

Oral Pre-Exposure Prophylaxis Modeling Results: Uganda

Results to inform Ministry of Health's PrEP rollout

Oral pre-exposure prophylaxis (PrEP) is the use of oral antiretroviral medications by HIV-negative individuals to prevent HIV acquisition. Following the World Health Organization guidance in 2015 that recommended PrEP use by individuals at substantial risk of contracting HIV, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) incorporated PrEP into its comprehensive HIV prevention programming. Ministries of health began integrating oral PrEP into their HIV prevention efforts.

In 2016, the Ugandan Ministry of Health formed a PrEP Technical Working Group and developed technical guidance for PrEP (Uganda Ministry of Health 2016). According to these guidelines, PrEP should be made available to several risk groups, including female sex workers, sero-discordant couples, men who have sex with men, people who inject drugs, adolescent girls and young women (AGYW) with multiple partners, and other key populations such as fisher folk and truckers (Uganda Ministry of Health 2016).

While HIV incidence in Uganda has fallen by almost 50 percent since 2010, it remains unacceptably high at 2.52 per 1,000 adults ages 15–49 years as of 2017, according to AIDSinfo (UNAIDS 2017). The epidemic exhibits some geographic variation, with the 2017 Uganda Population-based HIV Impact Assessment (PHIA) survey reporting HIV prevalence among adults ages 15–64 ranging from 3.1 percent in West Nile region to 8.0 percent in Central 1 region (ICAP PHIA Project 2018). With the help of PEPFAR and other partners, the Uganda Ministry of Health hopes to support oral PrEP scale-up in order to further reduce the country's HIV burden.

To assist national HIV programs in integrating oral PrEP into their existing HIV prevention strategy, the Health Policy Plus (HP+) project and Project SOAR, both funded by the U.S. Agency for International Development (USAID), developed a new mathematical modeling approach to estimate the impact and cost-effectiveness of scaling up oral PrEP in scenarios defined by population and/or geography. The approach uses the Incidence Patterns Model to estimate HIV incidence by risk group and sub-national region and the

Box 1 Oral PrEP Rollout Scenarios

1. Female sex workers and sero-discordant couples
2. Populations in scenario 1 + medium-risk adolescent girls and young women in regions with higher than the median HIV incidence
3. Populations in scenario 1 + medium-risk adolescent girls and young women in all regions

Goals model to project oral PrEP impact in the context of the national HIV prevention program.

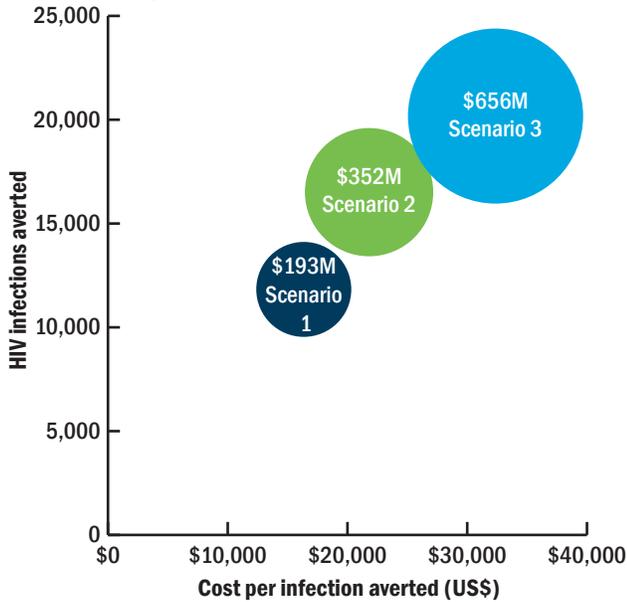
In close coordination with the Ministry of Health, Project SOAR developed three rollout scenarios that model the cost, impact, and cost-effectiveness of providing oral PrEP to selected high-risk populations (see Box 1). Medium-risk AGYW were defined in the model as women ages 15–24 who were not female sex workers but had multiple partners. In the modeled scenarios, oral PrEP coverage was scaled up to reach 50 percent of each target population by 2030. Except where otherwise noted, antiretroviral therapy (ART) was scaled up to reach the 90-90-90 targets and voluntary medical male circumcision (VMMC) was scaled up to 90 percent coverage among males ages 10–29 by 2020. PrEP efficacy was assumed to be 90 percent, and adherence was assumed to be 50 percent, giving an overall effectiveness of 45 percent. Oral PrEP unit cost was assumed to be \$133 per person per year, including antiretrovirals, service delivery, laboratory tests, demand creation, and adherence support.

RESULTS

The results of the rollout scenario analysis suggest that scenario 1, focusing on sero-discordant couples and female sex workers, has the lowest impact and cost, averting 11,800 infections and costing \$US193 million between 2018 and 2030. This is the most cost-effective scenario, costing US\$16,000 per HIV infection averted (HIA) (Figure 1, next page).



Figure 1 Cost-effectiveness, HIV infections averted, and total cost by oral PrEP rollout scenario, 2018–2030



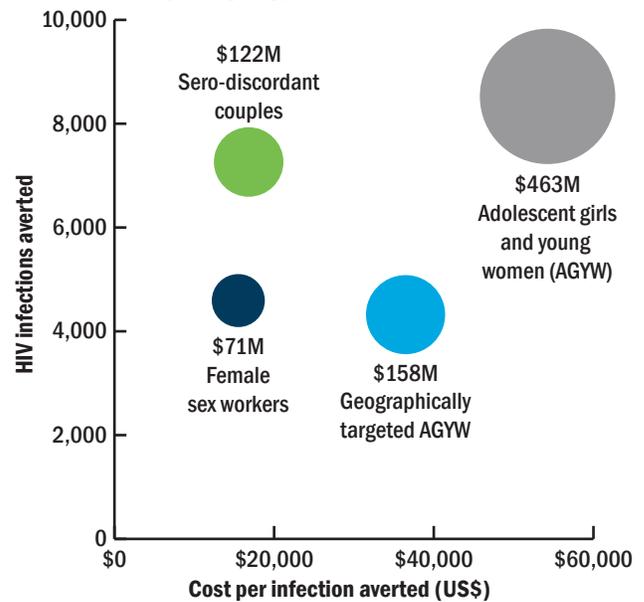
Bubble size and data labels indicate total cost of adding oral PrEP program (in US\$ millions).

Expanding oral PrEP to cover 50 percent of medium-risk AGYW in five high-incidence regions (scenario 2) increased the impact to 16,000 HIA but was slightly less cost-effective at US\$22,000 per HIA. Finally, expanding to medium-risk AGYW in the remaining five regions (scenario 3) increased the impact to 20,000 HIA, but would also have the highest cost per infection averted at US\$32,000.

By individual risk group, the projected cost per HIA was lowest (i.e., most cost-effective) for female sex workers, at US\$16,000, and highest (i.e., least cost-effective) for medium-risk AGYW from all regions, at US\$54,000 (Figure 2). Providing oral PrEP to medium-risk young women across the country was projected to have the greatest impact, averting a projected 8,500 HIV infections from 2018 to 2030.

These estimates were sensitive to changes in oral PrEP adherence; strategies with lower adherence averted fewer infections and were less cost-effective than those with higher adherence. Likewise, PrEP is more impactful and cost-effective when scale-up, of combination prevention interventions is delayed, particularly ART and VMMC. The analysis is also sensitive to unit cost differences across risk groups.

Figure 2 Cost-effectiveness, HIV infections averted, and total cost by risk group, 2018–2030



Bubble size and data labels indicate total cost of adding oral PrEP program (in US\$ millions).

CONCLUSION

Oral PrEP is an important component of combination prevention programs, given its potential to attract individuals and sub-populations that are at HIV risk but not using services, and PrEP's ability to protect highly vulnerable and underserved populations. This analysis provided data for decision-making to assist Uganda in refining its strategy for provision of oral PrEP. As a result, Uganda chose to expand beyond female sex workers and sero-discordant couples to include providing oral PrEP to AGYW, especially those in high HIV prevalence areas, such as fishing communities.

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