

COST-EFFECTIVENESS OF THE DAPIVIRINE RING: A MODELLING ANALYSIS

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BACKGROUND

New female-controlled products are urgently needed for HIV prevention and intravaginal rings (IVRs) that release antiretroviral drugs such as dapivirine (DPV) are one technology being developed. Two phase III trials of a monthly DPV ring are expected to report efficacy results in 2016.

METHODS

Mathematical model

- Deterministic HIV transmission model of South Africa.
- Calibrated to prevalence, incidence, ART and deaths, by age, sex and time.
- 'Late ART' is available for all individuals with CD4 count ≤ 200 cells/ μ L from 2004. Scale-up increases rapidly from 2009.
- Incorporates costing model.

DPV ring interventions

- Introduced in **2017** & scaled up over 2 years
- Efficacy (analyses repeated for alternative assumptions)
 - 25% (approximates lowest statistically detectable efficacy from trial)
 - 50%
 - 75%
- Primary analysis: prioritisation to sex workers, young women and those with multiple partners (see Table 1)
- If oral PrEP is also available, some users switch to DPV ring.

Table 1. Effective coverage of DPV ring by age and risk group

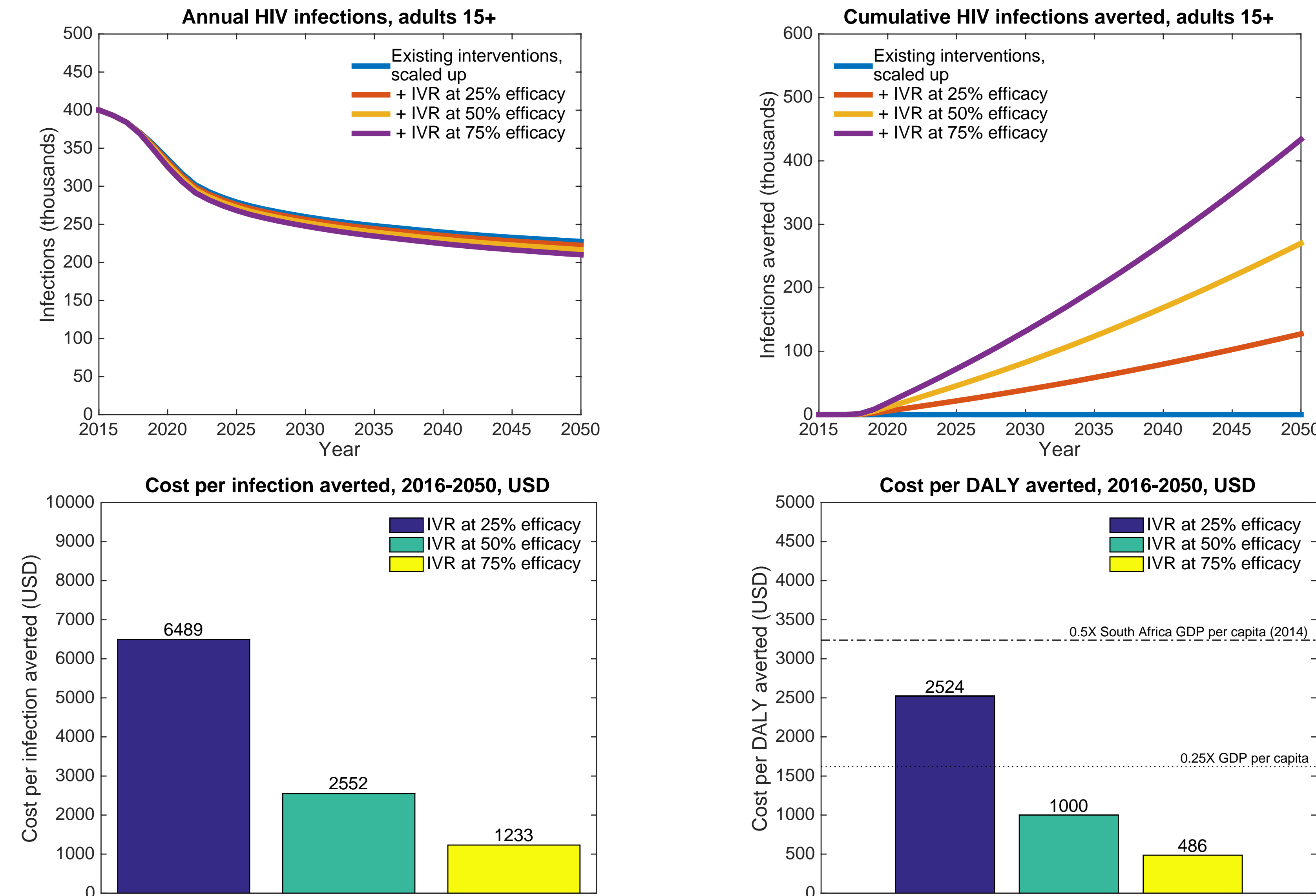
Effective coverage is the proportion of women who use the product with sufficiently high adherence to benefit from its protection.

	Female sex workers	15-29 year high-risk women	15-29 year low-risk women	30-49 year high-risk women	30-49 year low-risk women
Baseline(s)	No DPV ring				
Primary analysis Targeted: Medium coverage	30%	10%	4%	10%	2%
Targeted: Maximum coverage	80%	30%	10%	10%	10%
Uniform: 10% coverage all women	10%	10%	10%	10%	10%
Uniform: 30% coverage all women	30%	30%	30%	30%	30%

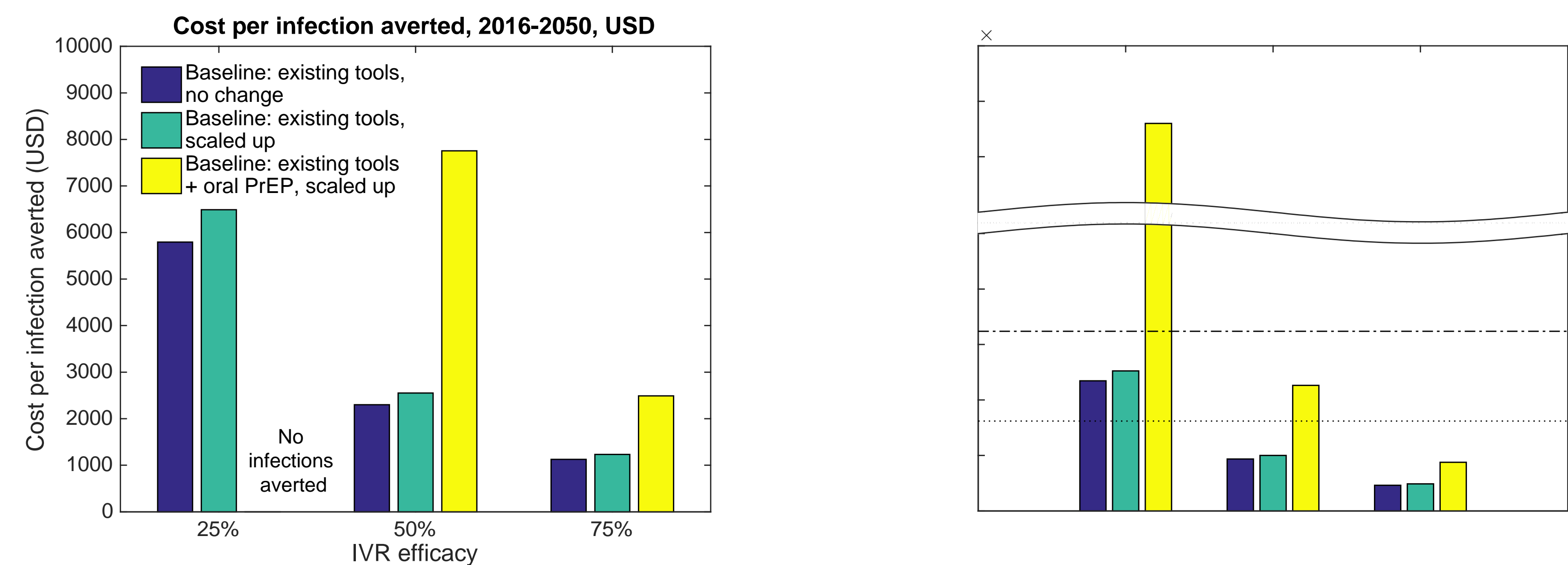
Cost assumptions

- DPV ring cost:
 - \$10M USD launch cost
 - \$5M USD annually (mass media)
 - \$107-115 per person per year (depending on sub-group)
- All costs discounted at 3% per year.

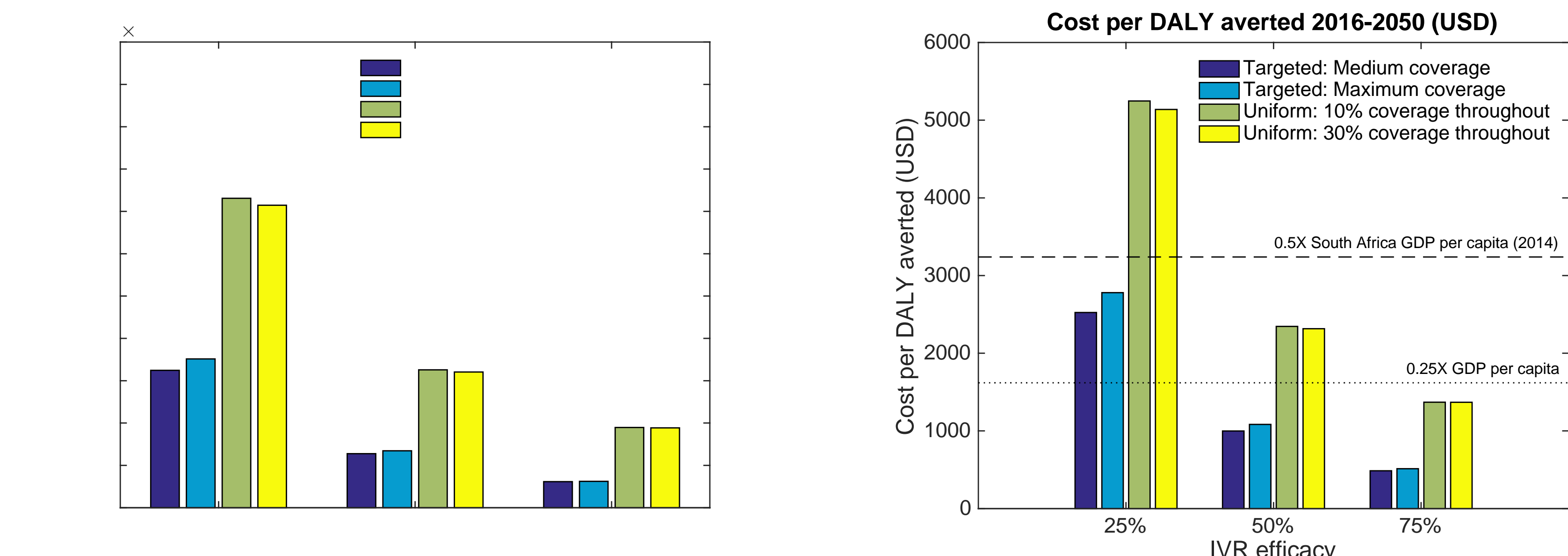
IMPACT AND COST-EFFECTIVENESS



VARYING BASELINE ASSUMPTIONS



PRIORITISATION BY HIV RISK



SUMMARY

- The overall impact of IVR scale-up on the HIV epidemic is modest, but could amount to up to 13,000 infections averted per year (on average).
- If an IVR product can **achieve the prices** assumed, and its use can be **highly targeted** to those at greatest risk (sex workers, young women and those with multiple partners), then its scale-up is expected to be **cost-effective** in South Africa.
 - This result is true even when efficacy is 25% and the more stringent criteria for cost-effectiveness are used.
 - The result is true in the context of scaling up existing interventions, but only at higher efficacies if the IVR cannibalises some oral PrEP users.
 - This result is true for different overall coverage levels of intervention scale-up, provided targeting remains strongly in favour of those at highest risk.
 - If the variable cost of delivery were to double then the intervention would still be considered likely to be cost-effective under the more permissive criteria (not shown).

- **Uniform coverage** of an IVR product across risk groups has a **larger potential impact** due to high numbers of low-risk women, but is **more expensive** than a targeted strategy.
- **Targeted scenarios** are approximately **twice as cost-effective** as uniform coverage.
- Even a **low efficacy** IVR product with **uniform coverage** across all women is considered **borderline cost-effective**.
- In other, poorer, settings, the IVR may be cost-effective under a more limited set of circumstances.
- Risk compensation is not considered fully here – this would reduce cost-effectiveness.
- Affordability is not considered here.

CONCLUSIONS

With an intervention prioritised to women at higher risk of HIV, all cost-effectiveness estimates are below 50% of South African GDP per capita, indicating that the DPV ring could substantially and cost-effectively generate health among women in South Africa even under the lowest efficacy estimates. However cost-effectiveness does not necessarily translate to affordability, which will differ by setting. The success of the DPV ring will also be determined by user demand and adherence, and new and forthcoming data on women's preferences will be critical for determining its use across different settings.

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