribution and uptake, and pathways to communal coping and health-enhancing behaviors differ by HIV status of pregnant women. Our results can help inform targeted counseling strategies to optimize HIVST uptake among couples.

Appendix

Supplemental Table

Model component	Quote
Predisposing factors	<p>[A woman] would feel scared because she won't be sure if her husband would accept to use it and this can result into fights among each other and the man would think that his wife doesn't trust him so it is a big challenge for them. Male Partner, FGD</p> <p>He might think that you don't trust him or his status so he may not want you to know how his status is. – HIV-positive pregnant woman, FGD</p> <p>During that situation, it brings domestic violence in a family if the man comes to know that I am HIV positive, they become angry and furious blaming you to infect him but I was of the view that the health workers would contact this man and invite him to the hospital and be told the truth as well as counseling him and this can make him cool and he doesn't do anything harmful to you and as a woman you have to live a calm life for the man to tolerate you. – HIV-positive pregnant woman, FGD</p>
Transformation of motivation	<p>It will be of great importance and it will save people's lives and even if one fears to go to the hospital, you can self-test and come to know your status. – Male partner, FGD</p>
Role of HIV status	<p><i>I cannot deliver it to him ... remember am pregnant and HIV positive, remember he will not accept that he is also HIV positive after self-testing so he can abandon you..... – HIV-positive pregnant woman, FGD</i></p>

Chapter 5: Conclusions

Summary of Findings & Implications for Policy-Makers and Stakeholders

This work provided a unique and important opportunity to investigate real-world implementation of critical HIV interventions as they were integrated and scaled up in national health systems. Our key findings include:

- In Kenya, we find real-world integrated APS to be a safe, acceptable, and effective intervention to identify newly diagnosed HIV-positive men and link them to care in Kenya.
- Also in Kenya, we find that APS is acceptable as a strategy to reach male sexual partners of females diagnosed with HIV. We also highlighted the nuances and priorities to the acceptability of intervention.
- In Uganda, interdependent relationship factors can influence and motivate distribution and uptake of HIVST and subsequent health-enhancing behaviors among pregnant women and their male partners, which can inform recommendations as HIVST continues to be scaled up.

These findings provide opportunities to inform recommendations for further scale-up. The effectiveness of real-world APS implementation, including with high acceptability, uptake, and identifying of individuals living with HIV unaware of their status, provides critical evidence and support for further scale-up nationally and regionally. In addition to the effectiveness outcomes, we also found that policymakers should continue to support IPV screening and monitoring for APS scale-up, and that APS should likely be universally offered to women testing HIV-positive and prioritizing APS delivery based on female characteristics is unlikely to increase the yield of new HIV cases identified.

For APS acceptability, we found that policy-makers and stakeholders should continue to prioritize focusing on intervention confidentiality and appropriate counseling as APS is scaled up, and to consider potentially excluding female clients at risk of IPV from this intervention. Importantly, there may be opportunities to maximize uptake of APS by highlighting the altruistic benefits of APS to potential clients.

Finally, for HIVST scale-up, we recommend that women in relationships with negative predisposing factors may benefit from targeted counseling and disclosure support before and after HIVST distribution, and that policy-makers and stakeholders leverage our finding that HIV-negative women in relationships with positive predisposing factors may be the most likely to deliver HIVST to their partners to maximize safe scale-up. There may also be opportunities to support and identify opportunities to strengthen relationships amongst couples, given the importance we found of interdependent relationship factors for health-enhancing behaviors related to HIVST and HIV care and treatment.

Future Research

These findings highlight both important outcomes but also opportunities for further research. It will continue to be critical to understand real-world implications of scale-up of HIV interventions when integrated into national systems, and to understand the nuances and priorities for guidelines and policies. As APS is scaled further, understanding how the intervention can be better designed and leveraged at-scale to maximize the identification of individuals living with HIV who are unaware of their status, and linking them to long-term care and support remains critical. This includes further understanding of acceptability at scale, and optimizing intervention

design to appropriately fit variable contexts and populations. These aspects also apply for HIVST scale-up as well, and further understanding how to safely prioritize and optimize HIVST utilization and distribution at-scale will also be important going forward.

Integration and scale-up of innovative mechanisms to identify and link to care individuals living with HIV will continue to be a priority over the next decade, and high-quality research focused on real-world implementation, leveraging the tools of Implementation Science, can serve an important role in this effort.

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