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 Eswatini, where adult HIV prevalence and incidence rates are among the highest in the world, 27.2 percent and 1.5 percent, respectively (ICAP PHIA Project 2017), the Ministry of Health (MOH) is working with PEPFAR and other partners to support oral PrEP scale-up to further reduce the country’s HIV burden. The oral PrEP demonstration projects were launched in August 2017, focused on adolescent girls and young women, men who have sex with men, sex workers, sero-discordant couples, pregnant and lactating women, clients with sexually transmitted infections, and anyone else who may be at substantial risk for HIV.

To assist the national HIV program 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 modelling 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 province in combination with the Goals model to project oral PrEP impact in the context of the national HIV prevention program.

In close coordination with the MOH, Project SOAR developed five rollout scenarios that model the cost, impact, and cost-effectiveness of providing oral PrEP to high-risk populations and all women and men ages 15–49 (see Box 1). Medium-risk young women were defined in the model as women ages 15–29 who were not female sex workers but had multiple partners. Medium-risk young adult men were defined as those ages 20–34 who had multiple partners but were not clients of sex workers. In the modelled scenarios, oral PrEP coverage was scaled up to reach 50 percent of each target population by 2030. Except where otherwise noted, antiretroviral therapy was scaled up to reach the 90-90-90 targets and voluntary medical male circumcision was scaled up to 90 percent coverage among males ages 10–29 by 2022. 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 $195 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 female sex workers and sero-discordant couples, has the lowest impact and cost, averting 650 infections and costing US$5 million between 2018 and 2030. This is the most cost-effective scenario, costing US$8,000 per HIV infection averted (HIA) (Figure 1, next page).

Expanding oral PrEP to cover 50 percent of medium-risk adolescent girls and young women (scenario 2) increased impact to 2,200 HIA but was less cost-effective, at US$22,000 per HIA. Expanding to include medium-risk young adult men (scenario 3) increased
impact to 3,400 HIA but was less cost-effective, at US$30,000 per HIA. Finally, a strategy that focused on all women and men between the ages of 15 and 49 (scenario 4) would have the largest impact with 4,900 HIA, but would also be the least cost-effective, at US$70,000 per HIA.

By individual risk group, the projected cost per HIA was lowest (i.e., most cost-effective) for sero-discordant couples at US$6,200, and highest (i.e., least cost-effective) for young adult men, at US$43,000 (Figure 2). Providing oral PrEP to adolescent girls and young women was projected to have the greatest impact, averting 1,600 HIV infections from 2018 to 2030.

These estimates were sensitive to changes in oral PrEP adherence; scenarios with lower adherence averted fewer infections and were less cost-effective than those with higher adherence. Likewise, PrEP was projected to be more impactful and cost-effective if scale-up of other combination prevention interventions is delayed, particularly antiretroviral therapy and voluntary medical male circumcision. The analysis is also sensitive to unit cost differences across risk groups.

**CONCLUSION**

Oral PrEP is an important component of HIV 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 demonstrated the trade-off between oral PrEP impact and cost-effectiveness in a highly generalized epidemic, such as that in Eswatini. It has influenced the MOH to consider scaling oral PrEP to high risk populations and individuals at substantial risk. In addition, scale up of PrEP for men aged 25 years and older has been prioritized, based on both the modeling analysis and Swaziland HIV Incidence Measurement Survey data showing increasing HIV prevalence among men over 25 years old.

**REFERENCES**