POPULATION IMPACT OF EXPANDING PREP USAGE IN SOUTH AFRICA: MODEL COMPARISON ANALYSIS

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BACKGROUND

Long-acting injectable cabotegravir (CAB-LA) has demonstrated superiority to daily oral tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) for HIV pre-exposure prophylaxis (PrEP) in two clinical trials (HPTN 083 & 084) and is recommended by the WHO for people at high risk of HIV. The **HIV Modeling Consortium** and **HPTN Modeling Centre** conducted a comparative modelling analysis of the potential impact of expanding PrEP coverage by offering CAB-LA to men and women in South Africa.

METHODS

- Three independent age- and risk-stratified HIV transmission models (**Synthesis**, **EMOD-HIV** & **Thembisa**) were separately parameterized and calibrated to local data from South Africa
- **PrEP coverage expansion from current levels to 5-20% of the uninfected population** with either TDF/FTC or CAB-LA after 5 years (Figure 1) was simulated by recruiting PrEP users based on model-specific targeting of PrEP use by risk
- Models assumed 95% CAB-LA effectiveness based on HPTN 083 and model-specific TDF/FTC effectiveness
- Population impact and efficiency of PrEP expansions were evaluated over 20 years compared to baseline scenarios of TDF/FTC use only (Figure 1, black lines).

Model	Synthesis	EMOD-HIV	Thembisa
Description	Stochastic individual-based	Stochastic individual-based	Deterministic compartmental
TDF/FTC effectiveness	90-95% efficacy >80% adherence in 90% population	58%	85% men 65% women
TDF/FTC discontinuation*	0.01-0.05 per 3 months	0.31 per 3 months	0.84 per year
PrEP targeting	9% adults have PrEP indication+	3.5% adults at high risk, 20.5% low risk^	22% women & 32% men at high risk+

* Discontinuation rate despite continued risk
+ PrEP available to all but targeted to some groups
^ 76% adults are not PrEP eligible

Expanding PrEP access with CAB-LA in South Africa may be highly effective & efficient if used in periods of substantial risk

RESULTS

- In baseline scenarios with no PrEP expansion, HIV prevalence was similar in all models (~17%), while HIV incidence and ART use varied (Figure 2), and median PrEP coverage remained ≤2%

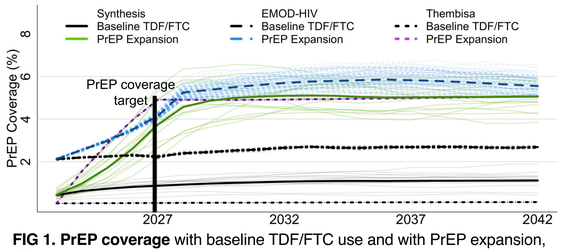

FIG 1. PrEP coverage with baseline TDF/FTC use and with PrEP expansion, 5% coverage level shown

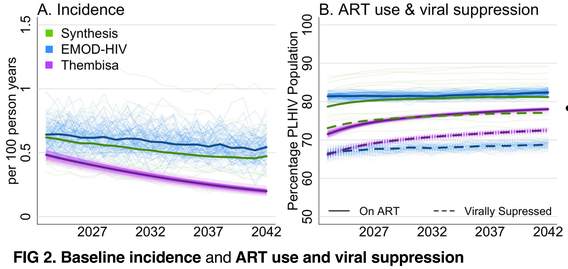

FIG 2. Baseline incidence and **ART use and viral suppression**

- **Achieving 5% PrEP coverage with CAB-LA by 2027 may avert 46% (Synthesis), 35% (EMOD-HIV), and 12% (Thembisa) of new infections over 20 years** (Figure 3)
- Increasing coverage to 20% may increase the impact by 12 percentage points (pp) (Synthesis), 18pp (EMOD-HIV), and 23pp (Thembisa)
- 5% coverage with oral TDF/FTC would be expected to *reduce* impact by 16pp (Synthesis), 21pp (EMOD-HIV), and 3pp (Thembisa) compared to 5% CAB-LA coverage
- **5% CAB-LA coverage was projected to be highly efficient in two models with 14 (Synthesis) and 13 (EMOD-HIV) additional person-years (PYs) on CAB-LA needed to prevent one infection**, compared to 119 PYs (Thembisa, Figure 4)

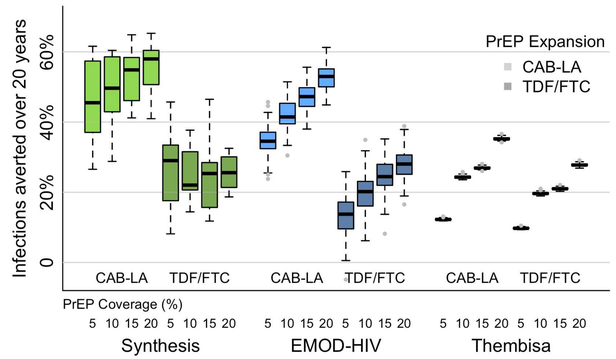

FIG 3. Infections averted over 20 years with PrEP coverage 5-20% and PrEP expansion with either CAB-LA or TDF/FTC

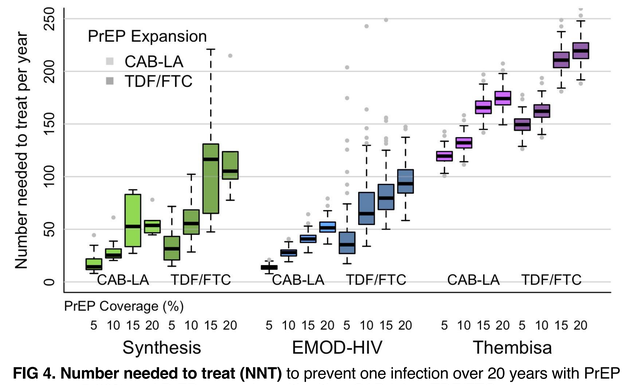

FIG 4. Number needed to treat (NNT) to prevent one infection over 20 years with PrEP coverage 5-20% and PrEP expansion with either CAB-LA or TDF/FTC

INTERPRETATION

- A smaller increase in infections averted with increased PrEP coverage for Synthesis showed the limited effect of increasing users once those at substantial risk have been covered
- Higher NNT for Thembisa could reflect lower incidence in that model
- PrEP expansion with TDF/FTC instead of CAB-LA *reduced* intervention impact due to lower assumed effectiveness and (in EMOD-HIV) higher discontinuation

CONCLUSIONS

- **Offering CAB-LA in South Africa could impact the HIV epidemic substantially if it results in higher PrEP coverage** and is adequately targeted to people at high risk of acquiring HIV
- Expanding PrEP could be highly efficient if predominately used during periods of substantial risk

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