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Offering the Choice of Self-Administered Oral HIV Testing among Long-distance Truck Drivers in Kenya: A Trial-based Cost-effectiveness Analysis

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HIV testing in long-distance truck drivers

Awareness of HIV status is critical for achieving UNAIDS targets, particularly sub-populations at high risk of acquiring and transmitting HIV who may require targeted, resource-intensive strategies for HIV test uptake.

Long distance truck drivers (LDTDs) are a high-HIV-risk sub-population facing unique healthcare barriers due to continuous travel and irregular schedules. A novel intervention—the choice to HIV self-test (CHIVST) at a roadside clinic—increased test uptake for Kenyan LDTDs (Kelvin AIDS Care 2018). We conducted a trial-based cost-effectiveness analysis of CHIVST vs provider testing to inform decision making in resource-limited settings.

Estimating cost-effectiveness

Effectiveness data came from a randomized controlled trial of clinic- or home-based self-administered oral HIV testing (n=150) vs provider-administered testing (standard of care, n=155) for LDTDs at roadside clinics in Kenya. Economic cost data were from the literature, reflected a societal perspective, and were reported in 2017 international dollars (2017 I\$).

Generalized Poisson and linear gamma regression models were used to estimate effectiveness and incremental costs. Incremental effectiveness was the reciprocal of the difference in absolute risk of HIV testing uptake across trial arms and expressed as the number needed to treat, or the number offered CHIVST for an additional HIV test uptake. We reported incremental cost-effectiveness ratios, with 95% CIs calculated using Fieller's theorem. Deterministic sensitivity analysis identified key cost drivers of variation in the cost-effectiveness ratio. Non-parametric bootstrapping was used to estimate the probability of cost-effectiveness at a given willingness-to-pay threshold.

Table 1. Mean per patient costs for CHIVST vs standard of care (2017 I\$)

Cost domain	Mean per patient costs [95% CI]		P-value
	CHIVST	SOC	
HIV test kit	13.17 [11.52 – 14.81]	0.00 [0.00 – 0.00]	<0.001
Medical supplies	0.28 [0.26 – 0.31]	0.25 [0.23 – 0.28]	0.090
Labor			
Nurses	2.60 [2.43 – 2.78]	1.87 [1.68 – 2.06]	<0.001
Other	0.94 [0.87 – 1.02]	0.84 [0.76 – 0.93]	0.090
Health facility	1.57 [1.44 – 1.71]	1.41 [1.27 – 1.55]	0.090
Equipment	0.11 [0.43 – 0.17]	0.00 [0.00 – 0.00]	<0.001
Overhead	4.07 [3.79 – 4.35]	3.47 [3.12 – 3.82]	0.009
Patient time	3.79 [3.55 – 4.04]	2.62 [2.35 – 2.88]	<0.001
Per patient cost	26.56 [24.31 – 28.80]	10.47 [9.43– 11.52]	<0.001

Choice of self-testing: Costs more, but cost-effective

LDTDs offered CHIVST were 23% (95% CI 11 – 37%) more likely to uptake any HIV test vs those offered provider-administered testing. This translated to over six LDTDs offered CHIVST for each additional test uptake (Table 2).

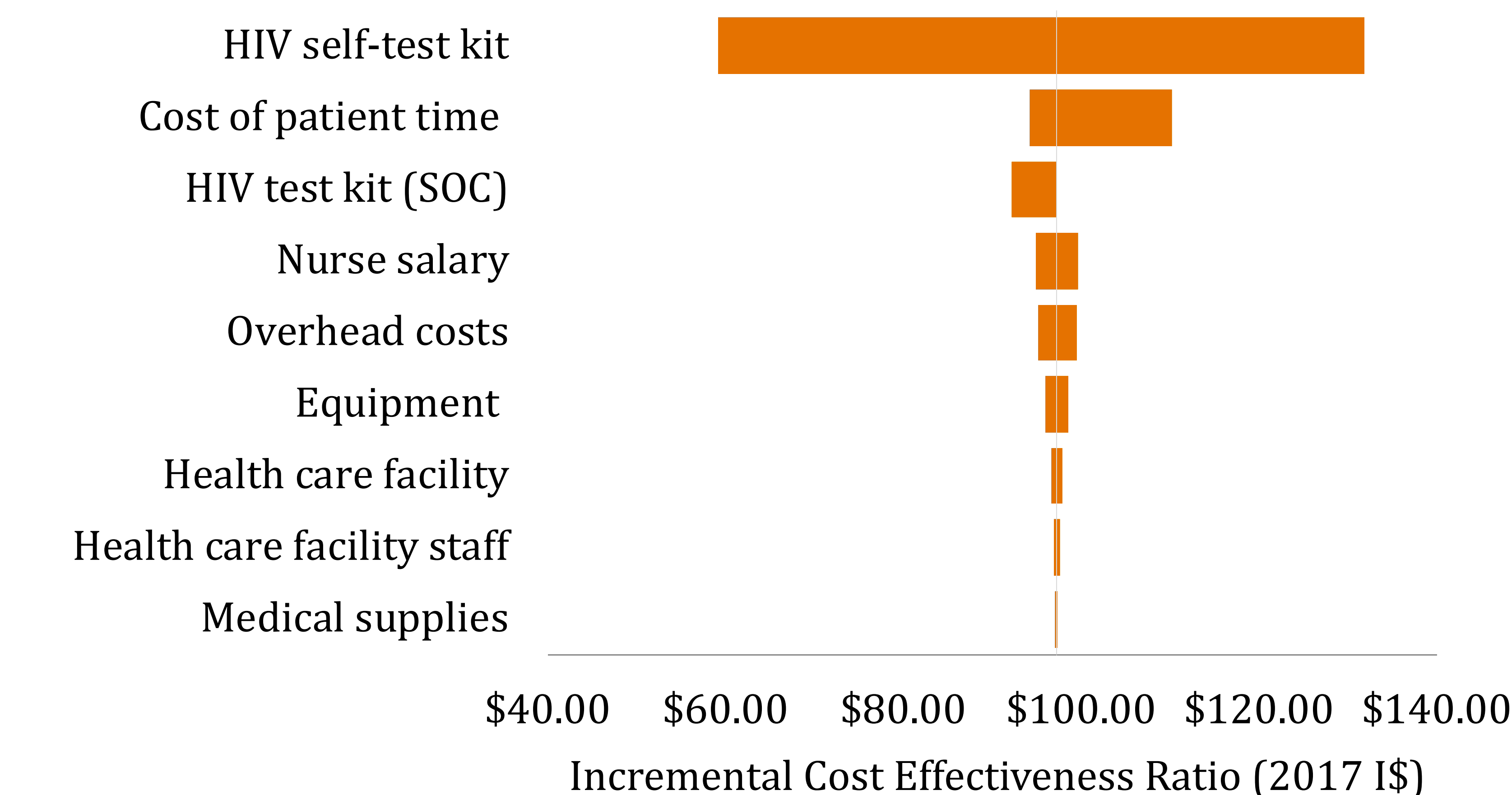
CHIVST is cost-effective at willingness to pay threshold of I\$97 for each additional test uptake. This cost-effectiveness ratio falls below 3x Kenya's 2017 GDP/capita ((I\$97 < I\$9,774, Table 2), a commonly used willingness to pay threshold for assessing cost-effectiveness in low-income settings. Per patient costs across cost domains ranged from I\$0.11 (equipment) to I\$13.17 (HIV self-test kit), with mean total per patient costs for CHIVST >2x for SOC (Table 1).

Table 2. Incremental effectiveness, costs, and cost-effectiveness

Outcome	Base case estimate	95% CI
Number needed to treat (NNT)	6.25	[5.00 – 8.33]
Incremental cost (2017 I\$)	15.55	[12.72 – 18.38]
Cost-effectiveness ratio (2017 I\$)	97.18	[65.74 – 120.98]

Self-test kits and patient time are the main cost drivers of cost-effectiveness (Figure 1). The probability that CHIVST is cost-effective approaches one at a willingness-to-pay threshold of I\$140 (Figure 2), which is substantially lower than the GDP/capita of Kenya in 2017.

Figure 1. Cost of HIV self-test kit is the primary driver of variation in the ICER



Offering self-administered oral HIV-testing is a **cost-effective** strategy to increase HIV test uptake for long-distance truck drivers

Choice of self-testing is an efficient use of resources

Offering the choice of HIV self-testing to long-distance truck drivers at roadside clinics is a highly efficient use of resources. Our findings add to growing evidence on the cost-effectiveness of HIV self-testing among high-risk populations in resource-limited settings. Future work should consider long-term health and economic outcomes, which were not captured in this study's analytic time horizon, as well as the application of self-testing options in other high-risk populations.

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Figure 2. The probability CHIST is cost-effective is high at low WTP thresholds

