



POLICY BRIEF

Leveraging Targeted Subsidies to Increase Sanitation Coverage

Evidence from a randomized control trial in Cambodia

iDE's sanitation marketing efforts in Cambodia have resulted in over 250,000 sales of improved pour-flush latrines. Despite the overall efficacy of this approach, iDE recognizes that market actors are not necessarily incentivized to reach the poorest segments of the market. iDE and Causal Design utilized a randomized control trial—in which poor households in treatment villages were offered partial subsidies, financing and cash-only options, while control-village households were offered only financing or cash-only purchase options—to test which financing mechanism leads to the greatest coverage change among poor households, while having the least distortionary effect on the market. The study finds uptake rates among poor households that were offered subsidies increased by 14 to 16 percentage points compared to the control group, while there was no significant effect on non-poor households. Additionally, a cost-effectiveness analysis shows that the increase in sales and subsequent economies of scale from the targeted subsidy program result in lower per-unit program cost compared to the cash-only and sanitation finance program, equal to \$39 and \$66, respectively. This study provides compelling evidence for the impact and cost-effectiveness of well-targeted subsidies on latrine uptake among lower-income households in a market-based approach.

Introduction

Since late 2011, iDE's sanitation marketing efforts in Cambodia have resulted in over 250,000 sales of improved pour-flush latrines across seven provinces. iDE facilitates these latrine sales through a network of Latrine Business Owners (LBOs) and sales agents, called "Sanitation Teachers." Since program inception, iDE has seen improved latrine coverage across those seven provinces nearly double, from 29 percent to 56 percent. iDE's unique approach to sanitation marketing builds both demand and supply capacity in order to drive rapid increases in coverage rates. In Cambodia, this includes training LBOs to produce quality, hygienic latrines, while also equipping a cadre of Sanitation Teachers to sell the latrines at a market rate that allows sufficient margins for LBOs to profit and for Sanitation Teachers to be paid a commission. Despite the overall efficacy of this approach, iDE recognizes that market actors are not necessarily incentivized to reach the poorest, who are often unable or unwilling to pay full market price for a high-quality latrine.

To address this problem, iDE has explored two mechanisms for cutting down barriers to latrine purchases by poor households: targeted subsidies and sanitation financing. To determine the impact of these two mechanisms on latrine uptake among both poor and non-poor households, iDE and research partner Causal Design implemented a pilot study utilizing a randomized controlled trial (RCT) evaluation design in which poor households in treatment villages were

offered partial subsidies, financing and cash-only options, while control-village households were offered only financing or cash-only purchase options. This paper lays out the study's primary findings and, in doing so, answers the following questions:

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?

We begin this paper by laying out the RCT design, and follow with an overview of the study's main findings as they relate to the three questions above. We end by exploring the implications that the research findings may have for sanitation policy and future implementation.

Pilot and study design

Designing the RCT

The objective of this study was to test the potential for sanitation financing and targeted subsidies to increase latrine purchases among the lowest income households in Cambodia. To accomplish this, the study built on iDE's existing sanitation marketing program, which has already established a supply and sales chain in and around the pilot area villages. The pilot took place in 166 villages across three districts of Kandal Province in Cambodia from November 2015 until August 2016.

The study utilized the Cambodian government's national system for identifying low-income households in order to determine eligibility for targeted subsidy. This program, known as ID Poor, assesses households' wealth and places them in one of three categories: ID poor 1 (IDP 1), ID poor 2 (IDP 2) and Non-Poor, with IDP 1 being the poorest. Using this system, the Sanitation Teacher offered vouchers to IDP 1 households to purchase a latrine at a \$25 USD discount (on a \$56 USD market price), while offering IDP 2 households the opportunity to purchase a latrine with a \$12.50 USD discount. Non-poor households could purchase latrines at the market price of \$56 USD. The study uses stratified random assignment of 166 villages (15,721 households) into two treatment classifications across three districts of Kandal Province. Subsidies offered to each of the IDP categories were only offered in the treated villages, while financing and cash-only purchasing options were available to both treatment arms.

The mechanics of subsidies and financing

iDE-trained Sanitation Teachers sold latrines in either group or door-to-door sales presentations. In both treatment and control villages, households were given the opportunity to purchase a latrine by either paying cash or by applying for a 12-month loan from a local microfinance (MFI) partner. If the purchaser chose to pay cash, the household paid a \$5 USD deposit and was instructed to pay the latrine business the balance due in cash at the time of installation. In the case of a credit purchase, the household paid the deposit at the time of sale and began payments to the MFI in the month following installation. Loan requests were submitted by Sanitation Teacher to the MFI branches, where a credit officer (CO) assessed the credit-worthiness of the household. If the MFI declined a household's request for a loan, the household was given the opportunity to purchase the latrine with cash.

In treatment villages, IDP households who wished to receive a subsidy were required to show a copy of their official IDP card, which was then photographed and verified using the national IDP database. Upon confirmation of the household's IDP status, the sales agent provided the purchaser with a discount voucher and instructed the buyer to retain the voucher until the latrine was delivered and properly installed. Once installation was complete, they were told to pay the

difference between the market price of the latrine and the value of the subsidy and give the voucher to the latrine business or to the MFI if the latrine was purchased on credit. The business owner or the MFI then submitted the voucher to iDE as proof of installation. Upon receipt, iDE verified the installation of the latrine to the designated household and then paid the value of the voucher to the respective LBO to complete the market price transaction.

Data Sources

Before the pilot, the field team conducted a count of households without latrines within the three pilot districts. iDE-trained research assistants carried out a census of all pilot area households and gathered information on the household's IDP status, access to and ownership of latrines, type of latrine, self-reported diarrheal incidence and reason for not owning a latrine. This served as the primary dataset for calculating baseline sanitation coverage at the village level.

During the pilot, iDE's Sanitation Teachers submitted latrine orders directly from the field using a front-end mobile application called TaroWorks. Orders are synced to iDE's cloud-base order management system hosted on Salesforce. The order record includes the customer's IDP status, the price and subsidy status of the latrine, whether payment was made through cash or financing, and if an order was ultimately cancelled. Latrine orders are verified using a quality lot control sampling procedure to ensure accuracy in reporting total scale and to prevent fraud among Sanitation Teachers and LBOs. A total of 1,778 latrine sales order records were made through the pilot.

In addition to the order records used in the analysis, the analysis drew on two other data sources to better understand the context of the sales. First, we conducted qualitative debriefs during and after the program with iDE staff and Sanitation Teachers to understand their experience while selling. Second, we conducted a household survey at the end of the pilot to gather information on demographics, knowledge of latrine pricing and offerings, experience of latrine sales, perceptions of financing, perceptions and attitudes towards subsidy, and general market knowledge.

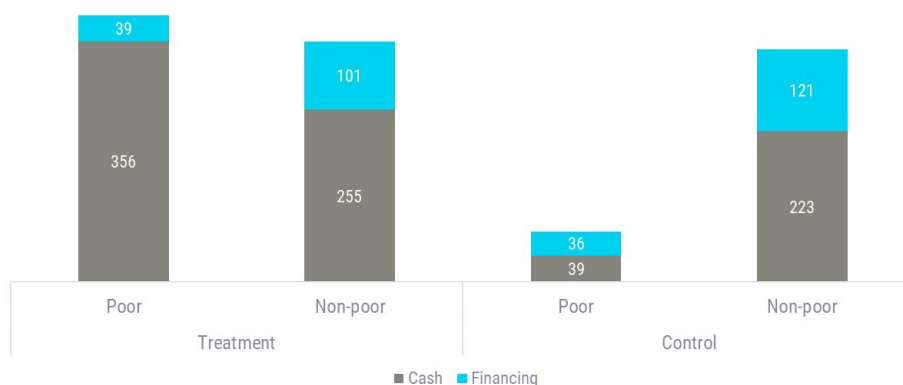
Results

Impact Evaluation

The principal aim of this study was to determine how targeted subsidies impact latrine uptake among poor households. iDE was also interested in capturing any market-distortion effects that affect the propensity of non-poor households to purchase latrines. This section presents data and analysis suggesting that well-targeted subsidies do significantly increase poor households' latrine purchases with minimal impact on non-poor household latrine sales.

In terms of the absolute number of latrines, sales to IDP households were more than five times greater in treatment villages than in control villages (399 sales vs 77 sales). When stratified by IDP designation, IDP 1 sales in treatment villages were 6.5 times those in control (196 vs. 30) and IDP 2 sales in treatment villages were 4.3 times of those in control (203 vs. 47).

Total toilet sales by payment type and experimental group



While the descriptive statistics above show a large difference in uptake of latrines between the treatment and control groups, the study ultimately relies on rigorous quantitative methods to better estimate the impact of subsidies. The evaluation uses a single difference (treatment effect) model at the village level that accounts for a number of potentially confounding factors to estimate the difference in uptake between treatment and control. Control variables include village poverty rates, prevalence of prior sanitation subsidies, and prior negative experiences with sanitation solutions. Additionally, the randomization of treatment assignment across villages reduces bias in our estimates of the true effect of the subsidy. Truncated results from the treatment effects model estimating impact on the uptake rate among “valid” households (those that did not already have access to improved sanitation) are presented below.

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 (0.0403)	0.169*** (0.0586)	0.147*** (0.0499)	0.143** (0.0621)
Constant	0.283*** (0.0957)	0.0838 (0.274)	0.0841 (0.115)	0.216 (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]*

¹Valid households are those that do not have improved sanitation, as measured by latrine census

²This table shows only truncated model results, and does not include control variables

The above regression analysis shows that uptake increased by 16.9 and 14.7 percentage points among IDP 1 and IDP 2 households, respectively, when they were offered subsidies. Additionally, the subsidies did not appear to create any change in demand among non-poor households. Additional analyses, utilizing an interaction effects model, show that lower baseline coverage rates may be associated with lower non-poor latrine sales, suggesting that implementers should delay

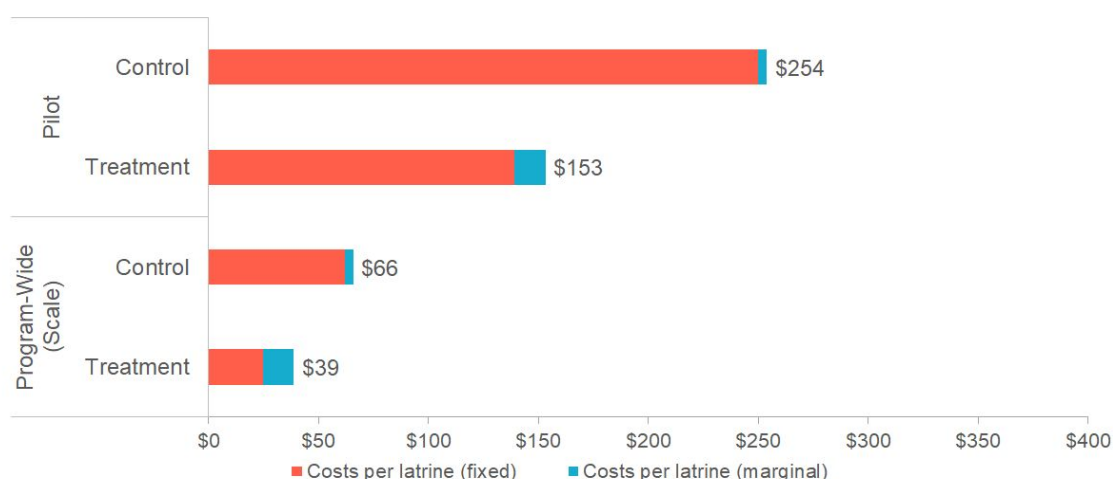
the introduction of subsidies until markets have matured in order to minimize distortions. Overall, the targeted-subsidy led to an increase in coverage of 14.3 percentage points in villages where subsidies were offered, when compared with control villages.

Additional regression analyses on latrine sales, latrine deliveries, and changes in total sanitation coverage show similarly positive and robust results. These quantitative findings, combined with qualitative results from the household survey showing very few non-poor, or control group, households were aware of the targeted subsidy (14 percent) and household's high trust and support for the IDP program more generally, suggest that well-targeted subsidies do have the potential to significantly increase sanitation uptake among poor households while maintaining the integrity of the sanitation market for households that are not eligible for subsidy. As with any such intervention, subsidies come with a price. The next section explores whether subsidies' impact on sales are enough to offset the additional costs of the subsidy incurred by the project.

Cost-Effectiveness

iDE and its research partners carried out a separate cost-effectiveness analysis in order to understand the relative costs and outputs when comparing the treatment and control arms of the pilot. The analysis looks at the cost-effectiveness ratio (CER)—calculated per latrine sold—for each arm of the pilot as well as for prospective, scaled-up versions of the treatment and control arms. The CER only reflects iDE costs and does not consider the total economic value of the latrines.

Costs are divided into two primary categories, fixed and marginal. Fixed costs represent the operational, administrative, and staff costs required to implement the program over ten months. Marginal costs are comprised of the added cost of selling a single latrine. For the treatment group, the marginal cost includes commission paid to the Sanitation Teacher, the average subsidy value paid out, and the average cost to process a loan across the pilot. Marginal costs for the control group consist solely of Sanitation Teacher commissions and average loan-processing costs. The figure below shows the CER analysis for the pilot program and for the program-wide versions of both treatment and control programs.



Despite having a marginal cost of almost \$10 USD more than the control group, the increase in latrine sales in treatment villages results in a lower fixed cost per latrine, and thus to a lower CER for the treatment group. In terms of absolute numbers, Sanitation Teachers in the treatment group effectively sold 755 latrines at an average program cost of \$153.30 USD per latrine compared to the control group, in which Sanitation Teachers sold 421 latrines at an average cost

of \$254.06 USD per latrine. For the program-wide estimates, the smart subsidy program runs about \$39 per latrine compared to the control group which is about \$66 per latrine – the lower per unit costs in the program-wide estimates are attributable to economies of scale.

Implications for policy and implementation

The results of the impact evaluation and cost-effectiveness analyses show that in a direct comparison of sanitation coverage outcomes, well-targeted latrine subsidies have the potential to increase sanitation coverage more efficiently than unsubsidized efforts and that they may do so without adversely affecting sales to non-poor customers. Using these insights and lessons learned from pilot operations, we would highlight the following implications for future policy making and implementation in the sanitation sector.

- **Timing is key:** While subsidies proved to have a clearly positive impact on sanitation uptake by the poor, the analysis also showed that lower baseline coverage rates are weakly associated with lower uptake by non-poor households. This finding suggests that implementers should avoid introducing subsidies into a market too early to avoid unintended market distortions. When setting national policy, governments and regulatory agencies should also consider at what point local markets are best able to handle targeted subsidies.
- **Familiarity with the local market matters:** We conducted this study in a geographic area where we have maintained a sanitation marketing presence over several years. Our network of experienced local sales agents and management team were invaluable to ensuring we understood the local market, and to addressing operational challenges associated with administering subsidies.
- **Subsidies must be well-targeted, but targeting can be a challenge:** The ID Poor system in Cambodia represents an almost ideal system for targeting subsidies. For the most part, system records were up to date, the general population trusts in it, and iDE staff and Sanitation Teachers were able to quickly confirm household eligibility. Such systems are not common in the developing world, so others attempting to imitate this approach will need to proceed cautiously when designing their subsidy verification and study protocols.
- **Subsidies offer operational efficiencies when compared to financing:** Much of the sector's energy has been focused on strategies for unlocking capital to provide financing to consumers of WASH products such as latrines. During this pilot and in iDE's experience more generally, slow loan processing times and high rejection rates have made it difficult to operationalize sanitation financing at scale. In contrast, well-targeted subsidies can be simple and inexpensive to administer, making them an attractive alternative to financing as a means of reaching the poorest and most vulnerable.

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