Price Subsidies, Diagnostic Tests, and Targeting of Malaria Treatment: Evidence from a Randomized Controlled Trial

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Introduction

- Treating infectious diseases have positive spillovers and therefore they should be subsidized.
- However, if product has hetrogenous returns, it is important to target subsidies where they have highest returns: Hence trade-off between targeting and accessibilty.
- So essentially you want to target the group with highest returns. This is a menu-setting problem.

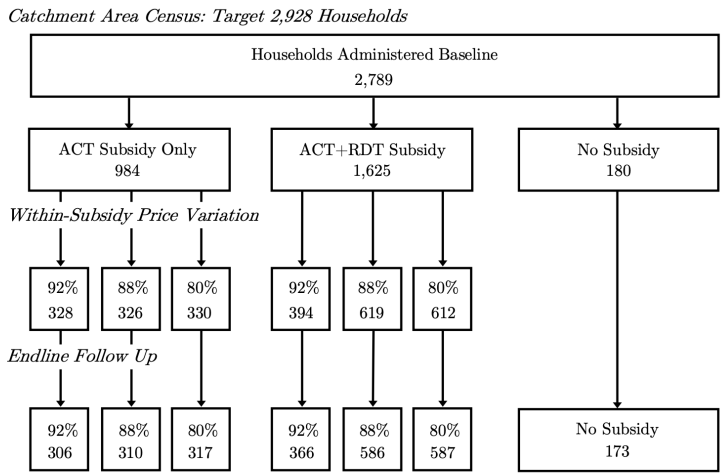
This Paper

- This paper studies the menu-setting problem introduced by subsidies for the latest class of antimalarials in Kenya.
- This durg is very useful if the patient has malaria but people usually take drug without being tested and hence presumptive treatment is common.
- Over treatment can also contribute to parasite resistance rendering drug ineffective in future.
- Usually you would have public health system where diagnostic tools and trained medical personnel can target technologies to patients with high returns. However, if public health system is weak or inaccessible, then this is not possible.
- Alternative is to give subsidized drugs through retail sector.
- Importantly, beneficiaries are not mimicking the high return group but rather they also don't have information about their malaria status.

Experimental Design

- The experiment conducted with over 2,700 households in Western Kenya, introduced random variation in access to heavily subsidized ACTs and rapid tests sold through local drug shops and monitored the impact on treatment seeking behavior and medication taking.

Figure 2. Experimental Design and Attrition: Number of Households per Study Arm

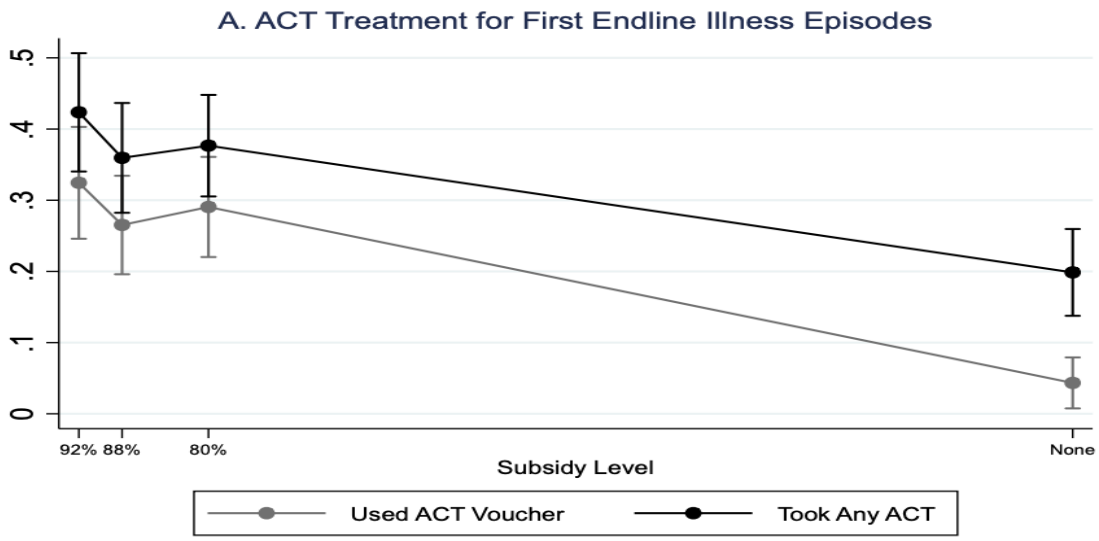


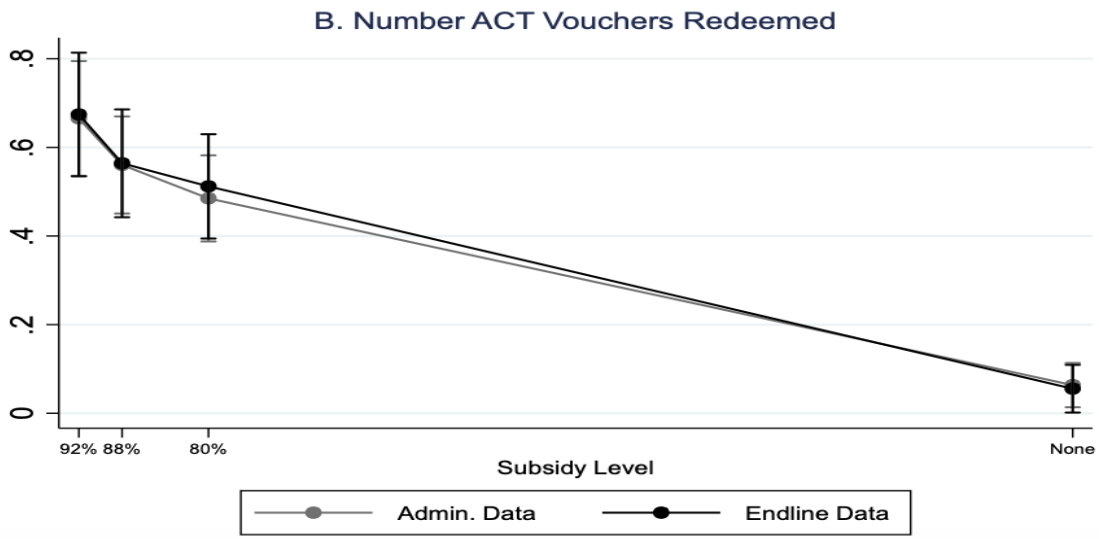
Notes: At the end of the baseline survey each household received two ACT vouchers and, if sampled for the RDT subsidy, two RDT vouchers. 49 percent of ACT subsidy only households and 80 percent of ACT+RDT subsidy households were selected for surprise RDT testing at the drug shop. Within each ACT subsidy level, those in the ACT+RDT subsidy group were also randomized into three RDT subsidy levels. Since we find no differences across RDT subsdidy levels we group them together for simplicity. Details for the impact of the different RDT subsidies are provided in Appendix Table A6.

Results I

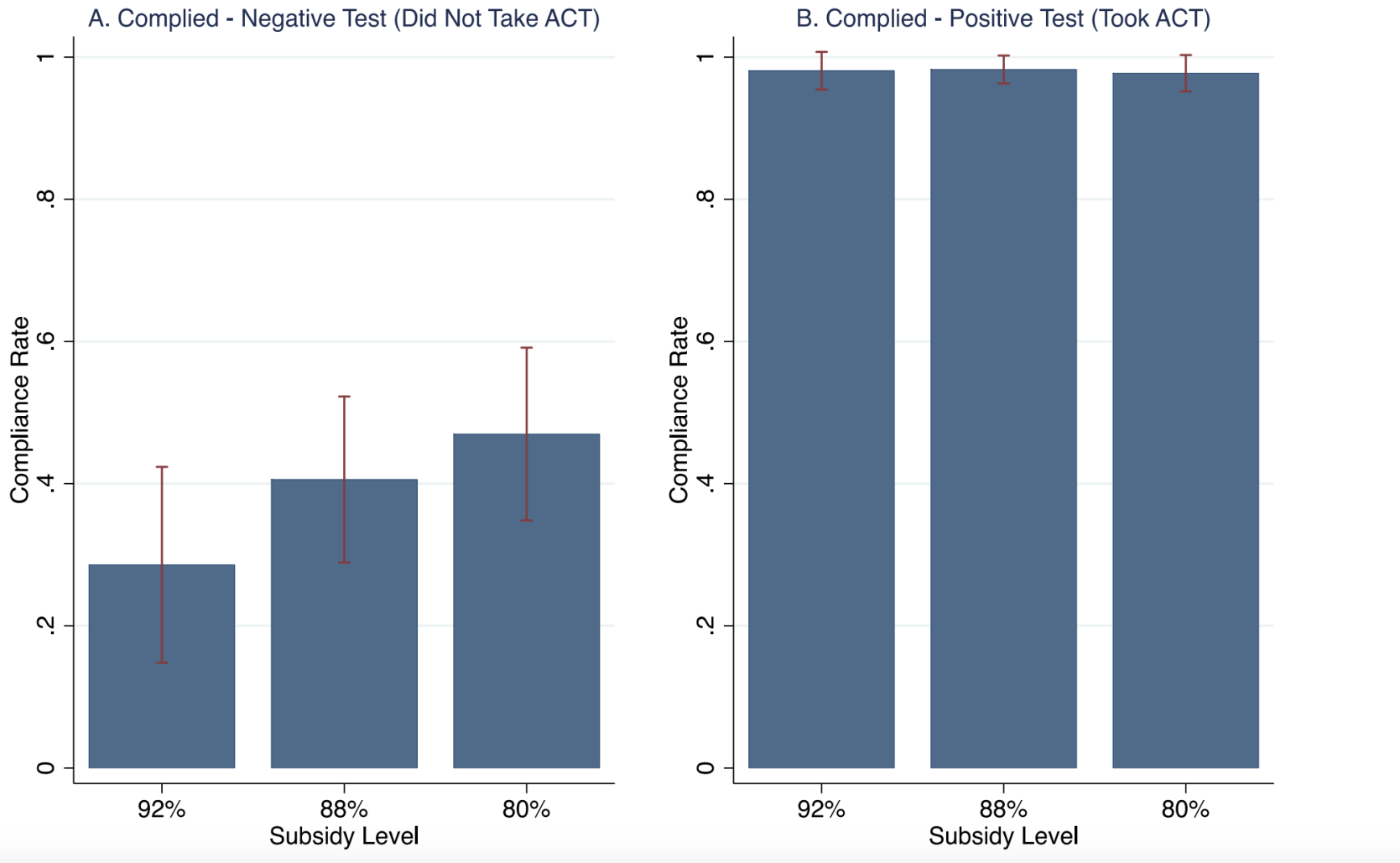
1. Many households bypass the public system entirely and instead procure medication through retail-sector drug shops.
2. So heavy retail sector subsidy increases targeting. However, this increase is among both appropriate and inappropriate users and hence overall targeting is not great. Only 56% of those who bought the drug had malaria.
3. Decreasing subsidy from 92% to 80% increases targeting without much loss to accessibility and therefore trade-off is not that severe.

ACT demand by subsidy level





Compliance by subsidy level



Impact of Subsidy on Targeting

Table 3. Impact of Retail-Sector ACT Subsidy on ACT Targeting

	Dependent Variable:		
	Actual Malaria Status	Predicted Positivity	Predicted Positivity
	(1)	(2)	(3)
ACT Subsidy = 88%	0.187**	0.112***	0.111**
	(0.081)	(0.042)	(0.053)
ACT Subsidy = 80%	0.182**	0.107**	0.040
	(0.084)	(0.043)	(0.052)
P-value: 88%= 80% = 0	0.038**	0.012**	0.104
P-value: 88%= 80%	0.955	0.906	0.179
DV Mean (ACT 92%, no RDT)	0.563	0.424	0.422
N	190	189	178
Data Source	Admin.	Admin.	Endline

Notes: The omitted category is the 92% ACT subsidy group. Sample in columns 1 and 2 include all first ACT voucher redemption among households selected for a surprise RDT and no RDT voucher (in column 2, 1 observation has a missing value for predicted malaria positivity). Sample in column 3 includes all endline first illness episodes treated with ACTs among households not selected for a surprise RDT and not selected for an RDT voucher. Robust standard errors (clustered at the household level in the endline data) are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels respectively.

Mechanisms: Where does targeting improve?

Table 4. Mechanisms Behind ACT Targeting Effects

	(1)	(2)
Panel A. Does the ACT Subsidy Level Reallocate ACTs Across Dosage Groups?		
	Used First Voucher for Patient Under 14	Used First Voucher for Patient 14 or Older
ACT Subsidy = 88%	0.035	-0.057**
	(0.035)	(0.027)
ACT Subsidy = 80%	0.031	-0.080***
	(0.034)	(0.026)
P-value: 88%= 80% = 0	0.540	0.007***
DV Mean (ACT 92%, no RDT)	0.268	0.171
N	984	984
Subsample	All HH	All HH
Panel B. Does the ACT Subsidy Level Reallocate ACTs Within Dosage Groups?		
	Surprise RDT Result: Patient Under 14	Surprise RDT Result: Patient 14+
ACT Subsidy = 88%	0.060	0.256*
	(0.082)	(0.148)
ACT Subsidy = 80%	0.066	0.170
	(0.083)	(0.160)
P-value: 88%= 80% = 0	0.687	0.192
DV Mean (ACT 92%, no RDT)	0.791	0.214
N	132	58
Additional Controls	None	None

Notes: The omitted category is the 92% subsidy group. Panel A includes all households not sampled for an RDT, regardless of surprise RDT status. Panel B limits sample to households who were selected for a surprise RDT test and redeemed at least one ACT voucher. Dose group controls include dummy variables for three of the 4 ACT dose groups (based on patient age). Heteroskedasticity robust standard errors in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels respectively.

Estimated Impacts of Various Subsidy Schemes on Under- and Over-Treatment

Table 7. Estimated Impacts of Various Subsidy Schemes on Under- and Over-Treatment

	(1) No Subsidy	(2) ACT 92% Subsidy	(3) ACT 88% Subsidy	(4) ACT 80% Subsidy	(5) ACT 80% + RDT Subsidy
Experimental Estimates of Access and Drug Shop Targeting					
Total Share Taking ACT	0.190	0.415	0.351	0.369	0.385
Share Taking ACT at Drug Shop	0.071	0.320	0.288	0.278	0.303
Share Taking ACT at Health Center	0.119	0.095	0.063	0.084	0.078
Targeting at Drug Shop	1.000	0.563	0.750	0.745	0.806
Assumptions for Estimates of Under- and Over-Treatment					
Share of Illness Episodes That are Malaria[a]	0.386	0.386	0.386	0.386	0.386
Targeting at Health Center (Medium)[b]	0.75	0.75	0.75	0.75	0.75
Targeting at Health Center (High)	1.000	1.000	1.000	1.000	1.000
Targeting at Health Center (Low)	0.65	0.65	0.65	0.65	0.65
Under- and Over-Treatment: Preferred Estimates (assuming Medium Targeting at Health Center)					
Overall Targeting	0.844	0.606	0.750	0.747	0.795
Over Treatment	0.048	0.266	0.143	0.152	0.129
Under Treatment	0.583	0.347	0.317	0.287	0.207
Under- and Over-Treatment: Alternative Estimates (assuming High Targeting at Health Center)					
Overall Targeting	1.000	0.664	0.795	0.805	0.846
Over Treatment	0.000	0.227	0.117	0.117	0.096
Under Treatment	0.506	0.285	0.276	0.231	0.155
Under- and Over-Treatment: Alternative Estimates (assuming Low Targeting at Health Center)					
Overall Targeting	0.781	0.583	0.732	0.723	0.774
Over Treatment	0.068	0.282	0.153	0.166	0.142
Under Treatment	0.614	0.372	0.333	0.309	0.227

Notes: Source: Authors' computations. Targeting (T) is the share of ACTs taken for illness episodes that are malaria. Overtreatment (OT) is the share of non-malaria episodes treated with an ACT. Undertreatment (UT) is the share of malaria episodes not treated with an ACT. See section 3 for the formulas relating T, OT and UT to the estimated parameters.

[a] The assumption on the share of illness episodes that are malaria (Π) is based on the rate observed in the symptoms database collected through unannounced household visits during which rapid diagnostic tests for malaria were administered. See section 4.3 for details.

[b]