

COMBINATION PREVENTION EVALUATION: INFORMING INNOVATIONS IN HIV TESTING, LINKAGE AND TREATMENT DELIVERY TO MEET 90-90-90 GOALS

OVERVIEW

Global targets—known as “90-90-90”—aimed at ending the HIV epidemic call for 90 percent of people living with HIV (PLHIV) to know their HIV status; 90 percent of people diagnosed with HIV to receive sustained antiretroviral therapy (ART); and 90 percent of people receiving ART to have viral suppression by 2020.¹ Reducing HIV-related morbidity and mortality, and effectively eliminating HIV-transmission risk, depends on achieving and maintaining viral load suppression (VLS).^{2,3} In accordance with these “90-90-90” targets, countries are striving to achieve ≥ 73 percent VLS among all PLHIV.¹ Despite the significant scale-up of HIV testing services (HTS) and ART, only 47 percent of the world’s 36.9 million PLHIV in 2017 had suppressed viral loads.⁴

Achieving ≥ 73 percent VLS among all PLHIV requires countries to implement a thoughtful mix of effective facility and community-based HTS, linkage, ART-delivery, and ART-retention interventions tailored to meet general and key population needs at local, regional, and national levels. Relatively few highly effective HTS, linkage, and retention interventions, however, have been identified for all population subgroups in urban and rural communities.^{1, 2, 4, 5, 6} To achieve “90-90-90” targets and ≥ 73 percent VLS among all PLHIV, countries need additional HTS, linkage, and retention interventions that are effective for all populations, including underserved groups, such as adolescents and young adults, men, and key populations. Countries also need additional information about the purposeful mix of these effective interventions in urban and rural communities.

CDC’S ROLE

To help inform innovations in HIV testing, linkage, and ART delivery, the U.S. Centers for Disease Control and Prevention (CDC) and partners conducted research and program evaluations of combination-prevention interventions in Botswana, Mozambique, Eswatini, and Tanzania. Combination prevention is the set of evidence-based biomedical, structural, and behavioral interventions implemented at a scale and quality expected to reduce HIV incidence within a geographic area or population.⁷

- **Botswana:** In collaboration with the Botswana Ministry of Health (MOH) and the Harvard School of Public Health, the Botswana Combination Prevention Project (BCPP) aimed to reduce HIV incidence among adults in 15 communities through intensified efforts to reach 90-90-90 goals by 2018. This pair-matched community-randomized trial compared HIV incidence in 15 control communities with 15 intervention communities receiving expanded HTS, strengthened voluntary medical male circumcision, and expanded ART.
- **Mozambique:** In collaboration with the Mozambique MOH and implementing partners, the Chókwe Health Demographic Surveillance System Combination Prevention Evaluation (CHDSS-CPE) aims to achieve “90-90-90” targets and reduce HIV incidence in a population of approximately 50,000 residents aged 15-59 years of Chókwe district, Gaza Province, Mozambique. CHDSS-CPE is a census-based health demographic surveillance system with annual home-based HTS, and follow-up counseling and referral to care for residents who test HIV-positive.
- **Eswatini:** As a demonstration project conducted in collaboration with the Eswatini MOH and Population Services International, CommLink was designed to improve exceptionally low enrollment in HIV care among clients tested and diagnosed in community settings.⁸ CommLink provided point-of-diagnosis clinical care, and follow-up linkage case management, escort, and treatment navigation services recommended by CDC and the World Health Organization. The primary aim of CommLink was to enroll in ART care ≥ 90 percent of eligible clients within three months of diagnosis.

¹ UNAIDS. 90-90-90: An ambitious treatment target to help end the AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS, 2014. Available at: http://www.unaids.org/sites/default/files/media_asset/90-90-90_en_0.pdf.

² World Health Organization. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach. Geneva, Switzerland: World Health Organization; 2016. <http://www.who.int/hiv/pub/arv/arv-2016/en/>.

³ Centers for Disease Control and Prevention (CDC). Evidence of HIV treatment and viral suppression in preventing the sexual transmission of HIV. August 2018. <https://www.cdc.gov/hiv/risk/art/index.html>

⁴ UNAIDS. Global AIDS Update. Geneva: Joint United Nations Programme on HIV/AIDS, 2018. Available at: http://www.unaids.org/sites/default/files/media_asset/miles-to-go_en.pdf.

⁵ Govindasamy D, Meghij J, Negussi EK, et al. Interventions to improve or facilitate linkage to or retention in pre-ART (HIV) care and initiation of ART in low- and middle- income settings—a systematic review. *Journal of the International AIDS Society*. 2014;17:19032.

⁶ Sharma M, Ying R, Tarr G, Barnabas R. Systematic review and meta-analysis of community and facility-based HIV testing to address linkage to care gaps in sub-Saharan Africa. *Nature*. 2015;528:S77-S85.

⁷ The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR). Guidance for the prevention of sexually transmitted HIV infections. August, 2011. Available at: <https://www.pepfar.gov/reports/guidance/index.htm>

⁸ MacKellar D, Williams D, Storer N, et al. Enrollment in HIV care two years after HIV diagnosis in the Kingdom of Eswatini: an evaluation of a national program of new linkage procedures. *PLoS One*. 2016; DOI:10.1371/journal.pone.0150086.

- **Tanzania:** In collaboration with the Tanzania MOH, Community Development, Gender, Elderly and Children (MOHCDGEC) and the International Center for AIDS Care and Treatment Programs (ICAP) at Columbia University, the Bukoba Combination Prevention Evaluation (BCPE) aimed to increase prevalence of VLS among all PLHIV, and reduce VLS-associated gender and age-group disparities, in an urban lake-side council of approximately 150,000 residents. BCPE was a single community, pre-/post-intervention, program evaluation that implemented a community-wide HTS, linkage case management (LCM), and defaulter tracing intervention under real-world ART-eligibility and treatment polices over a 2.5-year intervention period.

ACCOMPLISHMENTS / RESULTS

With the exception of Mozambique, the above CDC-supported combination prevention evaluations were completed in 2018. A brief summary of implementation history, findings, and impact on country programs of completed evaluations is provided below.

- **Botswana:** BCPP results suggest that interventions to identify at least 90 percent of HIV-positive persons in the community, provide universal ART, and monitor viral suppression among all HIV-infected persons can significantly reduce new HIV infections over time. The study found a decrease of 30 percent or more in new HIV infections in communities receiving these enhanced services compared to communities receiving standard care.⁹ The Government of Botswana adopted a number of successful BCPP interventions as part of its national guidelines. These interventions include rapidly linking PLHIV found in the community to HIV clinical services, rapid ART initiation including offering ART before baseline lab results are available, and lengthening the interval between refills and viral load tests to reduce clinic visits.
- **Mozambique:** CHDSS-CPE will be completed in 2019 after five annual rounds of health-demographic surveillance, and integrated home-based HTS and linkage services. Baseline findings suggested high prevalence of undiagnosed HIV infection and low ART coverage, particularly among young PLHIV.¹⁰ ¹¹ To address these findings, in 2016, the Mozambique MOH approved ART for all PLHIV in Chókwe district, and CDC supported a peer-delivered, facility-based linkage intervention. The combined interventions achieved remarkable increases in population-level HIV diagnostic and ART coverage. From 2014–2017, 76,620 tests were conducted; 40,272 (78 percent) of 51,878 residents aged 15–59 years tested at home at least once, and 3,957 were newly HIV diagnosed.¹² Among all PLHIV, diagnostic coverage increased from 60 percent to 93 percent, and in 2017, exceeded 90 percent among PLHIV in all sex and age groups, except persons aged 15–24 years (82 percent). Among all PLHIV, ART coverage increased from 49 percent to 85 percent, and in 2017, exceeded 80 percent for women, aged 25–59 years, and men aged, 35–59 years.¹³ Trends in population prevalence of VLS and HIV incidence will be disseminated in 2019.
- **Eswatini:** Findings from the first phase of CommLink (June 2015 – March 2017) demonstrated remarkable success.¹⁴ Among 651 program participants, 635 (98 percent) enrolled in care within a median of five days and 541 (83 percent) initiated ART within a median of six days. After ART eligibility was expanded to all persons with HIV infection in October 2016, 96 percent of 225 CommLink clients initiated ART.¹³ In the second phase of CommLink, of 361 client cases available for analyses, 97 percent were initiated on ART within a median of two and a half days, 94 percent disclosed their HIV status to at least one partner or family member, and 42 percent had at least one partner, family member, or associate (PFA) tested for HIV.¹⁵ Of 209 PFAs tested, 128 (61 percent) were HIV-positive and 117 subsequently participated in CommLink.¹⁴ To help achieve “90-90-90” goals, the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) supported the national scale-up of CommLink in Eswatini in 2018 as both a community and facility-based linkage program, and recommends peer-delivered linkage case management as a potential strategy for countries to achieve ≥ 90 percent early enrollment in care and ART initiation after diagnosis of HIV infection.¹⁶

⁹ Makhema J, Wirth K, Pretorius Holme M, et al. Impact of Prevention and Treatment Interventions on Population HIV Incidence: Primary Results of the Community-Randomized Botswana Ya Tsie Prevention Project (WEAX0105LB). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23–27, 2018.

¹⁰ Casavant I, MacKellar D, Thompson R, et al. Home-Based HIV testing and new HIV diagnoses in Chókwe District, Mozambique (Abstract 975). Presented at the 2016 Conference on Retroviruses and Opportunistic Infections Boston, Massachusetts, February 2016.

¹¹ Auld A, Casavant I, Thompson R, et al. Low Antiretroviral Therapy coverage among adults, especially young men, living with HIV in a Southern Mozambican District with high HIV incidence (WEPEC173). Presented at the 2016 International AIDS conference, Durban, South Africa, July 2016.

¹² Nelson R, Casavant I, Thompson R, et al. Trends in HIV diagnostic coverage and prevalence of undiagnosed infection in a high burden district with annual home-based HIV testing: findings from the Chókwe Health Demographic Surveillance System (CHDSS), Chókwe District, Mozambique, 2014–2017 (THPEC224). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23–27, 2018.

¹³ De Louvado A, Pathmanathan I, Thompson R, et al. Achieving >80% ART coverage in a high burden district with annual home-based HIV testing: findings from the Chókwe Health Demographic Surveillance System (CHDSS), Mozambique, 2014–2017 (THPEC226). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23–27, 2018.

¹⁴ MacKellar D, Williams D, Bhembe B, et al. Peer-delivered linkage case management and same-day ART initiation for men and young persons with HIV infection — Eswatini, 2015–2017. *MMWR* 2018;67(23):663–667.

¹⁵ Williams D, MacKellar D, Dlamini M, et al. Rapid ART initiation and index client testing outcomes of *CommLink*, a community-based, HIV testing, mobile HIV care, and peer-delivered, linkage case management program - Swaziland, 2017 (THAC0401). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23–27, 2018.

¹⁶ United States President’s Emergency Plan for AIDS Relief (PEPFAR). PEPFAR solutions platform. Washington, DC: United States President’s Emergency Plan for AIDS Relief (PEPFAR); 2018. <https://www.pepfarsolutions.org/solutions?category=Men>

- **Tanzania:** The intervention phase of BCPE (October 2014 – March 2017) demonstrated considerable success in HIV testing, linkage to care, and defaulter tracing. During the intervention, 133,695 HIV tests were conducted and 4,143 (3.1 percent) clients were newly HIV diagnosed, of whom 1,182 were male and 881 were aged 15-24 years.¹⁷ Outpatient-department HTS in 11 health facilities accounted for 88,813 (66 percent) of all tests and 3,270 (79 percent) of new HIV diagnoses.¹⁶ Of 4,206 clients who received LCM services, 3,918 (93 percent) enrolled in HIV care [3,186 (81 percent) before Test and Start], and 47 percent, 67 percent, and 86 percent were initiated on ART within 90 days of diagnosis during CD4<350, CD4≤500, and Test and Start periods, respectively.¹⁸ Of 859 contacted patients who had defaulted from HIV care, 604 (70 percent) returned to care, and 573 started or re-started ART.¹⁹ To evaluate impact of these combined interventions, VLS prevalence was compared in pre- and post-intervention population-based surveys conducted in 2014 and 2017. Although benefiting from Test and Start policy for only six months during the intervention phase, population VLS prevalence among PLHIV increased two-fold overall (28.6 percent vs. 64.9 percent) and among females (33.3 percent vs. 68.0 percent), approximately three-fold among males (20.5 percent vs. 59.1 percent), and young adults, aged 18-24 (14.2 percent vs. 51.4 percent) and 25-29 (16.6 percent vs. 61.2 percent) years.¹⁸ BCPE outpatient-department HTS and LCM interventions were approved as new service delivery models by MOHCDGEC in 2017, and in three phases in 2018, were implemented by four non-governmental organizations in 208 health facilities and as part of community-based HTS in 11 regions of Tanzania. PEPFAR is supporting the nationwide scale-up of BCPE interventions in Tanzania in 2019 and recommends optimized outpatient-department HTS and peer-delivered LCM models as potential strategies for countries to help achieve “90-90-90” goals.¹⁵

FUTURE EFFORTS

CDC will continue to disseminate methods and findings of the combination prevention evaluations at local and international conferences, and help programs consider, adopt, and tailor evidence-based interventions to meet country needs. CDC will collaborate with other programs supported by PEPFAR to disseminate lessons learned and successful models for improving HIV case finding, and enrollment and retention in ART care. In addition to in-person technical assistance visits and webinars, CDC will share fact sheets, summaries of standard operating procedures, job aids, and monitoring and evaluation tools of effective combination-prevention interventions. These documents are available on the PEPFAR solutions website for the linkage case management intervention implemented in Eswatini and Tanzania.¹⁵

BENEFITS OF OUR WORK

Findings from the combination prevention evaluations may help countries adopt, tailor, and implement a mix of innovative HTS, linkage, and retention interventions to help achieve “90-90-90” and reduce HIV incidence and HIV-related morbidity and mortality. Effective intervention models identified in these evaluations might also be applicable in some communities in the United States where many HIV-positive persons are undiagnosed, or delay enrollment in or default from HIV care.

¹⁷ Msumi O, Cham HJ, MacKellar D, et al. Reaching men and young adults: methods and outcomes of a 2.5 year comprehensive facility- and community-based HIV testing intervention in Bukoba Municipal Council, Tanzania, 2014-2017 (THPEC290). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23-27, 2018.

¹⁸ Rwabiyago OE, MacKellar D, Maruyama H, et al. Implementing World Health Organization (WHO) recommended Linkage services: Methods, outcomes, and costs of the Bukoba Tanzania combination prevention evaluation peer-delivered linkage case management program, 2014-2017 (THPEC288). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23-27, 2018.

¹⁹ Steiner C, MacKellar D, Cham H, et al. Three-fold increases in population-level HIV viral-load suppression among men and young adults in a mixed urban-rural Tanzania lake-zone community: intervention outcomes of the Bukoba Combination Prevention Evaluation (BCPE) (LBPEC038). Presented at the 22nd International AIDS Conference, Amsterdam, Netherlands; July 23-27, 2018.