

Test and Prevent: What Works in Linkage to HIV Prevention

Samantha Dina,¹ Neeraja Bhavaraju,² Elizabeth Gardiner,³ Kristine Torjesen,⁴ on behalf of the OPTIONS Consortium

¹FSG, Boston, Massachusetts, United States of America

²formerly FSG, Washington, District of Columbia, United States of America

³formerly AVAC, New York City, New York, United States of America

⁴FHI 360, Durham, North Carolina, United States of America

TABLE OF CONTENTS

A GROWING NEED FOR LINKAGE TO HIV PREVENTION.....	2
FRAMING LINKAGE TO HIV PREVENTION	2
EMERGING TEST-AND-PREVENT INTERVENTIONS.....	3
Referral system interventions.....	5
Interpersonal engagement interventions.....	6
Service reorganization	7
ASSESSING AND PRIORITIZING LINKAGE INTERVENTIONS	8
ENABLING LINKAGE TO PREVENTION: NEXT STEPS.....	9
REFERENCES.....	10
ACKNOWLEDGMENTS.....	13

A GROWING NEED FOR LINKAGE TO HIV PREVENTION

With the UNAIDS 90-90-90 goals,¹ HIV policies, resources, and programs have become increasingly focused on identifying HIV-positive individuals and initiating them on HIV treatment as the primary method to achieve epidemic control.² As a result of this intense focus on treatment, most countries lag far behind on HIV prevention. In 2019, an estimated 1.7 million people acquired HIV — a global total more than three times higher than the goal for 2020, which is to reduce annual HIV infections to 500,000.^{3,4}

Today, however, HIV testing and prevention tools offer the potential to shift these trends. Biomedical prevention solutions such as oral pre-exposure prophylaxis (PrEP) represent new options for those at risk of HIV transmission. Index case testing is identifying HIV-negative individuals at high risk who could benefit from prevention interventions. Simultaneously, expansion of self-testing for HIV holds promise for reaching more people more regularly with HIV testing. In the context of sustained rates of HIV incidence, the advent of these options presents an opportunity to direct energy, attention, and resources to strengthening pathways to prevention for individuals at risk of HIV.

In this analysis, we draw from and build upon previous research on linkage to treatment and prevention.⁵⁻⁸ To add to this body of work, we conducted interviews with colleagues from 15 implementing organizations across five countries to identify interventions that are effective or show promise of effectiveness at linking HIV-negative individuals to HIV prevention services.⁹ This analysis also explores the enabling systemic conditions that support improved linkage between HIV testing and prevention and highlights remaining questions for further study.

FRAMING LINKAGE TO HIV PREVENTION

To identify opportunities to promote linkage to prevention for HIV-negative individuals, we must consider the prevention context. Several versions of a “prevention cascade” have been developed, based on similar frameworks for treatment programs. The stepwise nature of cascade frameworks, however, does not accurately reflect the reality of prevention. Two additional factors must be accounted for in a prevention framework: 1) there is no single HIV prevention solution for individuals who test HIV negative, unlike antiretroviral treatment (ART) for those who test HIV positive, and 2) individuals’ level of risk evolves over time, as does their need for HIV prevention, which results in people “cycling” on-and-off HIV prevention.

A revised framework that captures the dynamic, multi-faceted, and individualized nature of HIV prevention is needed. Our proposed cycle framework for HIV prevention (Figure 1) highlights a set of decision points along an individual’s prevention journey, taking into account changing levels of risk and individual preferences. The cycle begins with an informal self-assessment that prompts an individual to seek HIV testing. The HIV test is followed by a more formal risk assessment to determine appropriate prevention options, access to those options, uptake, and continued use. Every three months, in line with guidance for HIV testing for at-risk populations, the cycle begins anew. The underlying goal is for individuals who are at risk of HIV to remain protected, even if they switch HIV prevention methods.

cost of implementation, assessed in this paper in a relative, directional sense as the level of resources required to implement a linkage intervention at scale in a large population of individuals who test negative for HIV. Each intervention’s relevance also varies across testing settings and populations, although further research is needed to understand these differences. Some of these interventions have been used for linkage to HIV treatment; understanding their applicability in a prevention context will require further research.

Information provision interventions (Table 1) provide information about why and how individuals can access prevention following a negative HIV test, linking individuals to the risk assessment stage of the prevention cycle (Figure 1). For example, the HIV Self-Testing Africa (STAR) initiative led by PSI in Zimbabwe and South Africa distributes HIV self-test kits in pharmacies and community organizations along with pamphlets that include information on HIV prevention options and how to access them.¹⁵ In South Africa, promotional videos shown in youth-focused educational settings encourage adolescent girls and young women (AGYW) to ask their providers about PrEP.¹⁶ Additional examples of information provision interventions include a mobile phone application with self-assessment tools and HIV prevention recommendations targeted to young men who have sex with men (MSM) in the United States,¹⁷ health promotion messages delivered to AGYW in Kenya,¹⁸ and a South African website that offers users recommendations of PrEP service providers based on location.¹⁹

These interventions are relatively low-cost and may help to increase awareness of HIV prevention options, especially among first-time HIV testers. While significant evidence exists on the use of information provision interventions for condoms,²⁰ evidence on their use for antiretroviral (ARV)-based prevention is limited, early, and anecdotal.

Table 1: Cost and effectiveness of information provision interventions

Intervention	Cost	Strength of Evidence	Supporting Evidence
Promotional messages	\$ - \$\$	✓	<ul style="list-style-type: none"> A study in India tracked the effectiveness of educational materials for women visiting integrated counseling and testing centers and found that 50% of clients went for HIV testing after reviewing the materials, demonstrating change in behavior.¹⁰ One study cited “mass media can create awareness of VMMC but interpersonal communication serves as the catalyst to action.”¹¹
Self-administered risk assessments	\$	✓	<ul style="list-style-type: none"> A study of oral PrEP implementation in Uganda found an uptake of oral PrEP of only 11% among those screened by providers to be at high risk, but 39% uptake among those who self-identified as being at risk prior to the screening.¹² An interviewee in Zimbabwe noted that clients at clinics who use an intake self-assessment form are more likely to take up a prevention service when offered.¹³
Information on prevention service providers	\$	✓	<ul style="list-style-type: none"> A VMMC program in Tanzania launched a text message campaign that shared the benefits of VMMC, times/locations of clinics, and post-operation information; those who texted for VMMC locations were associated with requests for post-operation information — signifying uptake of VMMC.¹⁴

Cost	\$	Likely included in existing PrEP/HIV testing program budget
	\$\$	Requires limited resources beyond typical PrEP/HIV testing program budget
	\$\$\$	Requires significant resources beyond typical PrEP/HIV testing program budget
Effectiveness	?	No, mixed, or questionable evidence
	✓	Anecdotal or early evidence of effectiveness
	✓✓	Robust evidence only from treatment settings
	✓✓✓	Emerging evidence from prevention settings

Referral system interventions (Table 2) help smooth pathways for individuals to access prevention options following a negative HIV test (Figure 1). They help individuals navigate complex healthcare systems by providing information, resources, or financial incentives. The Desmond Tutu HIV Foundation in South Africa, for example, engages young people at community empowerment sessions, captures information about basic personal characteristics and interest in HIV prevention, and embeds these data in a clinic card with a unique barcode that can be scanned by health service providers in nearby public clinics. In this way, they are able to leverage technology as a substitute for a more resource-intensive personal hand-off between adolescent-friendly community programs and public health clinics.¹⁶ Similarly, implementing organizations in India, South Africa, and Kenya are experimenting with online appointment booking,²⁶ text message reminders,²² and incentives (e.g., cash, transportation vouchers)²⁵ to facilitate HIV prevention follow-up.

Though most referral system interventions lack a strong evidence base, recent studies in Malawi and Kenya have demonstrated the effectiveness of using incentives to increase VMMC uptake after HIV self-testing.^{8,25} Studies in Kenya have also demonstrated higher rates of follow-up appointment attendance with weekly text message reminders.²³ Referral letters and reminders can be low-resource solutions, while unique identifier systems and incentives are more costly.

Table 2: Cost and effectiveness of referral system interventions

Intervention	Cost	Strength of Evidence	Supporting Evidence
Referral letters or forms	\$	✓	<ul style="list-style-type: none"> Anecdotal evidence suggests referral letters facilitate access to a healthcare system by increasing the client information available to healthcare staff, translating into more effective service as well as increased client comfort in navigating the system.¹⁶ One study demonstrated that referral letters reduced the time required for registration processes and facilitated access to care for HIV-positive clients.²¹
Reminders	\$- \$\$	✓✓	<ul style="list-style-type: none"> A randomized control trial (RCT) in Kenya tested enhanced appointment reminders with a text message and phone call reminder vs. standard appointment card. Those with the enhanced reminders were 40% more likely to attend for additional testing compared to the standard of care group.²² A study in Kenya demonstrated improved adherence to ART with weekly text message reminders. 53% of intervention group reported 90% adherence vs. 40% of control group.²³
Unique identifier systems	\$\$ - \$\$\$	✓	<p>Some programs are seeing early signs of improved uptake with a unique identification system:</p> <ul style="list-style-type: none"> Desmond Tutu HIV Foundation in Cape Town has implemented a barcode system to facilitate linkage from empowerment session or school-based settings to facilities and has seen promising early results.¹⁶ LINKAGES India uses a unique identification system to promote follow-up after testing and ensure linkage to prevention while protecting client confidentiality.²⁴
Incentives for follow-up	\$\$ - \$\$\$	✓✓✓	<ul style="list-style-type: none"> A study in Malawi demonstrated that the use of cash incentives increased the proportion of men who visited a facility for care or prevention after taking a self-test: 19% of the group receiving a \$10 incentive linked to ART or VMMC compared to 4% of the control group.²⁵ A study in Kenya demonstrated improved uptake of VMMC among men who received incentives: 9% of the group receiving incentives underwent VMMC compared to 1.6% of the control group.⁸

Cost

\$ Likely included in existing PrEP/HIV testing program budget

\$\$ Requires limited resources beyond typical PrEP/HIV testing program budget

\$\$\$ Requires significant resources beyond typical PrEP/HIV testing program budget

Effectiveness	?	No, mixed, or questionable evidence
	✓	Anecdotal or early evidence of effectiveness
	✓✓	Robust evidence only from treatment settings
	✓✓✓	Emerging evidence from prevention settings

Interpersonal engagement interventions (Table 3) provide personalized, one-on-one support (in person, via phone, or online) to help individuals understand HIV test results, become familiar with HIV prevention options, and initiate prevention following a negative HIV test, providing support through the uptake stage of the prevention cycle (Figure 1). Interpersonal engagement interventions also provide the opportunity to combat stigma, address myths and misunderstandings, and change behaviors through individualized support and education.

Table 3: Cost and effectiveness of interpersonal communication interventions

Intervention	Cost	Strength of Evidence	Supporting Evidence
In-person mobilization or accompaniment	\$\$	✓✓	<ul style="list-style-type: none"> In the LINKAGES Malawi clinic, 98% of female sex workers (FSWs) who tested HIV positive initiated ART with peer navigators escorting them vs. 38% of FSWs without escorts.²⁷ One study demonstrated that receiving a follow-up home visit from a person living with HIV was significantly associated with timely linkage to care.⁶
Case management support	\$\$\$	✓✓	<ul style="list-style-type: none"> Clients living with HIV who participated in a case management program with a linkage coordinator at four HIV clinics in the United States were more likely to visit an HIV clinic and be retained in care (64% treatment vs. 49% control).⁷ A large study of 14 HIV care facilities in the US demonstrated that people who attended a clinic with on-site case management were more likely to be retained in care than individuals attending a clinic without these services.²⁸
Virtual support by peers or counselors	\$\$	✓	<ul style="list-style-type: none"> In a Nigerian study on HIV self-testing, participants noted the ability to interact with a helpline counselor as a critical factor enabling linkage to care.²⁹ The LINKAGES project in India found that referrals from online outreach workers resulted in a higher HIV case detection rate than in-person outreach in similar geographies (5.4% vs. 0.3% case detection rate¹, suggesting that online channels reach populations at high-risk of HIV that may not engage via in-person channels.²⁶
Virtual support using AI	\$\$	✓	<ul style="list-style-type: none"> In South Africa, a recently launched WhatsApp service with AI-enabled conversations about treatment and prevention options for those who have used an HIV self-test demonstrates user interest and use of the platform due to its convenience, confidentiality, and ability to provide guidance on navigating the healthcare system.³⁰

Cost	\$	Likely included in existing PrEP/HIV testing program budget
	\$\$	Requires limited resources beyond typical PrEP/HIV testing program budget
	\$\$\$	Requires significant resources beyond typical PrEP/HIV testing program budget
Effectiveness	?	No, mixed, or questionable evidence
	✓	Anecdotal or early evidence of effectiveness
	✓✓	Robust evidence only from treatment settings
	✓✓✓	Emerging evidence from prevention settings

Interpersonal engagement interventions offer differing levels of support. For example, peer educators in Malawi provide risk assessment, counseling, and HIV testing services, tracking referrals through quarterly visits to all individuals tested;³¹ peer navigators in Haiti accompany members of key populations from testing sites to clinics to encourage treatment or prevention uptake.³² Studies have demonstrated the effectiveness of case management and accompaniment in a treatment setting, showing increased ART uptake with accompaniment as well as improved retention in care for those receiving case management

services.^{27,28} Peer support interventions have been important in promoting and supporting PrEP uptake among AGYW.³³ While effective, these interventions are difficult to scale, requiring investments of time, talent, training, and outreach.

Some implementing organizations are experimenting with technology solutions to enable interpersonal connection at scale. For example, the USAID-funded LINKAGES project in India (providing prevention, care, and treatment services to key populations) leverages online counselors to encourage risk assessment, provide post-test information and counseling, and send testing reminders through a central, automated website. Use of the site has led to increased case detection compared to in-person outreach.²⁶ Similarly, Wits RHI in South Africa recently launched a WhatsApp chat line that uses artificial intelligence (AI) to enable conversations with individuals who share HIV self-test results via message to receive guidance on next steps for treatment or prevention.³⁰ These technology-enabled interpersonal interventions are demonstrating early positive usage rates and high potential to scale.

Service reorganization offers opportunities to better align HIV testing and HIV prevention and to streamline linkages between them (Table 4). Integrating these components strengthens the link between HIV testing and prevention uptake and reduces the burden placed on the individual to seek prevention services. Implementers are also experimenting with “fast-track” options to initiate prevention (PrEP, VMMC) or ART immediately following an HIV test and are testing the option to complete refills at pharmacies in lieu of repeat clinic visits.

Table 4: Cost and effectiveness of service reorganization interventions

Intervention	Cost	Strength of Evidence	Supporting Evidence
Fast-track options (same-day initiation, fast-track ARV or PrEP pickup)	\$	✓✓✓	<ul style="list-style-type: none"> A fast-track ARV pickup program in Malawi showed 97% retention and 2% loss to follow-up, decreased waiting times, and increased patient satisfaction.³⁴ An RCT in Mozambique showed 91% of individuals receiving same-day point-of-care CD4 count results and the option of ART initiation were linked to care within 1 week vs. 46% of individuals receiving standard referral.³⁵ In South Africa, the Teen Truck program supports AGYW eligible for PrEP with same-day initiation: 25% initiate same day and uptake of PrEP is positively correlated with personal agency and health-seeking behaviors.³⁶
Integration of HIV and testing services	\$\$\$	✓✓✓	<ul style="list-style-type: none"> After ART integration in Haiti clinics, the ART initiation rate increased from 18% to 70% for MSM and from 17% to 45% for FSW.³² At OUT’s TEN81 MSM clinic in South Africa, PrEP uptake for those who proactively visit the clinic for testing is nearly 100% among those eligible for PrEP.³⁷
Coordination of service providers	\$	✓✓	<ul style="list-style-type: none"> In Zambia, women diagnosed with HIV at co-located antenatal/HIV clinics were significantly more likely to initiate ART therapy than women in standard clinics.⁷ Jhpiego has begun co-locating VMMC providers and community testing providers in the STAR project and notes anecdotally that the close proximity has led to better uptake.³⁸

Cost

\$ Likely included in existing PrEP/HIV testing program budget

\$\$ Requires limited resources beyond typical PrEP/HIV testing program budget

\$\$\$ Requires significant resources beyond typical PrEP/HIV testing program budget

Effectiveness

? No, mixed, or questionable evidence

✓ Anecdotal or early evidence of effectiveness

✓✓ Robust evidence only from treatment settings

✓✓✓ Emerging evidence from prevention settings

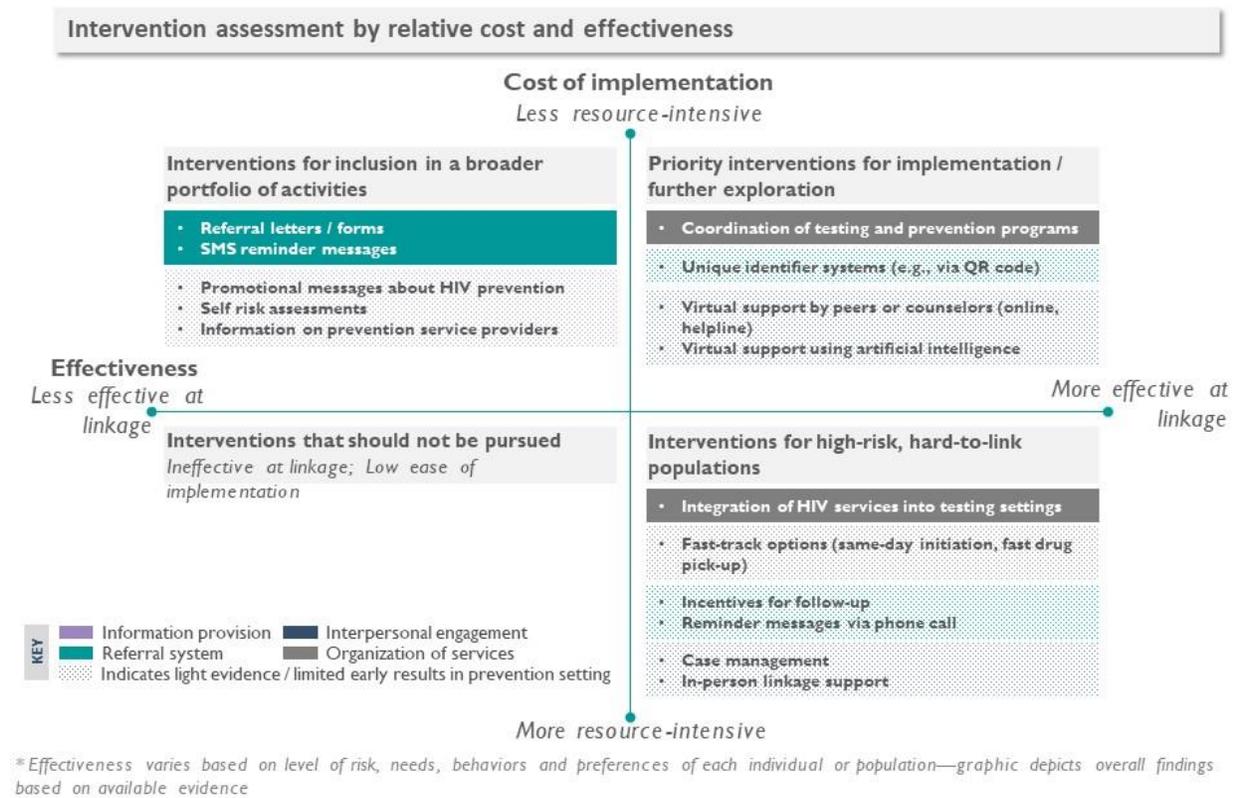
Some organizations are decentralizing HIV prevention services and integrating them directly in community testing sites to enable more direct linkage to ART or oral PrEP. The integrated model has achieved success in a treatment setting, as demonstrated by significant increases in ART initiation.³² Despite anecdotal evidence of increased PrEP uptake in community settings, early results suggest challenges with sustained, effective use. For example, same-day initiation of PrEP following an HIV test at a South African MSM clinic is demonstrating higher rates of PrEP uptake, but lower rates of continuation on PrEP, than a clinic-based program in the same community.³⁷

As an initial step to greater integration, some programs are more intentionally coordinating HIV testing and HIV prevention service provision so that they are co-located. This approach has proven effective in treatment settings,³² and experiments in VMMC programs also indicate early success.⁷

ASSESSING AND PRIORITIZING LINKAGE INTERVENTIONS

A combination of interventions is necessary to meet the diverse prevention needs and preferences of individuals who test HIV negative. The interventions reviewed here frequently involve a trade-off between cost and effectiveness (see Figure 2). This is especially true for interventions that require a greater investment in human resources, such as those in the interpersonal engagement category. However, a small group of interventions present the opportunity to achieve effectiveness at scale without requiring significant new investment.

Figure 2: Intervention assessment by relative cost and effectiveness



Given the trade-offs between cost and effectiveness, the potential for impact at scale, and the need for additional evidence, our research points to opportunities in three categories of interventions: priority

interventions for implementation or further testing, interventions for high-risk, hard-to-link populations, and complementary interventions that can be used in a portfolio.

- **Priority interventions for implementation and further exploration** include interventions that build on existing systems (e.g., coordination of testing and prevention programs, “fast-track” options) and interventions that leverage technology (e.g., virtual support by peers or AI, unique identifier systems) to achieve effective linkage at scale. These interventions integrate a component of personalized support or streamlined services to reduce the individual burden in navigating complex health systems. Although the evidence to date of their effectiveness in prevention settings is minimal, these interventions show significant promise and should be prioritized for further implementation research.
- **Interventions for high-risk, hard-to-link populations** include the integration of HIV prevention and testing settings, incentives for follow-up, and in-person case management or peer navigation. These interventions are likely to be the most effective at linking those who test HIV negative to HIV prevention services, as demonstrated by a significant body of evidence from HIV treatment. However, they also require the highest levels of investment in human (e.g., counselors, peer navigators) or financial (e.g., incentives) resources, making them cost-prohibitive for use with the broad HIV-negative population. These interventions should be used to support linkage to prevention for the best candidates for HIV prevention and for individuals who are most difficult to link to services through other methods.
- **Complementary interventions for use in a portfolio** include all of the information provision interventions (promotional messages, self-administered risk assessments, and information on prevention services) as well referral letters and text message reminders. These interventions typically make it easier for people already seeking HIV prevention to make the connection to HIV prevention services, but they do not help overcome major barriers to uptake, such as stigma or misinformation. Such complementary interventions can be implemented within existing testing programs at a relatively low cost to provide a minimum level of linkage to prevention services.

ENABLING LINKAGE TO PREVENTION: NEXT STEPS

Donors and policymakers can support the creation of an effective enabling environment for greater linkage from HIV testing to prevention in four ways:

1. **Funding, guidelines, and monitoring systems:** With a focus on the 90-90-90 framework to guide and measure success, resources are dedicated to identifying individuals who are HIV positive and connecting them to treatment — with little or no focus on those who test HIV negative. The 90-90-90 framework created a shared, defined measurement system, which translated to clear goals and investments for treatment.³⁹ Similar efforts must be built into national testing guidelines, donor funding, and monitoring and evaluation systems to define clear guidelines and encourage linkage from HIV testing to prevention services.
2. **Guidance on targeting:** The HIV-negative population is large, diverse, and has evolving needs. As a result, not all individuals testing negative for HIV will require linkage to HIV prevention, and those who do may benefit from different prevention options. Additional evidence and guidance on targeting is needed to further define the highest-priority populations for linkage to HIV prevention and help HIV testing programs use resources for linkage efficiently.
3. **Research on end user preferences:** The effectiveness of linkage interventions will differ based on context and end user preferences. As with HIV treatment, a differentiated delivery approach may contribute to improved uptake and retention in prevention.⁴⁰ The interventions detailed here vary across a number of dimensions, including appropriate channels, type of intervention, and

intensity of interaction, and each will have its own target audience. For example, while some individuals may prefer in-person support, others may seek a largely anonymous, online experience. Additional research is needed to understand end user preferences and inform a differentiated service delivery approach.

4. **Implementation science on linkage to prevention:** This research highlights the need for further research on key topics — some of which are under study in current HIV testing and prevention projects, while others are relatively unexplored. Dedicated resources for further research will be essential to making effective progress in HIV prevention. Questions for further research include: the cost-effectiveness of investing in linkage from testing to prevention relative to other methods of demand generation for HIV prevention services, how interventions used for linkage to HIV treatment can be effectively adapted for linkage to HIV prevention, and how technology can be used to enable greater scale of interpersonal interaction.

A push for universal HIV testing and treatment has led to growing investment in HIV testing, including index testing and self-testing. Large numbers of people who are HIV negative and at high-risk for HIV are being reached, but not offered effective prevention options, including oral PrEP. This gap represents a significant missed opportunity. We must make progress on linkage to prevention to improve the effectiveness of HIV testing and prevention programs, reach people in need of HIV prevention, and achieve epidemic control.

REFERENCES

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). 90-90-90: treatment for all. <https://www.unaids.org/en/resources/909090>. Accessed June 2, 2019.
2. UNAIDS. Invest in HIV prevention. Geneva: UNAIDS; 2015.
3. UNAIDS. Seizing the moment: Tackling entrenched inequities to end epidemics. <https://www.unaids.org/en/resources/documents/2020/global-aids-report>. Published 2020. Accessed July 17, 2020.
4. UNAIDS. Global AIDS update 2016. http://www.unaids.org/sites/default/files/media_asset/global-AIDS-update-2016_en.pdf. Published 2016. Accessed June 2, 2019.
5. Schaefer R, Gregson S, Fearon E, Henson B, Hallett TB, Hargreaves TR. HIV prevention cascades: a unifying framework to replicate the successes of treatment cascades. *Lancet HIV*. 2019;6(1):e60–e66.
6. Mavegam BO, Pharr JR, Cruz P, Ezeanolue EE. Effective interventions to improve young adults' linkage to HIV care in Sub-Saharan Africa: a systematic review. *AIDS Care*. 2017;29(10):1198–1204.
7. Okeke NL, Ostermann J, Thielman NM. Enhancing linkage and retention in HIV care: a review of interventions for highly resourced and resource-poor settings. *Curr HIV/AIDS Rep*. 2014;11(4):376–92.
8. Thirumurthy H, Masters SH, Rao S, et al. Effect of providing conditional economic compensation on uptake of voluntary medical male circumcision in Kenya: a randomized clinical trial. *JAMA*. 2014;312(7):703–711.
9. Interviews conducted with: Kevin Fisher, AVAC, United States; Tanya Shewchuk, Bill & Melinda Gates Foundation, United States; Anna Grimsrud, International AIDS Society, South Africa; Rachel Baggaley, Michele Rodolph, and Shona Dalal, World Health Organization, Switzerland; Sarah Jenkins, Clinton Health Access Initiative, South Africa; Linda-Gail Bekker, Desmond Tutu Foundation, South Africa; Jason Reed, Kelly Curran, and Kristina Grabbe, Jhpiego, United States; Chis Akolo and Ben Eveslage, LINKAGES, United States and India; Elizabeth Mpunga, LINKAGES Malawi, Malawi; Njambi Njuguna, LINKAGES Kenya, Kenya; Patricia Jeckonia, LVCT Health,

Kenya; Johan Meyer, OUT, South Africa; Nina Hasen and Karin Hatzold, PSI, United States and South Africa; Definate Nhamo, Pangaea Zimbabwe AIDS Trust (PZAT), Zimbabwe; and Mohammed Majam, University of Witwatersrand, Reproductive Health and HIV Institute (Wits RHI), South Africa. December 2018 – February 2019.

10. ORG Centre for Social Research. Assessment of effectiveness of IEC material at integrated counseling and testing centres. https://www.unicef.org/evaldatabase/index_67921.html. Published 2009. Accessed June 2, 2019.
11. Population Services International. USAID Combination Prevention Program: harnessing the web to connect with hidden populations. PSI. <https://www.psi.org/hiv-findings/section-3/index.html>. Accessed January 15, 2019.
12. Dunbar M. Risk assessment tools and the identification of individuals at high risk of HIV infection in the delivery of oral PrEP. https://www.prepwatch.org/wp-content/uploads/2018/04/Risk_tool_analysis_April2018.pdf. Published 2018. Accessed June 2, 2019.
13. Interview with Definate Nhamo, PZAT, Harare, Zimbabwe. December 12, 2018.
14. Bertrand JT, Njeuhmeli E, Forsythe S, Mattison SK, Mahler H, Hankins CA. Voluntary medical male circumcision: a qualitative study exploring the challenges of costing demand creation in eastern and southern Africa. *PLoS One*. 2011;6(11):e27562.
15. Interview with Nina Hasen, PSI, Washington, DC, USA, and Karin Hatzold, PSI, Harare, Zimbabwe. December 19, 2018.
16. Interview with Linda-Gail Bekker, Desmond Tutu Foundation, Cape Town, South Africa. January 7, 2019.
17. Le Grand S, Muessig KE, Horvath KJ, Rosengren AL, Hightow-Weidman LB. Using technology to support HIV self-testing among MSM. *Curr Opin HIV AIDS*. 2017;12(5):425–431.
18. Inwani I, Chhun N, Agot K, et al. High-yield HIV testing, facilitated linkage to care, and prevention for female youth in Kenya (GIRLS Study): implementation science protocol for a priority population. *JMIR Res Protoc*. 2017;6(12):e179.
19. Interview with Saiqa Mullick, Wits RHI, Johannesburg, South Africa. October 29, 2019.
20. USAID Project SEARCH. Condom social marketing. <https://www.jhsph.edu/research/centers-and-institutes/research-to-prevention/publications/csm.pdf>. Published 2011. Accessed June 2, 2019.
21. Nsigaye R, Wringe A, Roura M, et al. From HIV diagnosis to treatment: evaluation of a referral system to promote and monitor access to antiretroviral therapy in rural Tanzania. *J Int AIDS Soc*. 2009;12(1):31.
22. Mugo PM, Wahome EW, Gichuru EN, et al. Effect of text message, phone call, and in-person appointment reminders on uptake of repeat HIV testing among outpatients screened for acute HIV infection in Kenya: a randomized controlled trial. *PLoS One*. 2016;11(4):e0153612.
23. Pop-Eleches C, Thirumurthy H, Habyarimana JP, et al. Mobile phone technologies improve adherence to antiretroviral treatment in a resource-limited setting: a randomized controlled trial of text message reminders. *AIDS*. 2011;25(6):825–34.
24. Interview with Benjamin Eveslage, LINKAGES India, New Delhi, India. February 1, 2019.
25. Choko AT, Corbett EL, Stallard N, et al. HIV self-testing alone or with additional interventions, including financial incentives, and linkage to care or prevention among male partners of antenatal care clinic attendees in Malawi: An adaptive multi-arm, multi-stage cluster randomised trial. *PLoS Med*. 2019;16(1):e1002719.
26. Shah P. HIV programming goes online with the launch of Yes4Me in India. <https://linkagesproject.wordpress.com/2018/11/25/hiv-programming-goes-online-with-the-launch-of-yes4me-in-india/>. Published 2018. Accessed June 2, 2019.

27. Simwanza A, Kapenuka B, Msiska M, et al. Escorted referral by peer navigators improved linkage to HIV care and treatment services for FSW in Mzuzu, Malawi. Paper presented at: 22nd International AIDS Conference; July 23–27, 2018; Amsterdam, the Netherlands. <http://programme.aids2018.org/Abstract/Abstract/10148>. Accessed June 2, 2019.
28. Higa D, Crepez N, Mullins MM, et al. Identifying best practices for increasing linkage to, retention, and re-engagement in HIV medical care: findings from a systematic review, 1996–2014. *AIDS Behav.* 2016;20(5):961–66.
29. Dirisu OO, Tun W, Sekoni A, et al. Experiences with use of oral HIV self-testing among men who have sex with men and linkage to care: translating evidence to programmatic strategies for HIVST scale-up in Nigeria. Paper presented at: 22nd International AIDS Conference; July 23–27, 2018; Amsterdam, the Netherlands. <http://programme.aids2018.org/Abstract/Abstract/10848>. Accessed June 2, 2019.
30. Interview with Mohammed Majam, Wits RHI, Johannesburg, South Africa. January 16, 2019.
31. Interview with Elizabeth Mpunga, LINKAGES Malawi, Lilongwe, Malawi. February 6, 2019.
32. LINKAGES. Differentiated care for antiretroviral therapy for key populations: case examples from the LINKAGES project. <https://www.clac.cab/portfolio-item/differentiated-care-antiretroviral-therapy-key-populations-case-examples-linkages> Published 2017. Accessed June 2, 2019.
33. Celum C, Delany-Moretlwe S, Baeten J, et al. HIV pre-exposure prophylaxis for adolescent girls and young women in Africa: from efficacy trials to delivery. *J Int AIDS Soc.* 2019;22(Suppl 4):e25298.
34. Hagey J, Li X., Barr-Walker J, et al. Differentiated HIV care in sub-Saharan Africa: a scoping review to inform antiretroviral therapy provision for stable HIV-infected individuals in Kenya. <https://escholarship.org/uc/item/99z5k4bd>. Published 2018. Accessed June 2, 2019.
35. Elul B, Lamb MR, Lahuerta M, et al. A combination intervention strategy to improve linkage to and retention in HIV care following diagnosis in Mozambique: a cluster-randomized study. *PLoS Med.* 2017;14(11):e1002433.
36. Rosseau-Jemwa E, Celum C, Baeten J, Bekker LG. A comparative study of risk among adolescent girls and young women who accept or decline PrEP uptake from a community-based mobile clinic. Paper presented at: 22nd International AIDS Conference; July 23–27, 2018; Amsterdam, the Netherlands. <http://programme.aids2018.org/Abstract/Abstract/9445>. Accessed June 2, 2019.
37. Interview with Johan Meyer, OUT, Pretoria, South Africa. January 24, 2019.
38. Interview with Jason Reed, Kelly Curran, and Kristina Grabbe, Jhpiego, Washington, DC. February 7, 2019.
39. Granich R, Gupta S, Williams B. 90-90-90, Epidemic control and ending AIDS: global situation and recommendations. *Int Virol AIDS.* 2018;5(1):043.
40. Doherty M. Differentiated care – improving engagement and retention in HIV care. Paper presented at: 2018 Controlling the HIV Epidemic Summit; May 3–4, 2018; Geneva, Switzerland. https://www.iapac.org/tasp_prep/presentations/EHESummit18-Th-Doherty.pdf. Accessed June 2, 2019.

ACKNOWLEDGMENTS

This work was led by the OPTIONS Consortium, a program made possible by the generous assistance from the American people through the U.S. Agency for International Development (USAID) and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). Financial assistance was provided by USAID to FHI 360, the Wits Reproductive Health and HIV Institute, and AVAC under the terms of Cooperative Agreement No. AID-OAA-A-15-00035. The contents do not necessarily reflect the views of USAID or the United States Government.

Correspondence to: Kristine Torjesen
Science Facilitation Department
FHI 360
359 Blackwell Street, Suite 200
Durham, NC 27701
ktorjesen@fhi360.org
