

The impact of dolutegravir in first-line adult ART on HIV transmission and cost of HIV in South Africa

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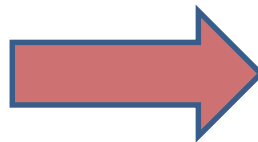
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Background

South Africa is considering switching all adults on first-line ART regimens containing **efavirenz** (EFV) to regimens containing **dolutegravir** (DTG)

Tenofovir +
Emtricitabine +
Efavirenz
(TEE)



Tenofovir +
Lamivudine +
Dolutegravir
(TLD)

We examined the **impact of switching** on:

- HIV transmission
- AIDS mortality
- cost of the HIV programme

Epidemiological model

- Epidemiological impact was analysed using **Thembisa, a compartmental HIV transmission model fitted to the South African HIV epidemic**
- **Updates to ART assumptions** in Thembisa:
 - **TLD increases viral suppression by 9%**, from 84% to 93%
 - **No treatment failure** under TLD
- Due to increased risk for neural tube defects in women conceiving on DTG, we added **contraception for women on DTG**:
 - **Maximum**: Increase contraceptive coverage from 58% to 100%, 1:1 impact on fertility
 - **Limited**: Increase coverage to 73% (covering unmet need), 1:0.2 impact on fertility

Cost analysis

- The **National ART Cost Model (NACM)** was used to calculate the average cost per adult of TEE or TLD fixed-dose combination regimens
- **Switch to TLD starts in April 2019, with full roll-out to all existing and new adult first-line patients by April 2020**
- **TLD price** based on recent negotiations (**\$75 per patient year**); same laboratory monitoring cost as TEE (1 creatinine test/ year)
- Added **cost of contraception at the same method mix as currently** (without additional sterilisations)
- Costs analysed from South African government perspective and presented in 2017/18 USD

Scenarios and treatment populations

1. Current pace of scale-up of universal test and treat (UTT)

(40% of newly diagnosed PLHIV initiate ART in a year, 85% retention at 12 mts)

- A. TEE (Baseline)
- B. TLD (all adults, no additional contraception)
- C. TLD (all adults, maximum contraception)
- D. TLD (all adults, limited contraception)
- E. TLD (men only)
- F. TLD (men + women ≥ 50 , no additional contraception)

2. Rapid UTT scale-up

(95% of newly diagnosed PLHIV initiate ART in a year, 96% retention at 12 mts)

Cost and impact of all scenarios analysed incrementally to a baseline of TEE at the same pace of UTT scale-up

Cost per patient year on ART in 2021

[2017 USD]	Drugs	Diagnostics	Fixed cost	Staff cost	TOTAL
First-line therapy with TEE	\$138	\$21	\$39	\$144	\$342
First-line therapy with TLD	\$89	\$21	\$39	\$144	\$293
Reduction under TLD	36%	-	-	-	14%

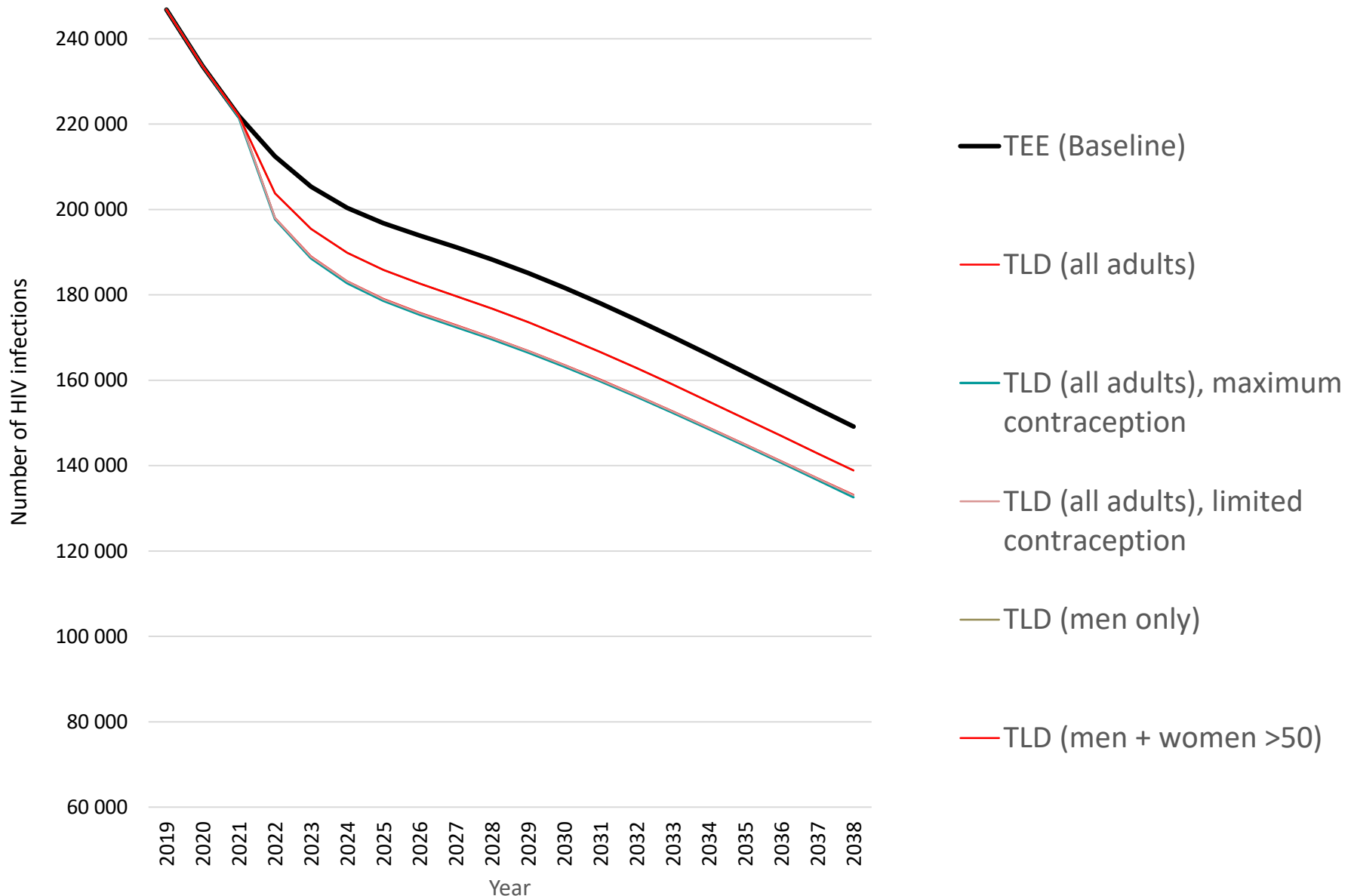
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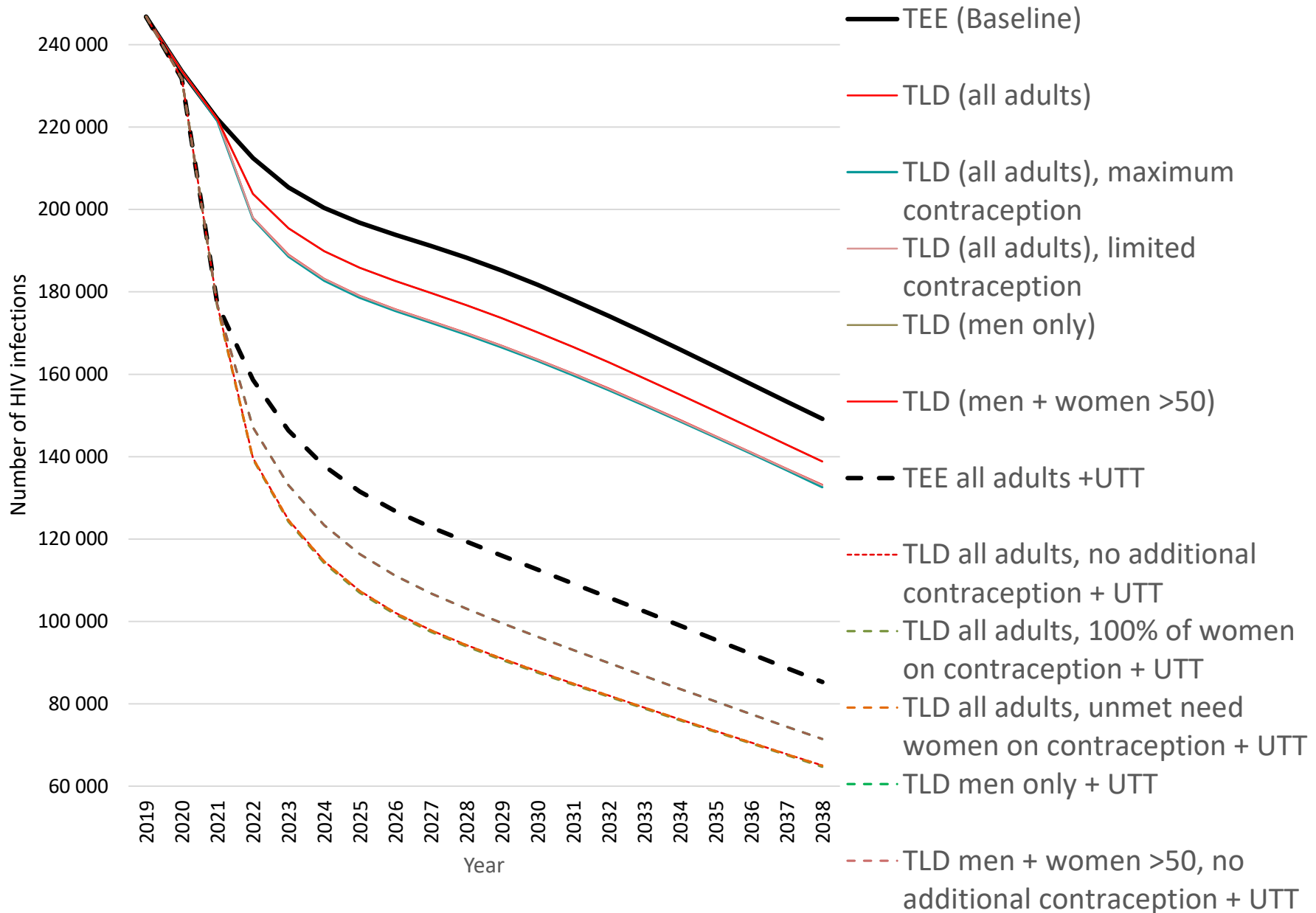
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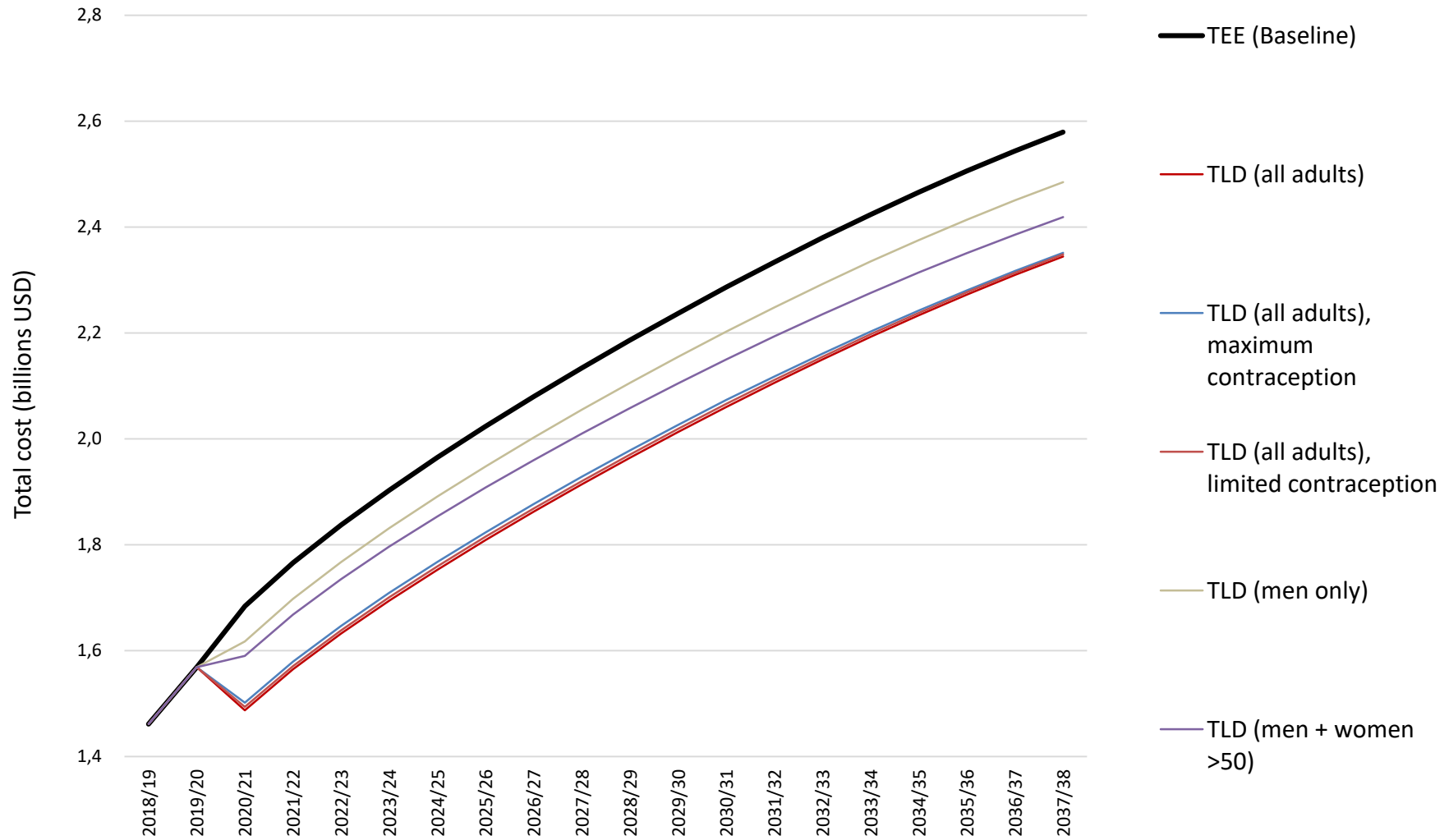
Impact on new HIV infections (2019-38)



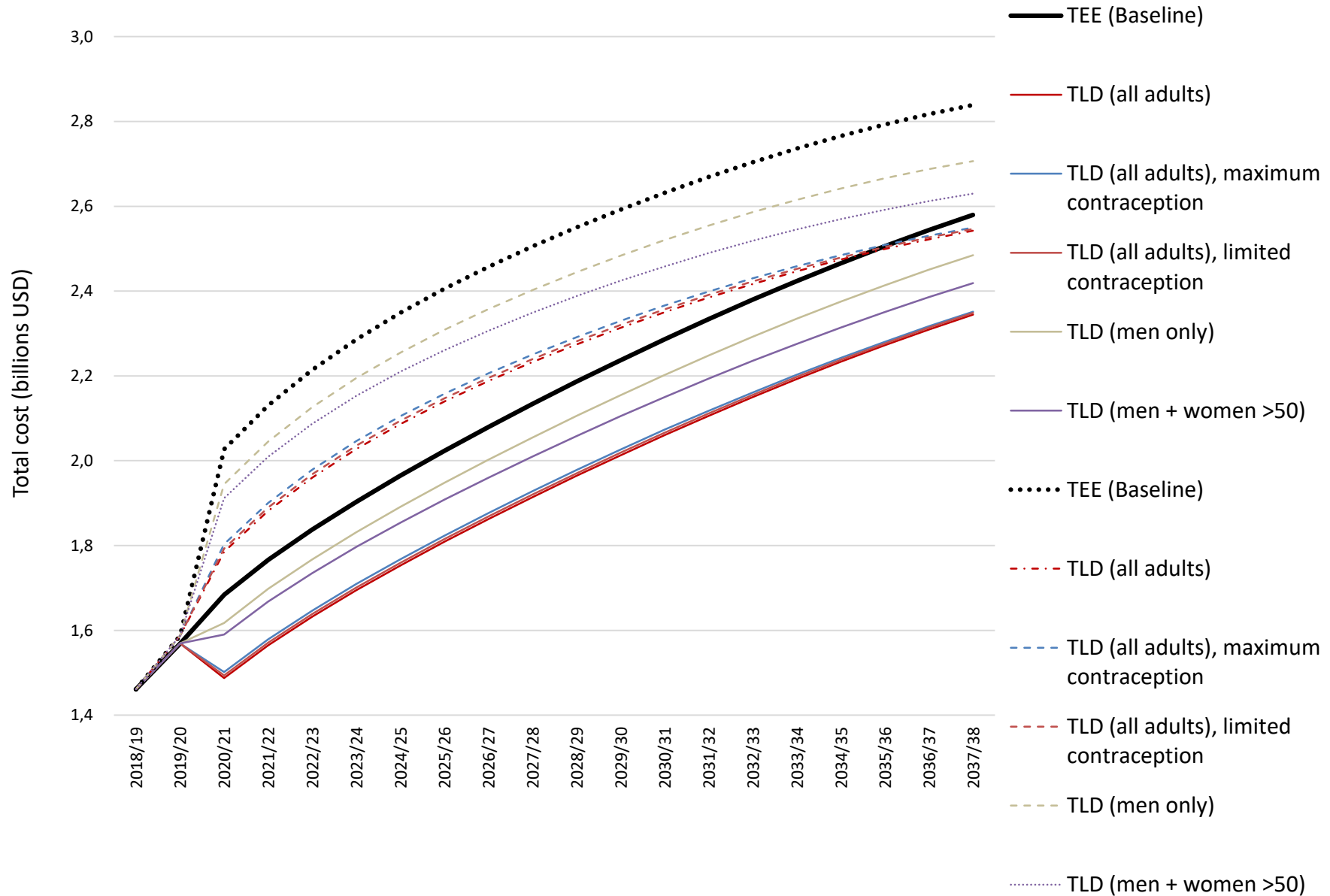
Impact on new HIV infections (2019-38)



Impact on total HIV cost (2019-38)



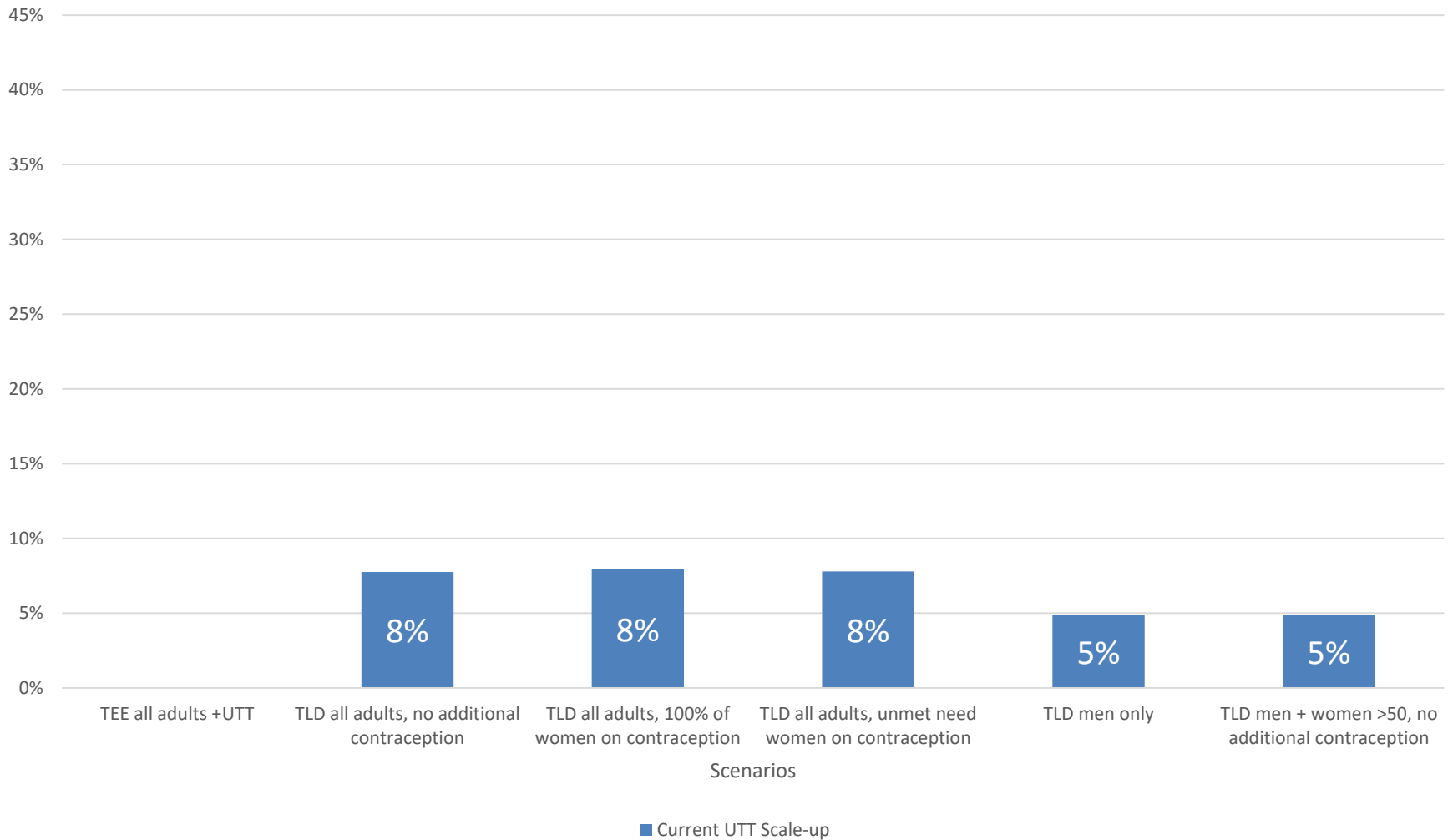
Impact on total HIV cost (2019-38)



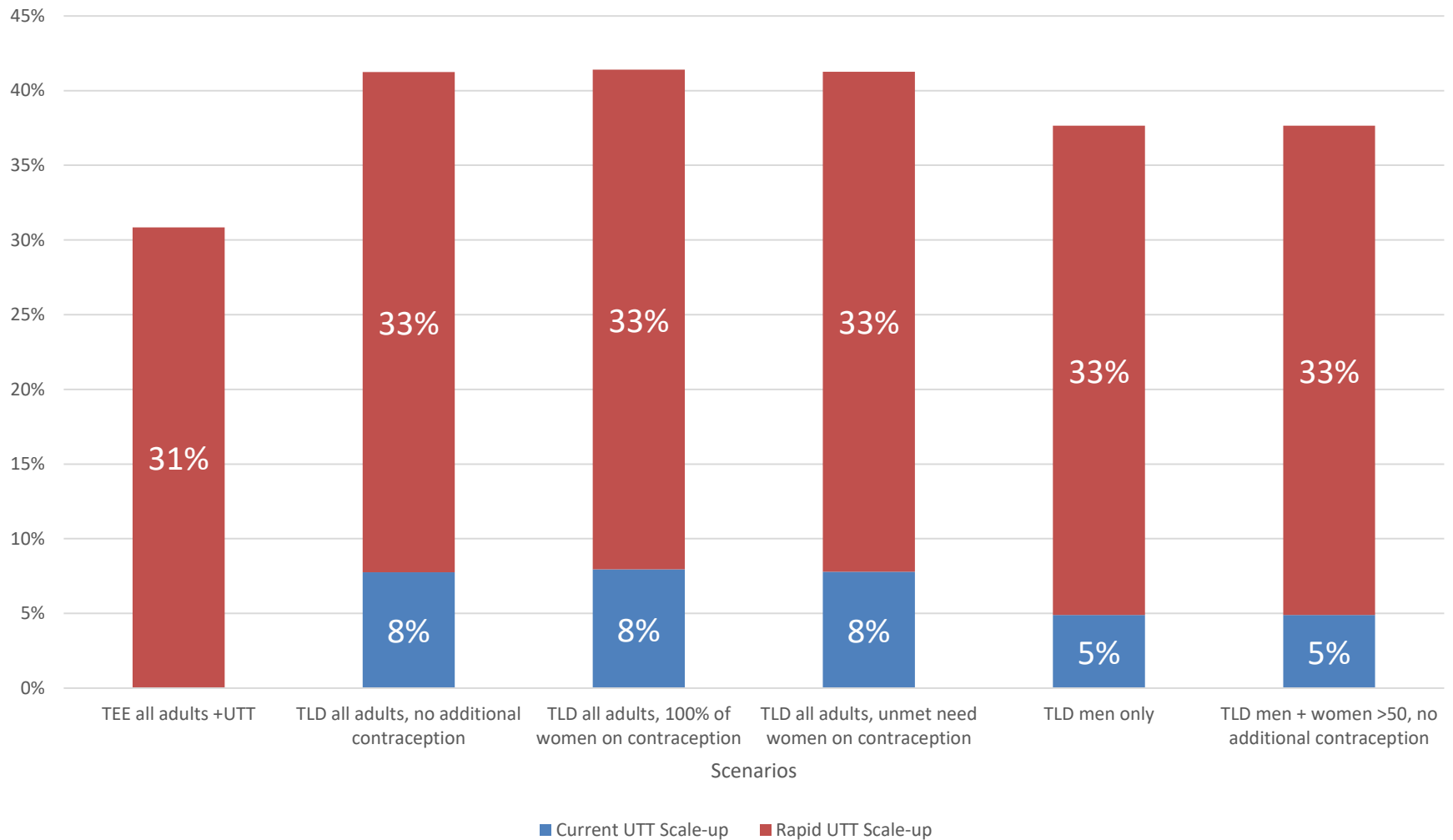
Cost-effectiveness of treatment with TLD vs. TEE (2019-38)

	TEE (Baseline)	TLD (all adults, no additional contraception)	TLD (all adults, maximum contraception)	TLD (all adults, limited contraception)	TLD (men only)	TLD (men + women ≥50)
1. Current UTT scale-up						
Total cost of HIV programme (billions USD)	42.37	38.39	38.61	38.49	40.90	40.04
Incremental cost (billions USD) (% change)	-	-3.97 (-9%)	-3.75 (-9%)	-3.87 (-9%)	-1.46 (-3%)	-2.33 (-5%)
2. Rapid UTT scale-up						
Total cost of HIV programme (billions USD)	48.52	43.57	43.85	43.69	46.59	45.56
Incremental cost (billions USD) (% change)	6.15 (15%)	1.21 (3%)	1.48 (3%)	1.33 (3%)	4.22 (10%)	3.20 (8%)

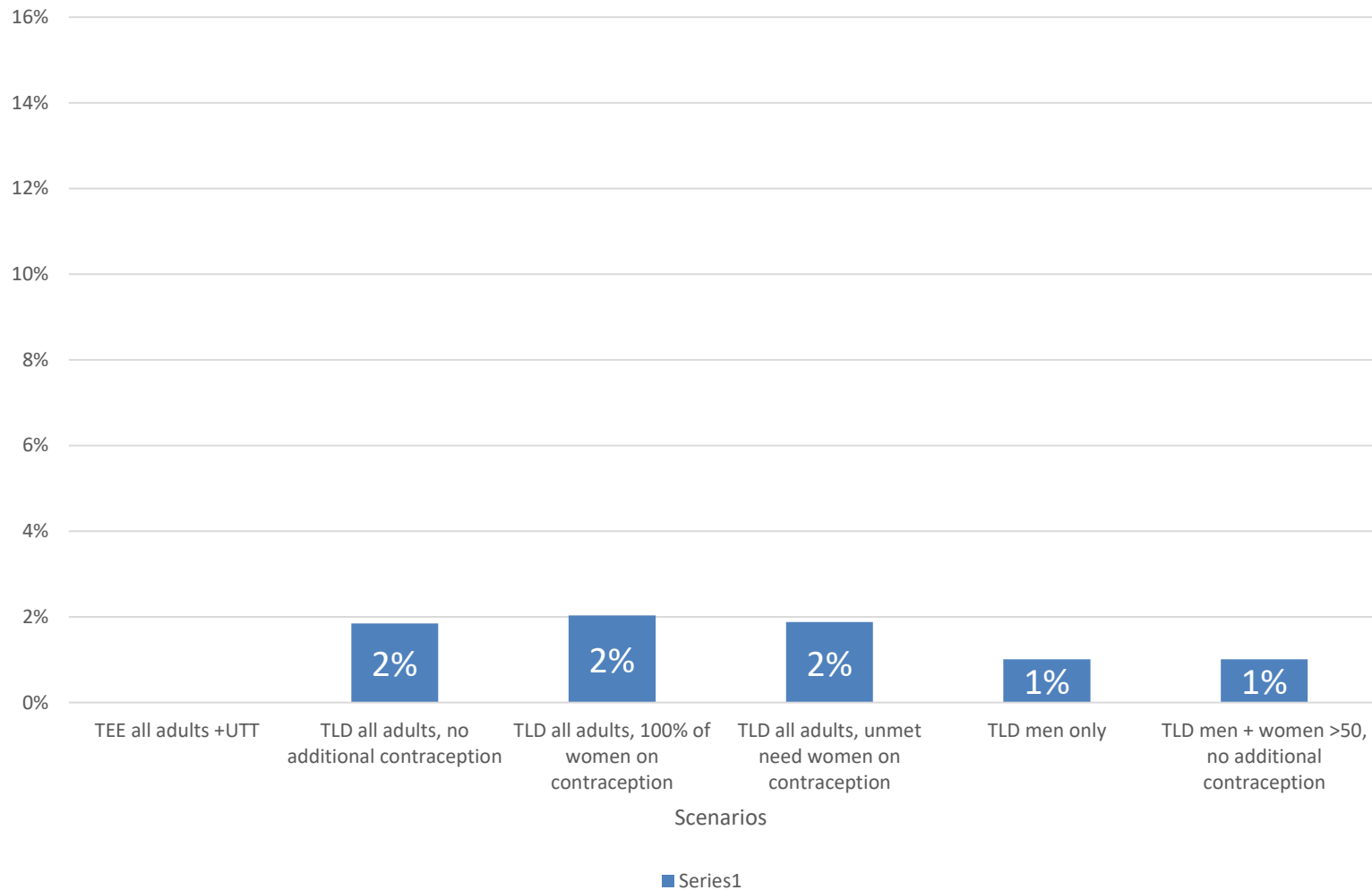
Key findings: New infections averted



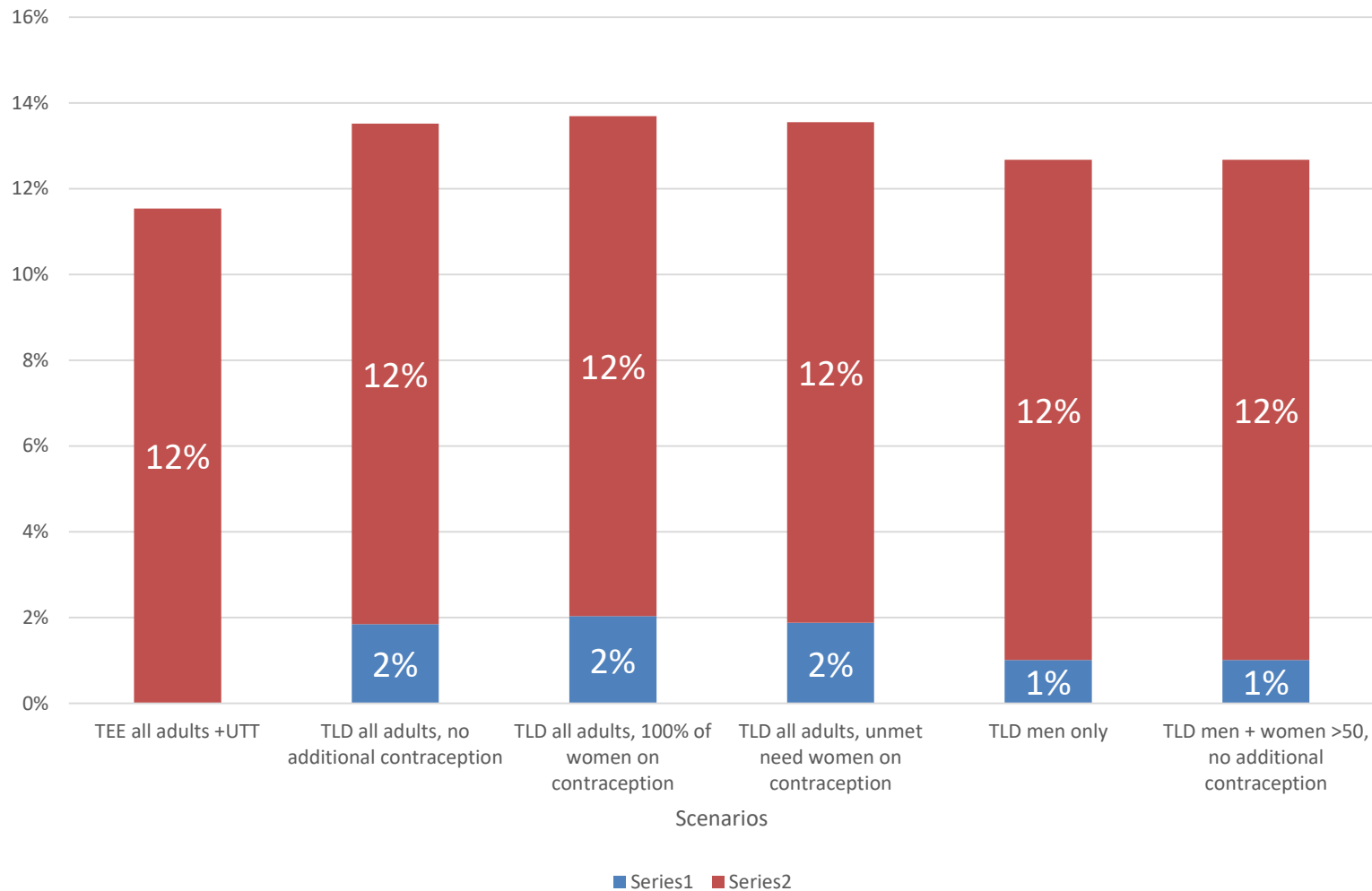
Key findings: New infections averted



Key findings: AIDS deaths averted



Key findings: AIDS deaths averted



Limitations

- We did not model
 - **difference in epidemiological impact of DTG provision to men and to men as well as women aged ≥ 50** (but limited number of new infections transmitted by women in this age group)
 - **expected longer survival on DTG** → possible underestimation of the benefits of DTG
 - **women opting to stay on EFV** due to the safety concerns in our 'maximum contraception' scenario → maximum impact of strict contraception recommendation on cost and HIV transmission
 - **impact of neural tube defects on mortality and cost** → would likely not have changed the difference in life years saved between the scenarios by much, or the finding of dominance across DTG scenarios.
- In 'rapid UTT scale-up' scenarios we assume much lower loss before and after ART initiation than is currently the case, **without including the cost of additional interventions** necessary for this (number of policies are currently in place to accelerate UTT uptake in South Africa, but their effectiveness and costs are unclear)

Conclusions

Switching adults from **TEE** to **TLD** and fully implementing **UTT** results in:

- A reduction of at least 5% in new HIV infections, and 1-2% in AIDS deaths
- A reduction in the cost of South Africa's HIV programme of 3-9% due to *three factors*:
 - Lower drug cost per patient year
 - Less need for second line
 - Less new infections
- TLD to men + women outside child-bearing age is superior to TLD for men only. **Even if adding cost of contraception for women on TLD, TLD still dominates TEE.**
- **TLD + contraception makes rapid UTT cheaper than baseline from 2034.**