

# Client risk segmentation to predict and prevent gaps in HIV service coverage in Indonesia

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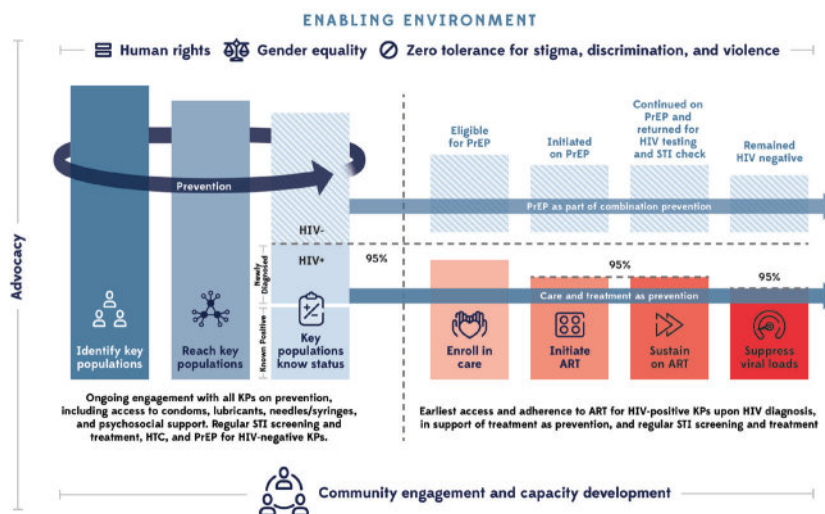
*Client risk segmentation aims to help programs focus effort and differentiate services by taking a granular look at the characteristics that distinguish individuals who meet certain HIV cascade criteria in routine program data—such as being newly diagnosed, initiating HIV treatment, or achieving HIV viral suppression—from those who do not.*

As coverage of life-saving HIV prevention and treatment services becomes more inclusive, client experiences contain increasingly valuable clues about how best to close access gaps. Using routine program data, the EpiC Indonesia program conducted client risk segmentation to identify the differentiating characteristics of clients facing elevated risks and to differentiate HIV services accordingly for improved impact. After applying the approach to predict the characteristics of HIV testing clients most likely to receive positive test results, the program introduced new HIV testing service priorities and achieved unprecedented successes in linking previously undiagnosed individuals to diagnosis and treatment.

## Using routine program data to drive differentiated service delivery

An HIV cascade framework, like that depicted in Figure 1, is often used to track progress toward public health impact by documenting coverage of proven prevention and treatment services among individuals facing the greatest HIV infection risks. By responding to the differentiated preferences and needs of unserved and underserved individuals, programs can help to raise the bars across the cascade and achieve HIV epidemic control and an end to the suffering associated with AIDS.<sup>1</sup>

Figure 1. The EpiC HIV Cascade Framework



<sup>1</sup> Grimsrud A, Bygrave H, Doherty M, et al. Reimagining HIV service delivery: the role of differentiated care from prevention to suppression. J Int AIDS Soc 2016; 19(1): 21484.

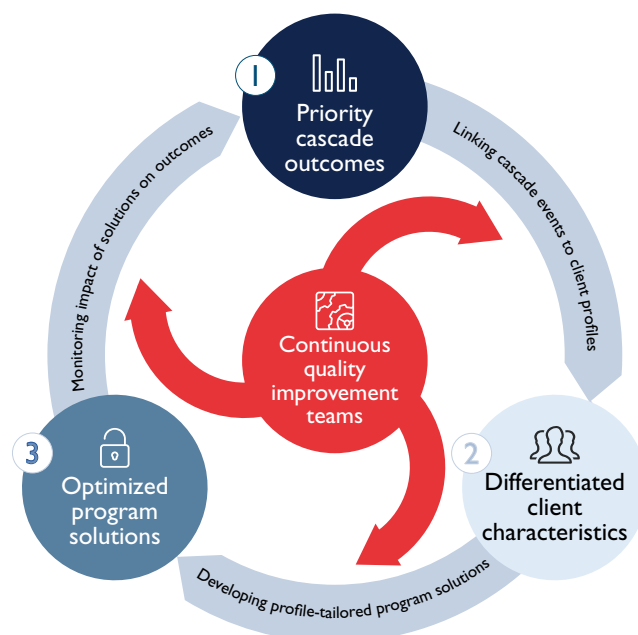
Programs have traditionally relied on epidemiological studies to identify the characteristics of priority clients, but these studies are sometimes challenged to supply the timely, context-relevant information needed to support continuous adaptation and improvement based on client preferences and needs. Program data are not typically considered to be representative of unreached populations, but the potential to apply program data to distinguish continuously between individuals who progress across the HIV service continuum, and those who do not, may increase as coverage expands.

Client risk segmentation (client segmentation) aims to help programs focus effort and differentiate services by taking a granular look at the characteristics that distinguish individuals who meet certain HIV cascade criteria in routine program data—such as being newly diagnosed, initiating HIV treatment, or achieving HIV viral suppression—from those who do not. Knowing these differences, programs can optimize the focus and effect of their outreach, targeted testing, and case management by devoting more time and resources to individuals with greater needs and fewer to those who don't want or need additional support.

Client segmentation focuses not only on data analysis, but on implementation of an iterative continuous quality improvement cycle in which analyses are linked to program actions, and the potential effects of these actions are evaluated. Throughout this cycle, client segmentation aims to generate critical insights in three core areas (Figure 2):

1. Identification of priority outcomes — gaps or leaks in the cascade as evidenced by program performance issues
2. Identification of priority clients — individuals with characteristics that are significantly associated with outcomes of interest, such as those who are more likely to have a positive HIV test result or are more likely to experience interruption in treatment (IIT)
3. Identification of priority solutions — in particular, modifications to services or support to make these more responsive to the preferences or needs of priority clients

**Figure 2: Implementing client segmentation as part of a continuous quality improvement cycle**



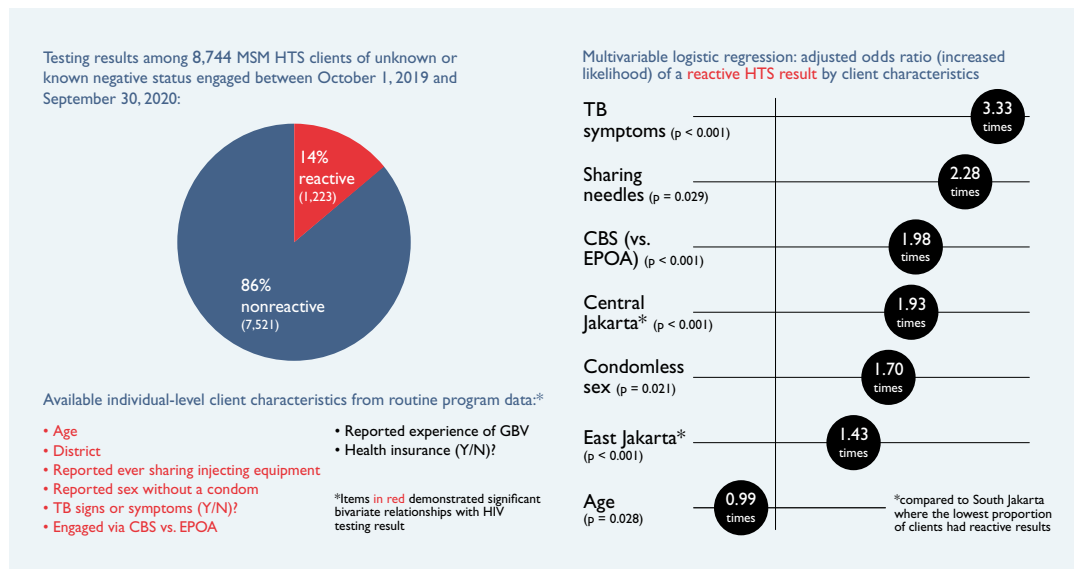
## Applying client segmentation to drive client-centered program improvement in Indonesia

The EpiC Indonesia team opted to focus initial client segmentation efforts on three priority areas for program improvement based on historical HIV cascade performance: (1) HIV testing services among men who have sex with men (MSM), (2) index testing services, and (3) reengagement in HIV treatment among individuals who had experienced IIT.<sup>2</sup> The team was able to identify client characteristics with significant statistical associations with testing and reengagement outcomes by using capacities established under the prior LINKAGES project to track individual client outcomes across services safely and confidentially with unique identifier codes that are free of personally identifying information.

### HIV testing among MSM

From October 1, 2019, to September 30, 2020, EpiC Indonesia supported HIV testing services for 8,744 unique MSM clients reporting unknown or known negative status prior to testing (Figure 3). Among these, 14 percent received reactive HIV testing results. Individual client characteristics that could be linked to testing outcomes in the routine program dataset were: age, district of service delivery, self-reported ever sharing injecting equipment, self-reported sex without a condom, having tuberculosis (TB) signs or symptoms, method of client engagement, self-reported ever experience of gender-based violence, and access to health insurance. In simple bivariate (Chi-square) analyses, all but the last two items had a significant association (at the 95% confidence interval) with the likelihood of receiving a reactive HIV test result.

**Figure 3: Characteristics of MSM HIV testing services clients who were more likely to have reactive results**



The team then constructed a multivariable logistic regression model to characterize the relationship between each of the variables with significant bivariate associations and the likelihood of receiving a reactive HIV test result, while accounting for the potential influence of all other variables. In the multivariable model, individuals reached in Central and East Jakarta were significantly more likely to receive a reactive test result, as were individuals who reported sex without a condom or sharing needles. Those with reported TB signs or symptoms were more than three times as likely as others to receive reactive HIV testing results.

<sup>2</sup> Index testing is safe, voluntary PLHIV-led referrals of their sexual or injecting partners and biological children to HIV testing and other services.

Historically, the program had focused on the need to ensure HIV testing and linkages to treatment for all potential TB cases but had not explicitly prioritized TB symptoms as a risk factor for HIV among key populations.

## Index testing

Facilitating voluntary, safe, and ethical participation in index testing at scale remains a challenge in Indonesia and globally. The team reviewed existing program data to assess the differentiating characteristics of: (1) clients who accepted participation in index testing (vs. those who declined) and (2) those acceptors who referred HIV-positive contacts (vs. no contacts or HIV-negative contacts).

The program supported offers of index testing to 4,999 people living with HIV (PLHIV) in 2020 (Figure 4). Of these, almost 42% accepted index testing. The client-level characteristics that could be linked to the decision to accept or decline included age, key and priority population status, the length of time the client had been on antiretroviral therapy (ART), whether the client reported receiving support from family or friends, reported experiences of physical or sexual violence in the past three months, reported service satisfaction, gender, current treatment for other illnesses, and reported positive self feelings. In simple bivariate (Chi-square) analyses, each of these items had a significant association (at the 95% confidence interval) with the likelihood of accepting or declining participation in index testing, except for client reports of service satisfaction. Of note, only 18 of 4,999 clients (0.4%) reported they were not satisfied with the services they received.

The team then constructed a multivariable logistic regression model to characterize the relationship between each of the variables with significant bivariate associations and the likelihood of accepting or declining index testing, while accounting for the potential influence of all other variables. This model was iteratively reduced to remove variables that, under the influence of other items, no longer featured an association to generate a predictive model. As depicted in Figure 4, the predictive model found that—accounting for the influences of the other variables in the model—clients who self-identified as MSM were substantially less likely to accept index testing than clients of other populations. Those who were on ART for seven or more months (and, thus, were probably more likely to have achieved viral suppression) were more than twice as likely to accept index testing as those who had been on ART for a shorter duration. The “receiving support” and “experienced physical or sexual violence” variables lost their significance in the multivariate model, as other variables in the model better explained variability in the likelihood of acceptance. Only 12 individuals in the dataset reported experiences of violence, and in the bivariate analysis, these individuals were, remarkably, much more likely to accept index testing (10/12 accepted).

**Figure 4: Characteristics of PLHIV clients who were more likely to accept voluntary index testing**

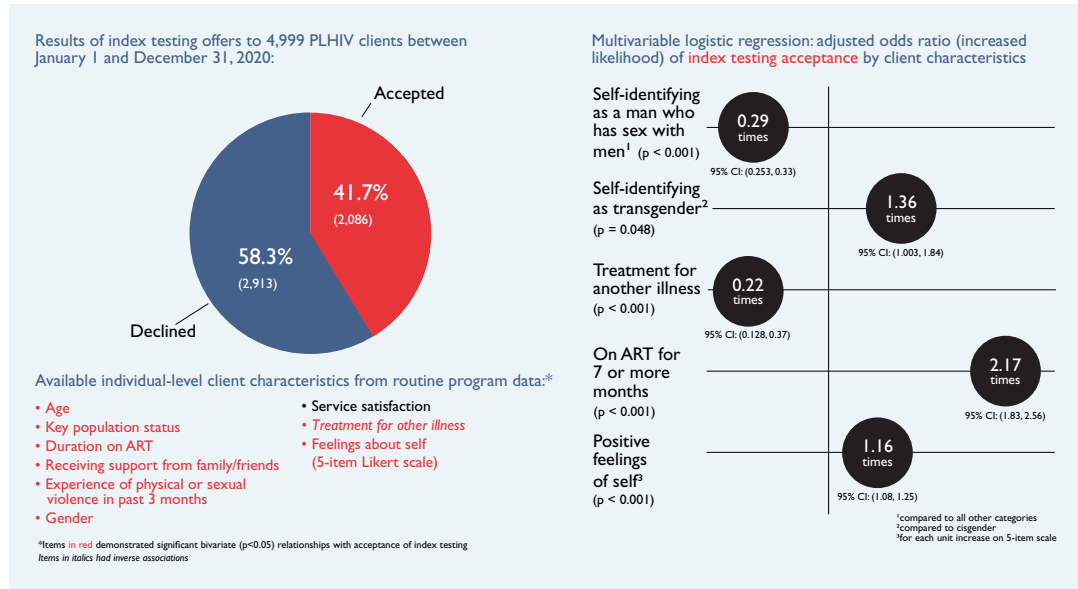
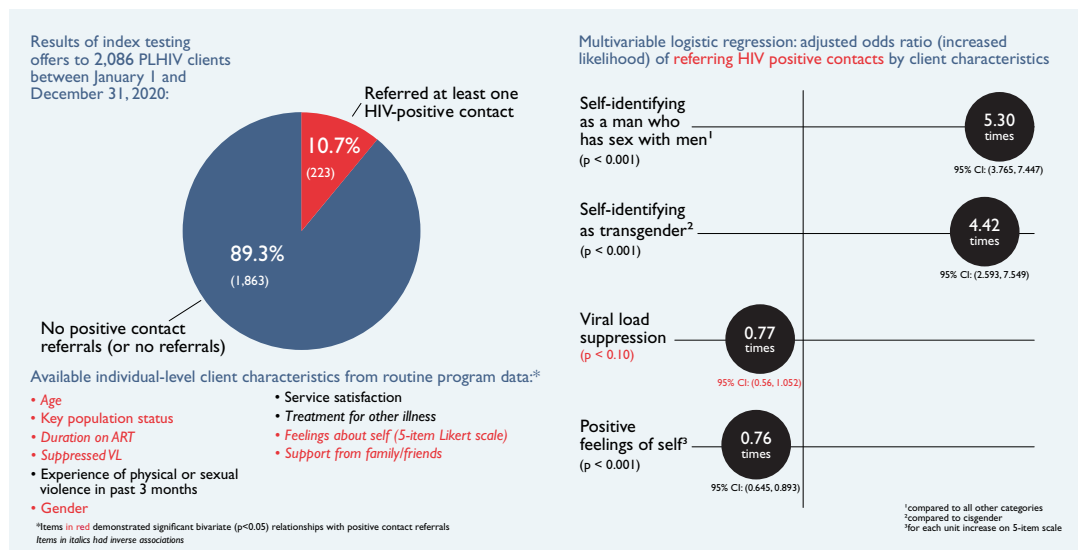


Figure 5 depicts an index-testing sub-analysis the team conducted looking at the characteristics of index testing acceptors who were more likely to refer positive contacts (vs. negative or no contacts). Among the 2,086 PLHIV clients who accepted index testing, almost 11% referred at least one positive contact. Again, variables with bivariate associations are in red in the bottom left.

In the multivariable model, MSM were more than five times as likely as other clients to refer positive contacts—in sharp contrast to the previous analysis illustrating that they were less likely to accept participation in index testing. Those with more positive self feelings were less likely than others to refer positive contacts. Those who were virally suppressed were less likely to refer positive contacts, though this finding was only borderline significant (at the 90% rather than the 95% confidence level).

**Figure 5: Characteristics of PLHIV clients who were more likely to refer contacts who test positive**



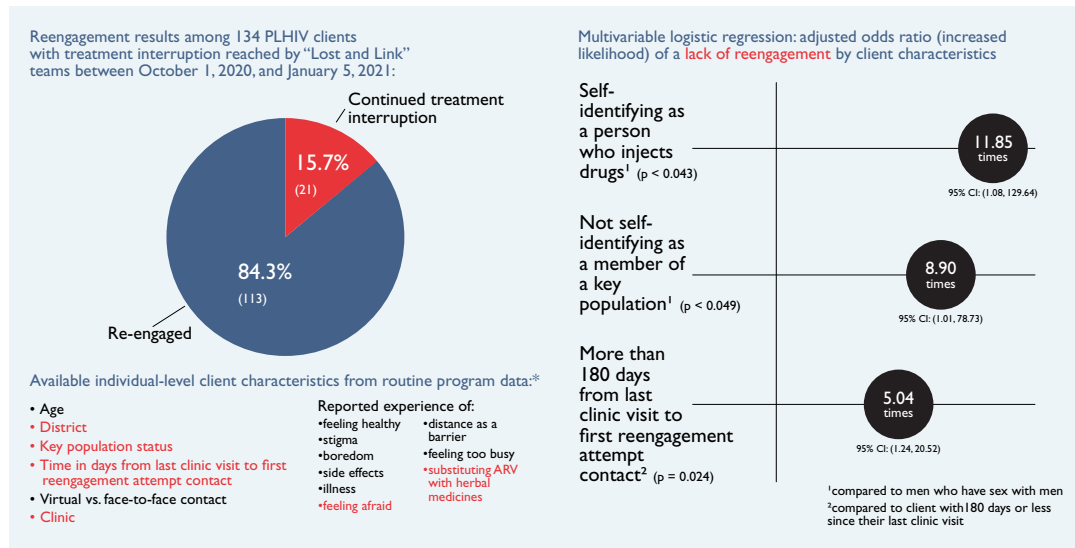
From these analyses, the team is working with community partners to develop strategies to tailor index testing to the differentiated preferences of MSM and to ensure “no missed opportunities” to promote participation in index testing among MSM, transgender individuals, and individuals who have been on treatment for six months or less or have not achieved viral suppression.

## Reengagement in HIV treatment services

The team also focused a client segmentation lens to optimize efforts to reengage PLHIV clients who have experienced IIT through the program’s “Lost and Link” initiative. The analysis depicted in Figure 6 looks at characteristics of PLHIV who had experienced treatment interruption and were reached by the team’s reengagement initiative between October 1, 2020, and January 5, 2021, but were less likely to be successfully reengaged in HIV treatment services.

Injecting drug use and delays in the time between the last clinic visit and the reengagement contact were associated with less likelihood of reengagement. The community-based partners implementing reengagement support were predominantly affiliated with the MSM community, which may have challenged their efforts to support reengagement of other key populations as well as PLHIV who did not self-identify as key population individuals. As a result of this analysis, the program is focusing on the activation of more inclusive and representative case management and reengagement support, as well as swift action to support clients with missed appointments and to reengage clients experiencing treatment interruption.

**Figure 6: Characteristics of “Lost and Link” PLHIV clients who were less likely to be successfully reengaged in treatment**



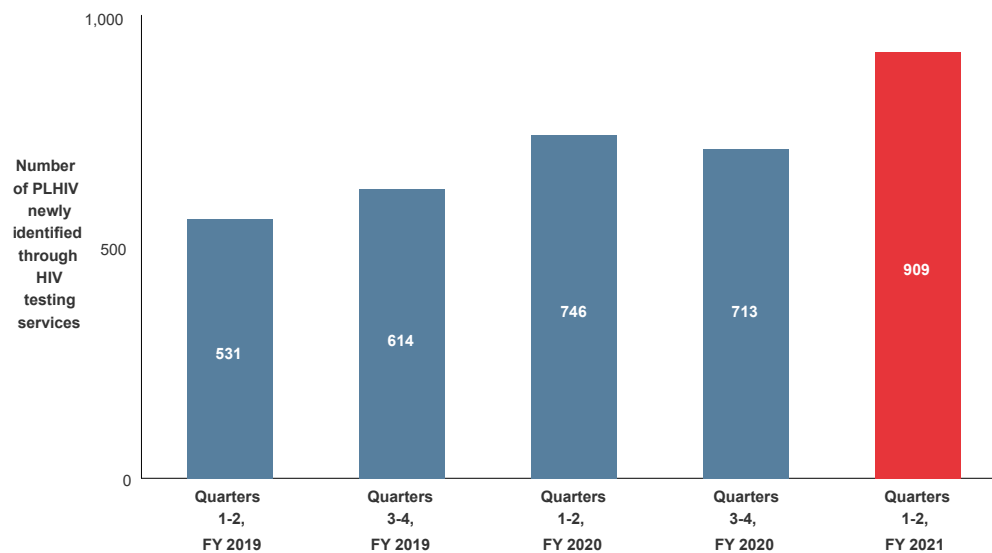
## Potential impact of client segmentation

Based on the HIV testing client segmentation analyses, the EpiC Indonesia team sharpened the promotion and focus of targeted HIV testing services for clients with characteristics associated with increased risk of HIV infection. The team strengthened TB screening and linkages, as well as the use of TB symptom data, to improve linkages to diagnostic and treatment services for both diseases. The team also modified the geographic focus of its HIV testing support. Civil society organization (CSO) implementing partners, particularly those focused on reaching MSM, then accelerated coverage in priority districts and intensified nighttime outreach, reactivated community-based support and index testing interventions, took advantage of social media channels,

and reviewed client risk profiles on a semiweekly basis to identify individuals who might benefit from HIV testing. Client service navigation strategies were similarly improved, including appointment booking on behalf of clients for expedited service provision.

Following these intensified efforts, routine semiannual program monitoring data recorded the project's greatest HIV testing achievements to date. Together, targeted testing for MSM and index testing activities helped the team newly identify and engage 909 PLHIV, despite limitations on the scale of HIV testing services imposed by movement restrictions due to COVID-19 (Figure 7). Ninety-nine percent (n=899) of newly positive MSM were immediately enrolled in HIV treatment by two CSO implementing partners.

**Figure 7: Newly diagnosed PLHIV by semiannual period, EpiC and LINKAGES Indonesia**




The team also applied client segmentation findings to intensify the focus of “Lost and Link” reengagement support for PLHIV clients experiencing IIT, specifically ensuring prompt follow-up after interruption. Implementation of this initiative expanded from 35 facilities in the second quarter of fiscal year 2021 (Q2 FY21)(January–March 2021) to 56 facilities in Q3. More than 118 individuals have been successfully reengaged in life-saving HIV treatment services through “Lost and Link” support since the beginning of FY21. COVID-19 lockdowns and movement restrictions have impeded efforts to work more closely with CSO partners providing support and treatment continuation services for people who inject drugs, but these activities are envisioned for the future.

## Next steps

Looking ahead, the EpiC team is exploring avenues to continuously update client segmentation analyses based on incoming program data using machine-learning automations both in Indonesia and globally. Information from near-real-time predictive analytics could be connected to automations that safely and confidentially recommend supportive interventions to providers based on artificial intelligence analyses of client characteristics and risks. The team is also investigating enhanced risk-assessment tools to collect information about other potential risk factors—such as reported engagement in chemsex—to differentiate and focus HIV testing efforts.<sup>3</sup>

<sup>3</sup> Chemsex is drug use immediately before or during sexual activities to facilitate, prolong, and/or intensify sexual experience.

In Indonesia, the EpiC team is focused on expanding client segmentation analyses to other aspects of the HIV service cascade, as well as integration of client segmentation into routine continuous quality improvement processes. While computers can help to identify clients with potentially greater needs, human intervention and creativity remain essential to develop and implement client-centered service solutions and innovations. The EpiC Indonesia team aims to help Indonesia's national HIV program accelerate the achievement of HIV epidemic control by identifying simple strategies for Global Fund-supported partners and others to access and apply client segmentation to program improvement.

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