Optimizing smart subsidies to drive toward 100% market-led rural sanitation coverage in Cambodia

Evidence from a randomized control trial.

Greg Lestikow

November 27, 2017

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Presentation overview

What we'll be discussing today

The issues we're facing and the big questions we're trying to answer

The study we designed to answer those questions

Our results, and what they tell us about targeted subsidies

How iDE intends on scaling up the use of smart subsidies in our Sanitation Marketing program in Cambodia.

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Sanitation Marketing

The Basics of SanMark

We work through the private sector to build markets

We design products to context

We train businesses to produce and distribute products

We recruit and train independent sales agents who are paid by suppliers

The issues we're facing

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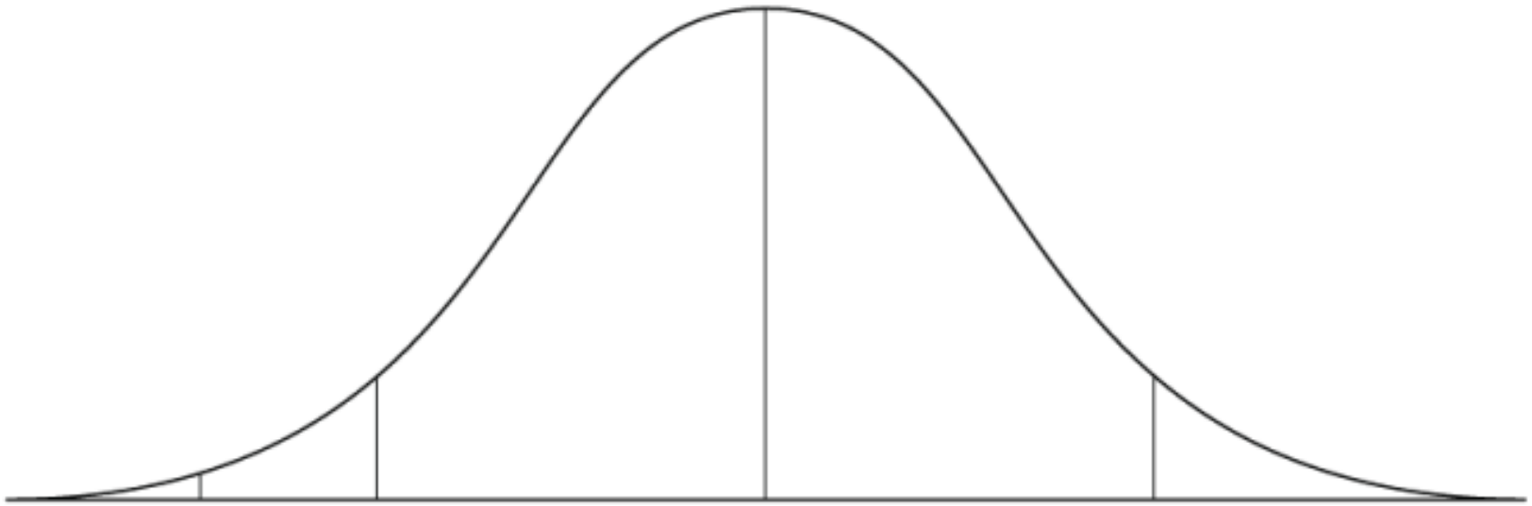
Our theory of change

The Technology Adoption Curve

As captured by Everett Rogers in his book Diffusion of Innovations, *people tend to adopt new technologies at varying rates. Their relative speed of adoption can be plotted as a normal distribution, with the primary differentiator being individuals' psychological disposition to new ideas.*



Innovators
(2.5%) are risk takers who have the resources and desire to try new things, even if they fail.

Early Adopters
(13.5%) are selective about which technologies they start using. They are considered the "one to check in with" for new information and reduce others' uncertainty about a new technology by adopting it.

Early Majority
(34%) take their time before adopting a new idea. They are willing to embrace a new technology as long as they understand how it fits with their lives.

Late Majority
(34%) adopt in reaction to peer pressure, emerging norms, or economic necessity. Most of the uncertainty around an idea must be resolved before they adopt.

Laggards
(16%) are traditional and make decisions based on past experience. They are often economically unable to take risks on new ideas.

We use a technology adoption curve to conceptualize the market.

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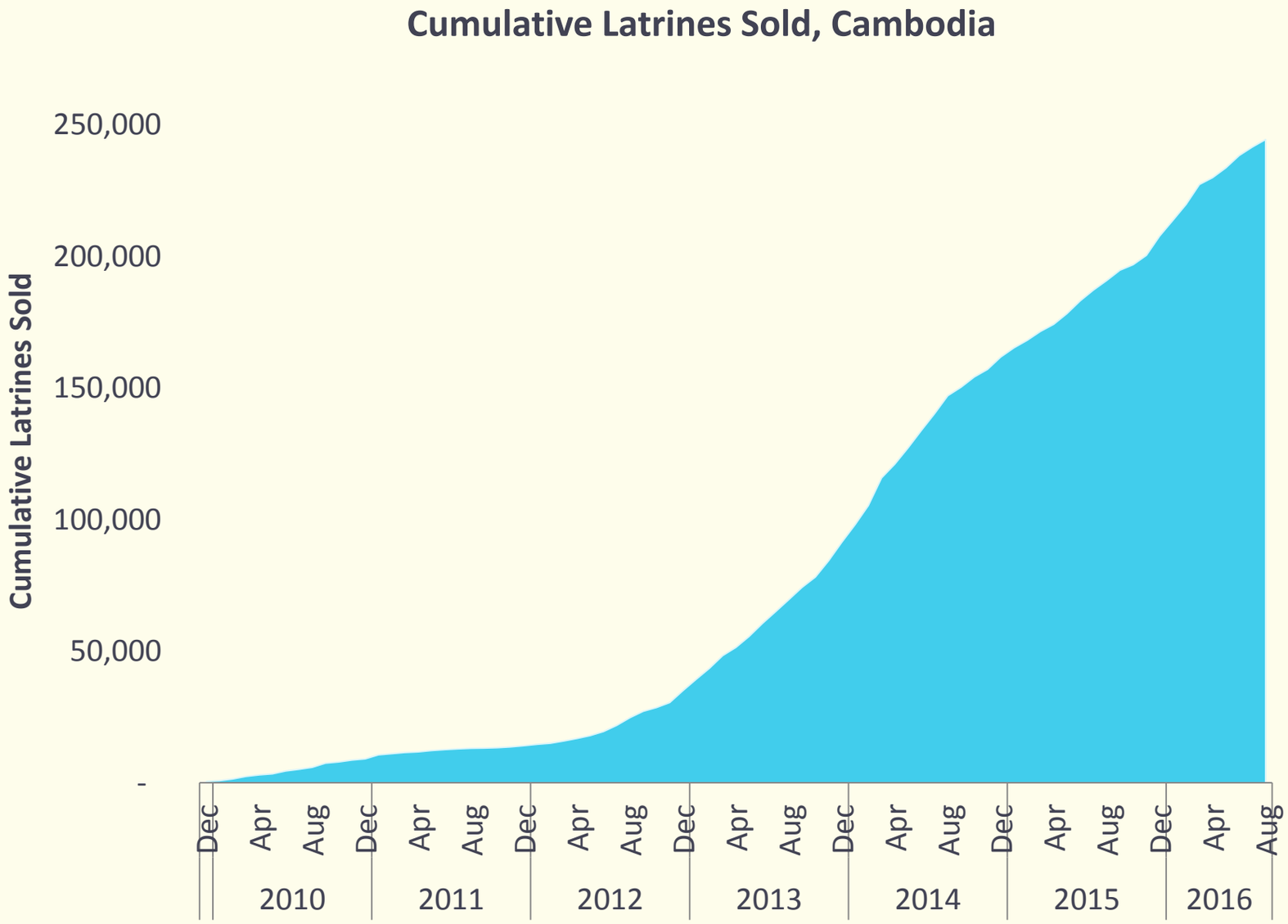
Our theory of change



As we achieve scale, we move the needle on coverage and move farther along the technology adoption curve.

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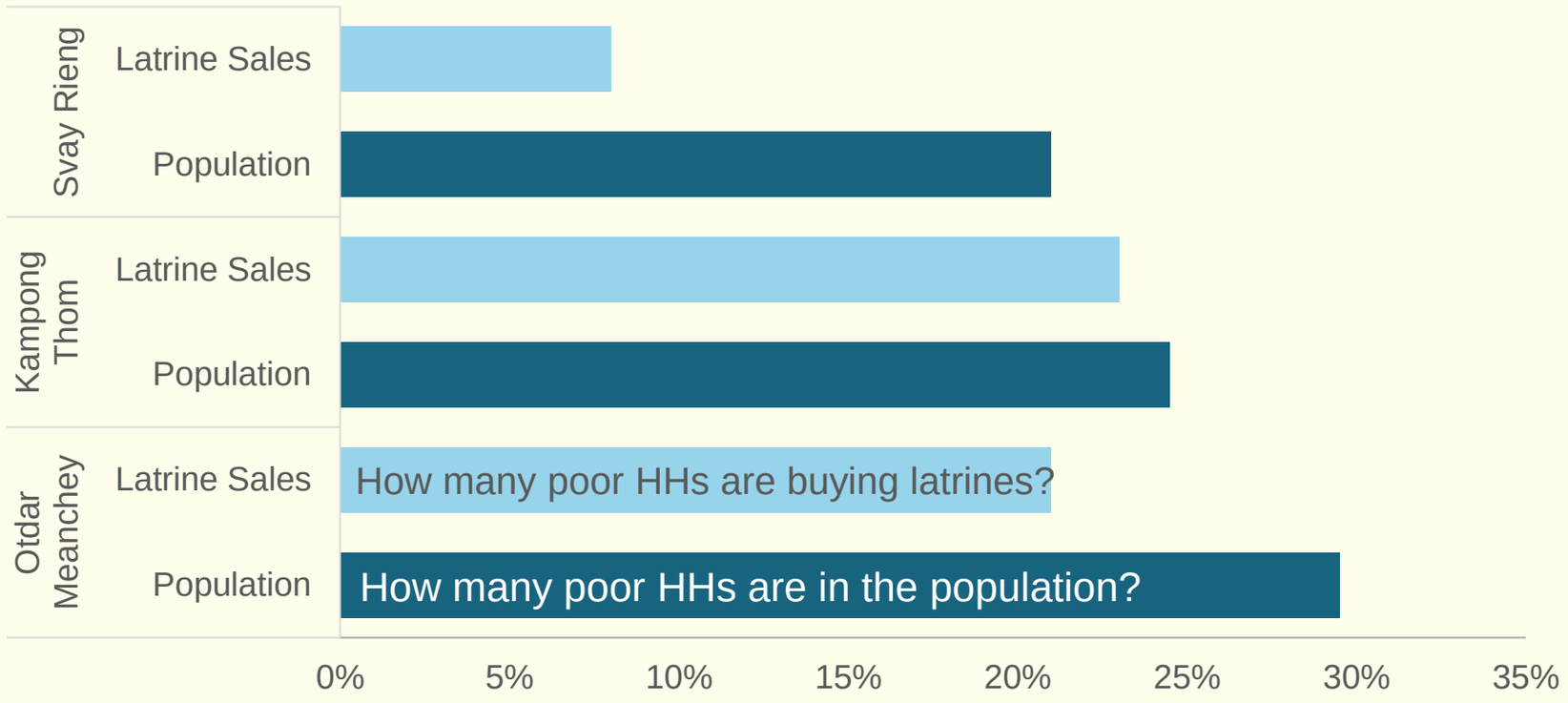
The issues we're facing

Poor HHs' share in latrine sales and in province population



A market-based approach does not inherently establish incentives to reach the poor.

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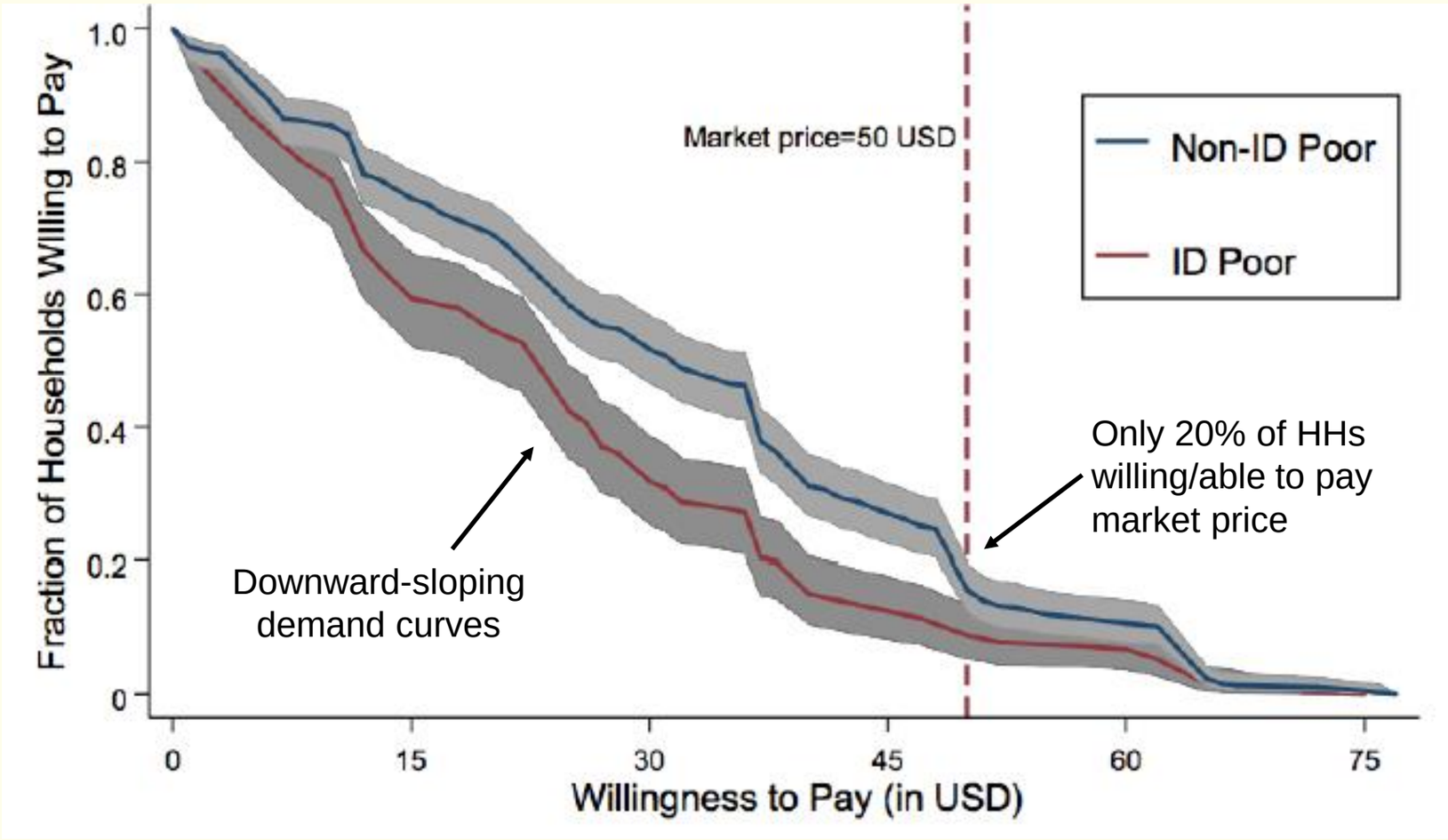
The issues we're facing



Prior market research suggests that relatively few poor households can afford latrines at market price…

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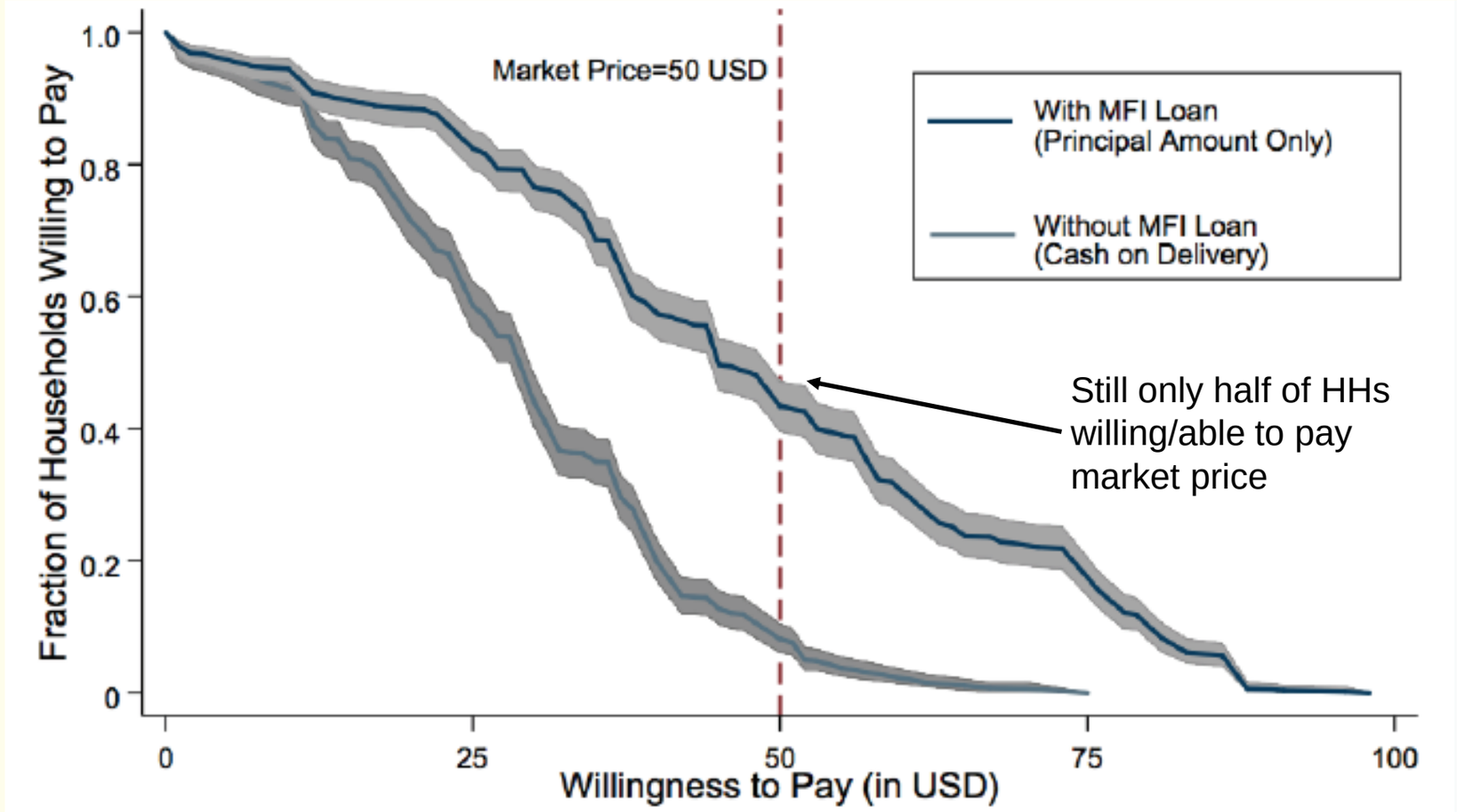
The issues we're facing



…and that financing can only take us so far, especially given operational complexities surrounding finance.

Given these issues, we want to know:

1. Do targeted, partial latrine subsidies increase latrine sales to poor households?
2. Do targeted, partial latrine subsidies affect latrine sales to non-poor households?
3. Are targeted subsidies a cost-effective means of increasing latrine sales to poor households?

Study design and mechanics

Study mechanics: targeting the subsidy

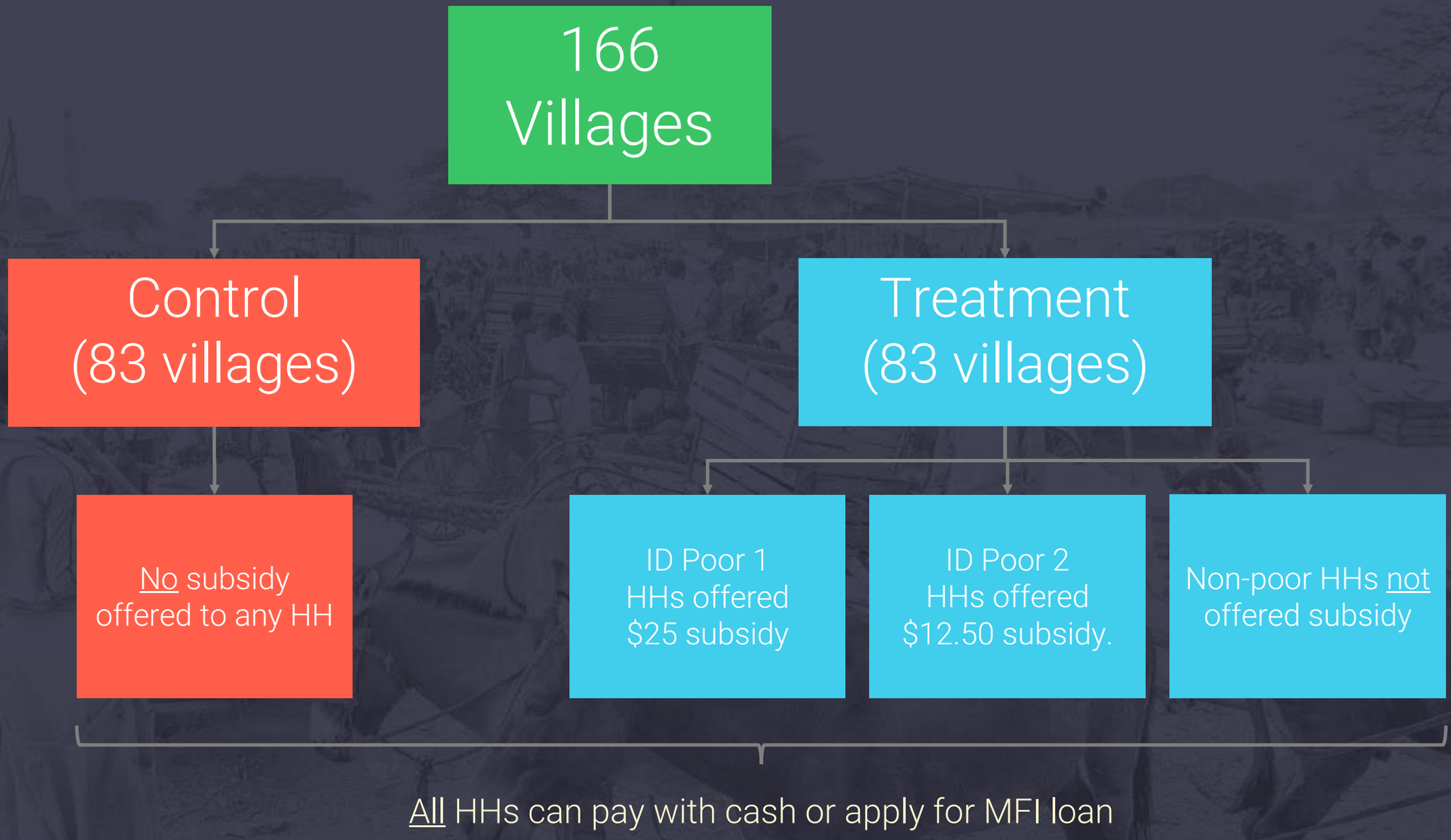
Cambodia's "ID Poor" system allows us to accurately target subsidies.

- **The national government works with local government to categorize households as ID Poor 1, ID Poor 2, and Non-poor**
- **ID Poor households have identification cards that iDE was able to verify with local officials and the national database.**
- **Sales agents took photos of ID cards and uploaded directly to our management information system on Salesforce using TaroWorks.**

Subsidy Amounts

- **ID Poor 1 HHs → $25 USD discount on a $56 USD market price = 44%**
- **ID Poor 2 HHs → $12.50 USD discount on a $56 USD market price = 22%**

RCT study design



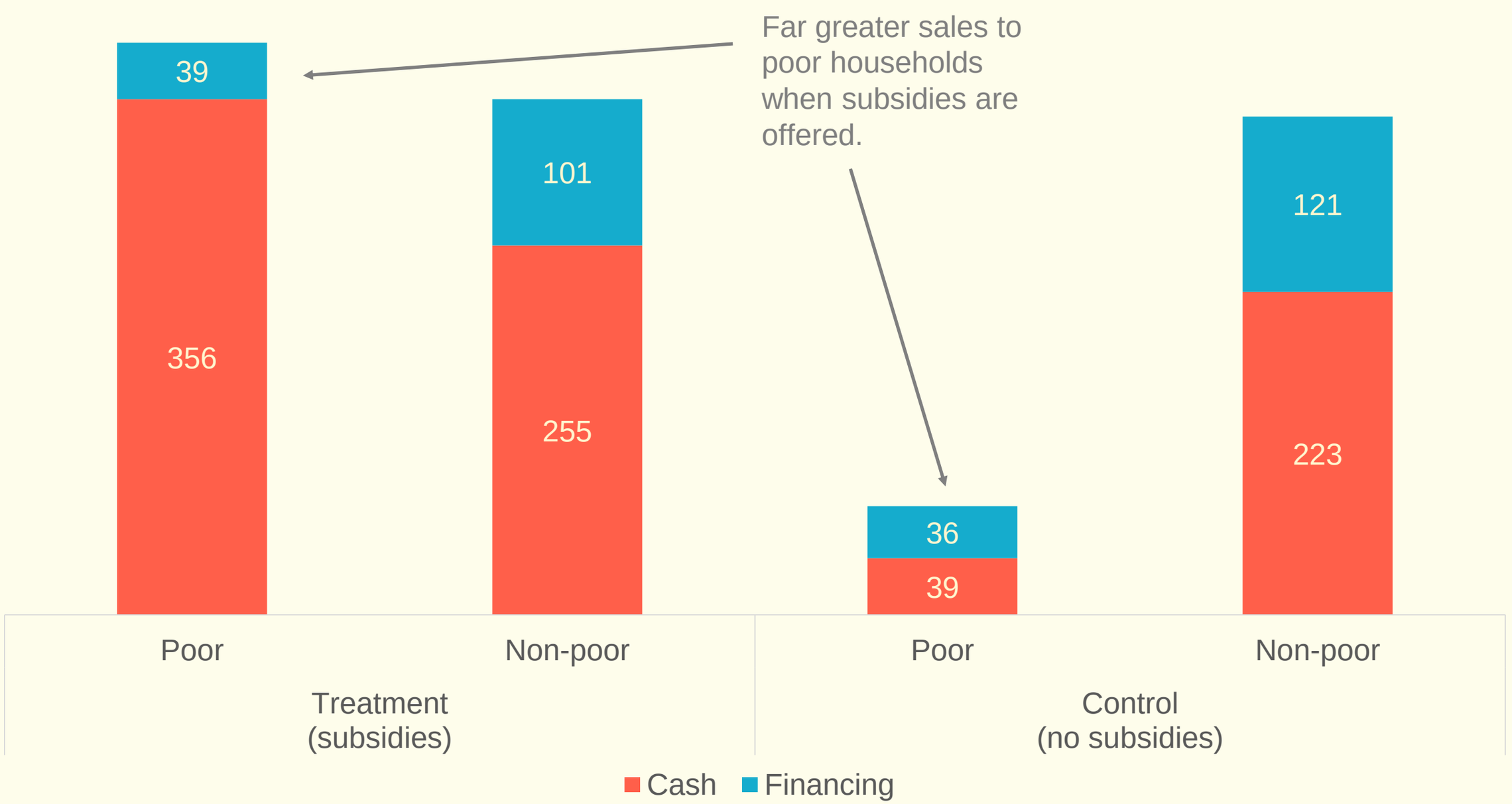
Results and insights

We want to know:

1. Do targeted, partial latrine subsidies increase latrine sales to poor households?
2. Do targeted, partial latrine subsidies affect latrine sales to non-poor households?
3. Are targeted subsidies or sanitation financing options—or a combination of the two—the most cost-effective means of increasing latrine sales to poor households?

Results: Absolute sales figures

Total toilet sales by payment type and experimental group



Results: Absolute sales figures

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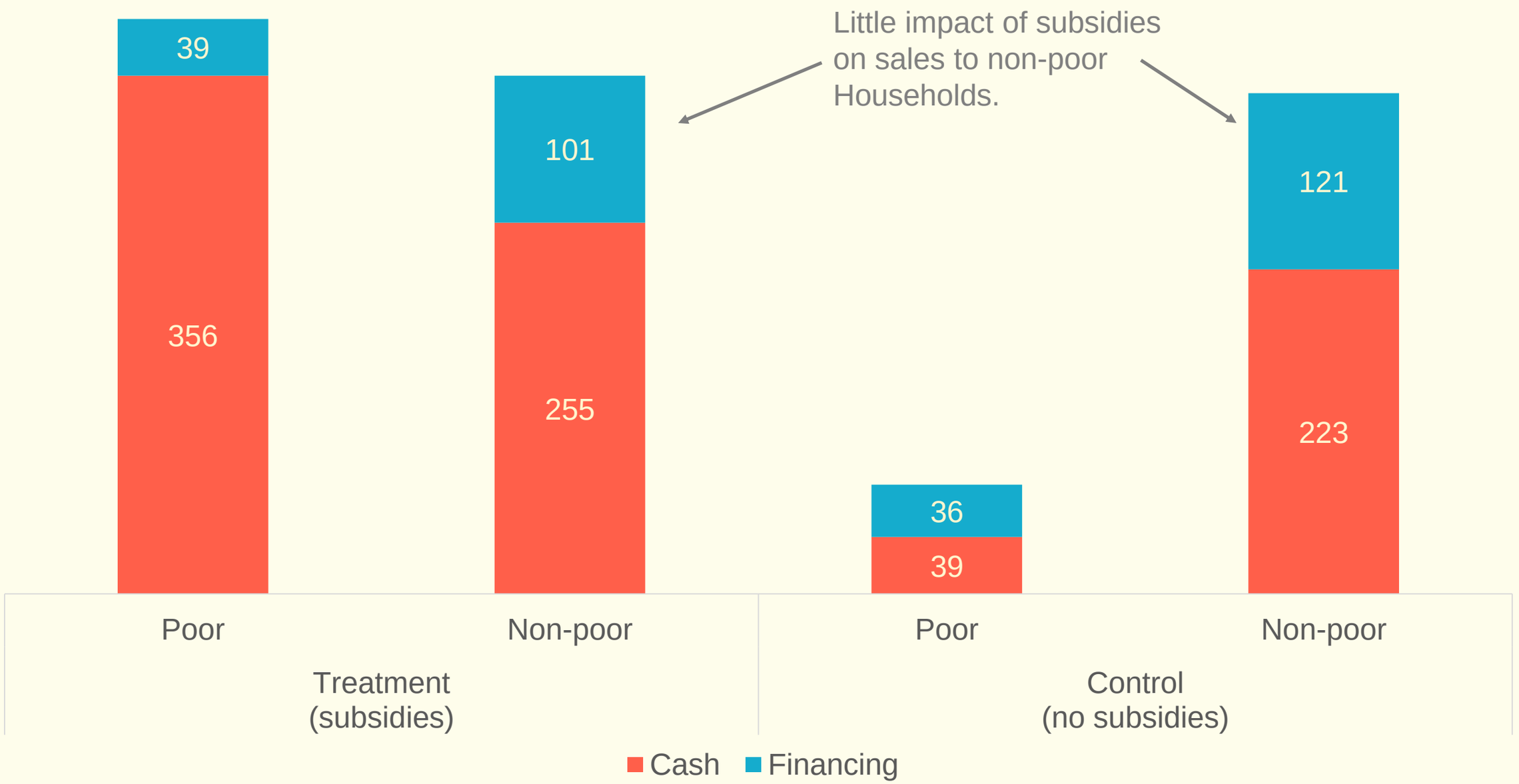


Results: Village-level treatment effects analysis

Outcome: Uptake rate among 'valid' households[1] Coverage change treatment effects model[2]				
	Non-poor	IDP 1	IDP 2	All HHs
Treatment (subsidy offer to IDP HHs)	-0.00159	0.169***	0.147***	0.143**
	(0.0403)	(0.0586)	(0.0499)	(0.0621)
Constant	0.283***	0.0838	0.0841	0.216
	(0.0957)	(0.274)	(0.115)	(0.242)
Observations	143	140	142	150
R-squared	0.232	0.206	0.290	0.181

Robust standard errors in parentheses. [*** p<0.01, ** p<0.05, * p<0.1]
[1]Valid households are those households that do not have improved sanitation, as measured by latrine census
[2]This table shows only truncated model results, and does not include control variables

Interpretations

Uptake increases by 16.9 and 14.7 percentage points among IDP 1 and IDP 2 households, respectively, when they are offered targeted subsidies.

Offering partial subsidy to IDP households has no statistically significant effect on the likelihood of non-poor households purchasing.

Overall uptake increases by 14.3 percentage points in villages where subsidies are offered, when compared with control villages.

We want to know:

1. Do targeted, partial latrine sales to poor households?
2. Do targeted, partial latrine subsidies affect latrine sales to non-poor households?
3. Are targeted subsidies a cost-effective means of increasing latrine sales to poor households?

Results: Cost-effectiveness analysis

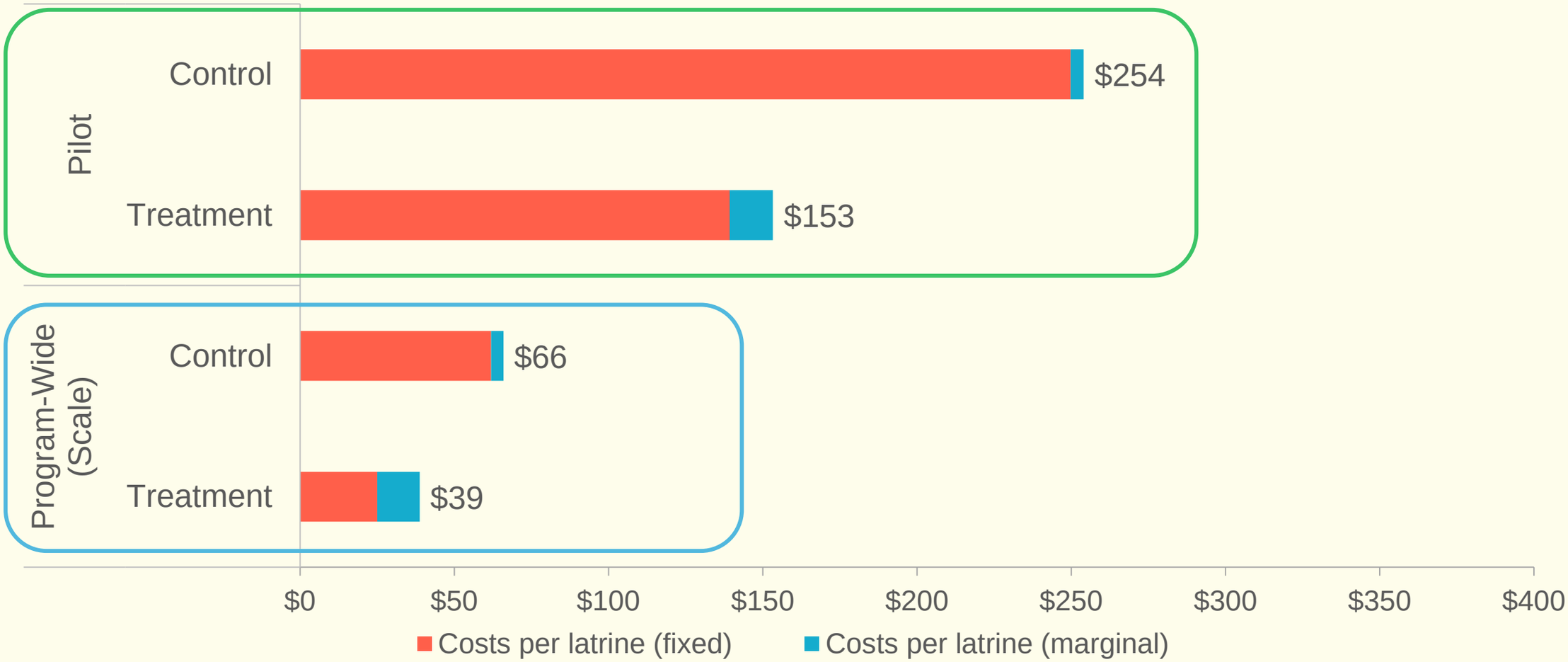
$$\text{Cost-Effectiveness Ratio} = \frac{\text{Total Fixed Costs} + (\text{Marginal Costs} * \text{Number of Latrines Sold})}{\text{Number of Latrines Sold}}$$

Marginal Costs

Control: sales agent commissions and loan processing costs

Treatment: subsidy amount, sales agent commissions, and loan processing costs

Results: Cost-effectiveness analysis



Takeaways

Higher sales in the pilot Treatment group "spread" fixed costs across a greater number of latrines, resulting in a higher cost-effectiveness ratio

If we project calculations out to a scaled version of the program, smart subsidies still look like a cost-effective way to drive increases in sanitation coverage

Future Plans and Takeaways

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Conclusions

Challenges & Limitations

- **The study took place in a province with high coverage rates – how would results differ in different circumstances?**
- **High turnover of Sales Agents, requiring considerable training and oversight.**
- **The study design may have impacted sales agent motivation to sell in control villages.**
- **The ID Poor system is by no means a worldwide standard – how do we target in the absence of such systems?**

Conclusions

Scale Up Plans

- **No longer pursuing formal sanitation finance.**
- **Instalment plans offered to customers by suppliers.**
- **Smart subsidy will be fully integrated into the existing sanitation marketing program under SMSU 3.0.**
- **Government of Cambodia adopted the recommended subsidy guidelines → coverage must be 60% before subsidy can be offered.**
- **Continue to share findings in hopes of influencing others in the sector – in Cambodia, but also in other contexts.**

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Conclusions

Takeaways

- **This study provides promising evidence that targeted subsidies can increase sanitation coverage among poor households and overall.**
- **It also shows that well-targeted subsidies need not have market distortion effects.**
- **Targeted subsidies may provide a cost-effective complement to financing.**

Thank you

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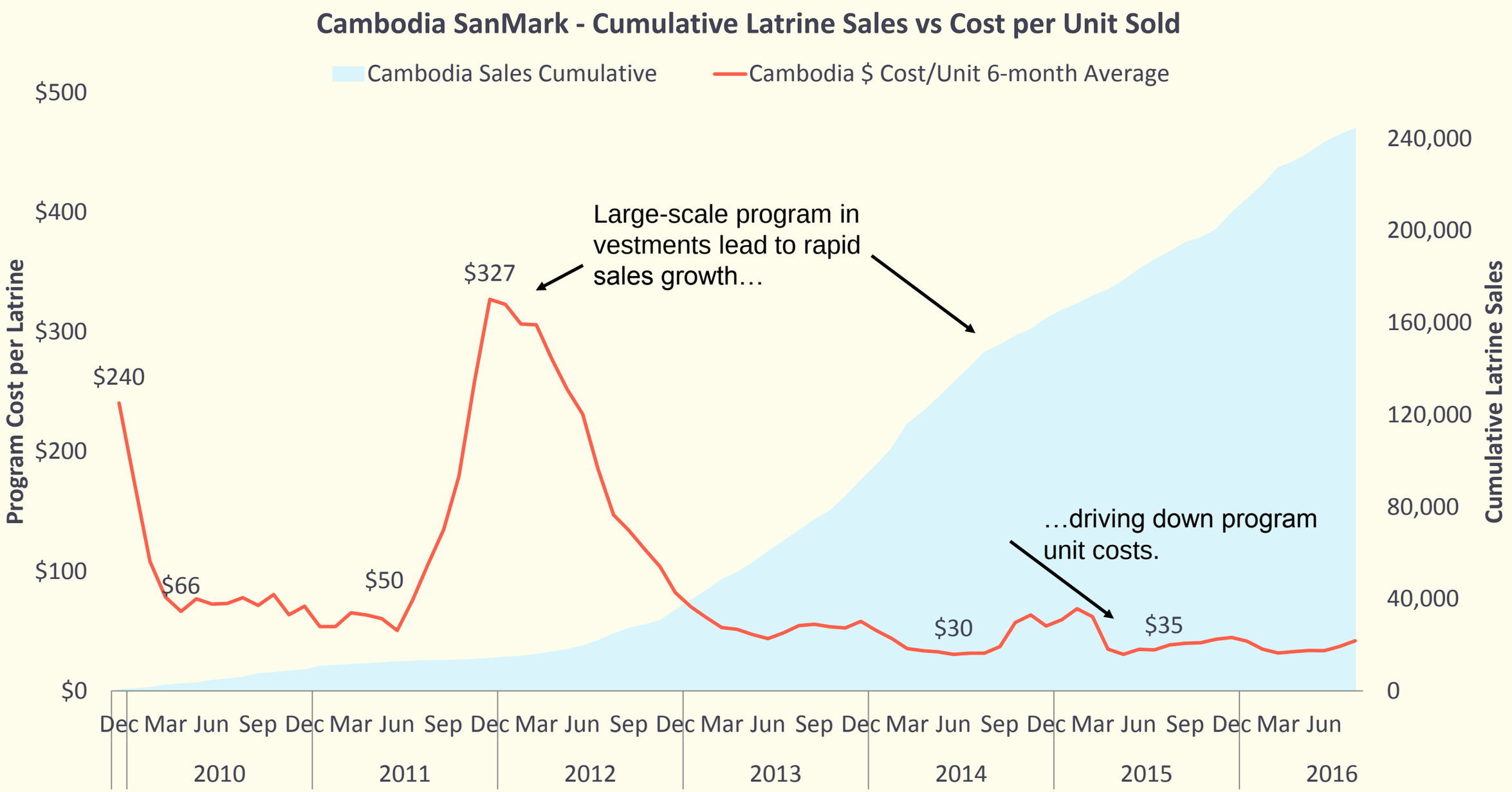
iDE Policy Brief available here

Program Cost-Effectiveness



Outstanding questions:

1. **At what point is it most cost-effective to introduce targeted subsidies?**
2. **What is the impact of targeted subsidies on future cost-effectiveness?**

Appendices: Model results

Table 12. Outcome: Latrine Orders (village level)

	Non-poor	ID Poor 1	ID Poor 2	All HHs
Treatment	0.659	2.235***	2.624***	5.518***
	(1.197)	(0.484)	(0.536)	(1.712)
Total households	0.00636	0.00553**	0.00431**	0.0162**
	(0.00474)	(0.00232)	(0.00192)	(0.00686)
"Valid" latrine customers	41.99***	3.010	7.754***	52.75***
	(7.111)	(2.791)	(2.632)	(9.936)
Village ID Poor 1 and 2	-13.96*	9.109***	5.689*	0.843
	(7.535)	(3.439)	(2.939)	(10.54)
District fixed effects				
District: Lvea Aem	-1.747	0.849	0.378	-0.519
	(2.450)	(1.037)	(1.398)	(3.829)
District: Mukh Kampul	3.194*	-0.0728	0.769	3.890
	(1.889)	(0.578)	(0.810)	(2.560)
Prior subsidies	2.107*	-0.0687	-0.327	1.712
	(1.138)	(0.454)	(0.459)	(1.566)
Prior free latrine	2.598	-0.161	-0.421	2.017
	(2.088)	(0.478)	(0.504)	(2.645)
Prior negative latrine experience	-1.835	-0.898*	-0.848	-3.581*
	(1.432)	(0.472)	(0.587)	(1.931)
Month of sale	-0.0295	-0.0907	0.0746	-0.0455
	(0.373)	(0.145)	(0.230)	(0.545)
ST fixed effects (See Appendix)				
Constant	-5.212*	-5.068***	-4.052***	-14.33***
	(2.730)	(1.690)	(1.259)	(4.113)
Observations	150	150	150	150
R-squared	0.540	0.368	0.419	0.538

Appendices: Model results

Table 13. Outcome: Latrine Deliveries (village level)

	Non-poor	ID Poor 1	ID Poor 2	All HHs
Treatment	0.116	2.094***	1.989***	4.199***
	(0.857)	(0.423)	(0.391)	(1.275)
Total households	0.00347	0.00414**	0.00243*	0.0100**
	(0.00339)	(0.00192)	(0.00135)	(0.00504)
"Valid" latrine customers	24.14***	1.770	4.998***	30.90***
	(4.998)	(2.354)	(1.864)	(7.225)
Village ID Poor 1 and 2	-10.13*	6.994**	4.815**	1.678
	(5.566)	(3.205)	(2.110)	(8.403)
District fixed effects				
District: Lvea Aem	-1.431	0.705	1.094	0.369
	(1.559)	(0.899)	(0.964)	(2.572)
District: Mukh Kampul	2.931**	-0.0754	1.161*	4.016*
	(1.415)	(0.535)	(0.680)	(2.042)
Prior subsidies	1.671**	0.0423	0.183	1.896
	(0.802)	(0.404)	(0.336)	(1.163)
Prior free latrine	2.360	-0.151	-0.242	1.967
	(1.475)	(0.440)	(0.364)	(1.916)
Prior negative latrine experience	-0.834	-0.718*	-0.532	-2.084
	(0.994)	(0.426)	(0.386)	(1.395)
Month of sale	-0.150	-0.0704	0.0138	-0.206
	(0.255)	(0.124)	(0.144)	(0.371)
ST fixed effects (See Appendix)				
Constant	-3.375	-4.331***	-3.479***	-11.18***
	(2.148)	(1.441)	(1.042)	(3.515)
Observations	150	150	150	150
R-squared	0.509	0.359	0.434	0.510

Appendices: Model results

Table 14. Outcome: Uptake Rate Among "Valid" Customers

VARIABLES	Non-poor	ID Poor 1	ID Poor 2	All HHs
Treatment	-0.00159	0.169***	0.147***	0.143**
	(0.0403)	(0.0586)	(0.0499)	(0.0621)
Total households	-0.000189*	-8.89e-05	-0.000190	-0.000264
	(0.000104)	(0.000207)	(0.000143)	(0.000262)
"Valid" latrine customers	-0.178	-0.146	-0.212	-0.478**
	(0.126)	(0.197)	(0.178)	(0.239)
Village ID Poor 1 and 2	-0.140	0.271	0.240	0.449
	(0.209)	(0.660)	(0.281)	(0.651)
District fixed effects				
District: Lvea Aem	-0.00531	0.0377	0.0976	-0.0527
	(0.0417)	(0.0930)	(0.0963)	(0.0790)
District: Mukh Kampul	0.0657	-0.0907	0.111	-0.00355
	(0.0579)	(0.0983)	(0.102)	(0.0788)
Prior subsidies	0.0475	0.111*	-0.0427	0.124*
	(0.0319)	(0.0623)	(0.0578)	(0.0654)
Prior free latrine	0.0828	0.0218	-0.0410	-0.00563
	(0.0759)	(0.0689)	(0.0425)	(0.0715)
Prior negative latrine experience	-0.0841**	-0.0914*	-0.0245	-0.119**
	(0.0372)	(0.0547)	(0.0398)	(0.0516)
Month of sale	-0.0199**	-0.0210	-0.0185	-0.0128
	(0.00780)	(0.0201)	(0.0165)	(0.0147)
ST fixed effects (See Appendix)				
Constant	0.283***	0.0838	0.0841	0.216
	(0.0957)	(0.274)	(0.115)	(0.242)
Observations	143	140	142	150
R-squared	0.232	0.206	0.290	0.181

Appendices: Model results

Table 15. Outcome: Total Coverage Rate

	Non-poor	ID Poor 1	ID Poor 2	All HHs
Treatment	-0.00202	0.0650***	0.0413***	0.00759**
	(0.00344)	(0.0132)	(0.00928)	(0.00365)
Total households	-3.44e-05**	-1.71e-05	-3.13e-05	-2.95e-05**
	(1.38e-05)	(3.93e-05)	(3.05e-05)	(1.31e-05)
"Valid" latrine customers	0.0806***	0.113**	0.121***	0.0805***
	(0.0184)	(0.0569)	(0.0398)	(0.0192)
Village ID Poor 1 and 2	-0.0215	-0.0648	-0.00524	-0.00165
	(0.0258)	(0.0941)	(0.0578)	(0.0266)
District fixed effects				
District: Lvea Aem	-0.00142	0.0117	0.00936	0.00426
	(0.00660)	(0.0361)	(0.0229)	(0.00696)
District: Mukh Kampul	0.0112**	-0.00165	0.0247	0.0132**
	(0.00545)	(0.0218)	(0.0152)	(0.00577)
Prior subsidies	0.00620*	0.00207	0.00252	0.00650*
	(0.00328)	(0.0125)	(0.00978)	(0.00353)
Prior free latrine	0.0144*	-0.000336	-0.00381	0.00906
	(0.00752)	(0.0128)	(0.0111)	(0.00569)
Prior negative latrine experience	-0.00619	-0.0234*	-0.0120	-0.00859**
	(0.00406)	(0.0129)	(0.0115)	(0.00394)
Month of sale	-0.00170*	0.00219	-0.00102	-0.00163
	(0.000960)	(0.00583)	(0.00415)	(0.00117)
ST fixed effects (See Appendix)				
Constant	0.00896	-0.0184	-0.00631	0.000920
	(0.00890)	(0.0349)	(0.0213)	(0.0102)
Observations	147	148	149	150
R-squared	0.463	0.319	0.343	0.462