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THE USE OF SUBSIDIES IN AN AREA-WIDE SANITATION APPROACH

OVERVIEW AND EVIDENCE GAPS

DECEMBER 2023

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ACRONYMS

4Ps	Pantawid Pamilya Pilipino Program
AI	Artificial Intelligence
AWS	Area-Wide Sanitation
BPL	Below the Poverty Line
CBT	Community-Based Targeting
CHOBA	Community Hygiene Output-Based Aid
CLTS	Community-Led Total Sanitation
DID	Difference-in-Difference
GESI	Gender Equality and Social Inclusion
IEC	Information, Education, and Communication
ID	Identification
iDE	International Development Enterprises
JMP	Joint Monitoring Programme
LEAP	Livelihood Empowerment Against Poverty
LPP	Latrine Promotion Program
LSA	Latrine Supply Agent
MBS	Market-Based Sanitation
NGO	Nongovernmental Organization
OBA	Output-Based Aid
OD	Open Defecation
ODF	Open Defecation Free
PhATS	Phased Approach to Total Sanitation
PMT	Proxy Means Testing
PPI	Poverty Probability Index
PPP	Purchasing Power Parity
RBP	Results-Based Payment
RCT	Randomized Controlled Trial
SanMark	Sanitation Marketing
TSC	Total Sanitation Campaign
UNICEF	United Nations Children's Fund

USAID	United States Agency for International Development
USD	United States Dollars
WASH	Water, Sanitation, and Hygiene
WASHPaLS	Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability
WHO	World Health Organization
WSSCC	Water Supply and Sanitation Collaborative Council

EXECUTIVE SUMMARY

INTRODUCTION

Hardware subsidies have held a controversial place in the sanitation sector's policy toolkit. Initially, subsidies were among the common policy tools for expanding access of rural populations to sanitation, often coming in the form of one-time distribution of latrine hardware to households with little or no attention to targeting the poor. Over time, however, hardware subsidies were found to produce distortionary effects on sanitation markets, introduce perverse incentives on the part of beneficiaries, and strain the budget of implementers, while often failing to achieve the behavior change needed for sustained maintenance and use of latrines. As such, the popularity of hardware subsidies faded in the mid-2000s, giving way to more demand- and behavior change-focused sanitation interventions such as community-led total sanitation (CLTS) and market-based sanitation (MBS).

Recognizing that "no subsidy" approaches alone also were not sufficient to achieve sustained access and use of latrines, recent hardware subsidy efforts have sought to improve upon their predecessors in several ways. First, these "smart" subsidies seek to reduce market distortion by restricting eligibility criteria to a portion of in-need households. Second, they seek to target poor and vulnerable households more accurately, using identification strategies that rely on local knowledge (e.g., community consultation), existing social protection systems, proxy means testing (PMT), and innovative technologies (e.g., geospatial techniques). Lastly, they avoid supplying hardware directly to households, instead relying on a diverse set of mechanisms, such as vouchers and rebates, to ensure recipients express demand for sanitation and change behavior, while stimulating the local sanitation market. Smart hardware subsidies are increasingly recognized as an effective tool for reaching the goals of equity and universal coverage in the area-wide sanitation (AWS) framework.

This review draws from a broad array of evidence on the use of household toilet hardware subsidies within the sanitation sector and borrows from that of other sectors where needed to present a practical overview of the elements of design and implementation that can impact the effectiveness of smart hardware subsidies in reaching poor and vulnerable households.

KEY FINDINGS AND AREAS FOR FUTURE RESEARCH

Subsidies can be effectively introduced alongside different sanitation programming approaches, but questions remain on timing. Smart subsidies have often been implemented in concert with other sanitation programs, but evidence is mixed as to when they should be introduced. Recent studies conducted in Laos, Cambodia, Bangladesh, and India testing subsidies alongside CLTS and MBS programs found a positive impact on uptake of improved latrines relative to implementing CLTS or MBS programs alone—at least in the short term. While market distortion is a risk, the review also found evidence that subsidies can stimulate local sanitation markets. That said, the current evidence base is centered in Asia and is limited to short-term outcomes. Future research can expand understanding by generating knowledge in the African context and examining longer-term impacts on uptake, equity, and universal achievement at community and higher levels. Moreover, it is crucial to consider the contextual factors surrounding the maturity of sanitation markets when introducing subsidies.

Vouchers and rebates are among the most common delivery mechanisms for smart hardware subsidies, but their strengths and weaknesses remain under-documented within the sanitation sector. The literature from other health sectors suggests that both voucher and rebate programs are flexible, targeted means of delivering subsidies that empower households to be participating agents in the local market, and often allow for some choice in selecting latrine components. But conversely, both present indirect costs to households, as they require them to incur additional

travel expenses for redeeming vouchers and claim rebates. Vouchers are more suitable in addressing financial constraints, as they do not require households to pre-finance the subsidy with their own cash, but often come with short validity periods that limit the amount of time households have to decide to redeem the voucher and prepare the non-subsidized costs. These considerations must be carefully weighed while considering the local context in which subsidies are deployed.

Subsidy validity periods may strongly impact subsidy uptake and effectiveness but are often driven by programmatic operational considerations. The literature shows wide variation in the validity periods of subsidies, ranging from on-the-spot to about 18 months. The choice of validity period has often been made to satisfy operational constraints rather than to optimize sanitation outcomes. Shorter windows may accelerate the achievement of open defecation free outcomes but disadvantage poor and vulnerable households. Longer validity periods have shown mixed results in terms of redemption rates. Future research may explore the optimal time frame, accounting for budget constraints and other factors affecting the length of validity periods. The scalability and cost-effectiveness of intensive follow-up and monitoring efforts to ensure high redemption rates also need further study.

While the question of "optimal" subsidy amount depends on context, there is hypothetical evidence that subsidy size may correlate with households' willingness to invest in improved latrines. The lack of standardized metrics for reporting subsidy amounts (or relative subsidy size vs. the full cost of the latrine) is, however, a major limitation of the literature. Available evidence does not focus on vulnerable households, and product choices may not align with preferences. Some studies show that small subsidies can still have a significant impact in terms of uptake; meanwhile, large subsidies can be costly and challenging to maintain at scale. Future research could experiment with different subsidy amounts to determine relative effectiveness and appropriate subsidies for specific contexts.

Poverty and vulnerability are often used as criteria for targeting, but available evidence does not point to one best targeting method. The inherent flexibility of indicators of a household's level of poverty and vulnerability makes them liable to subjective—and even political—interpretations. In the sanitation literature, few subsidy studies that target vulnerable groups systematically report inclusion and exclusion errors (projected or actual), as it is often costly, time-consuming, and challenging to conduct independent monitoring exercises to validate vulnerability status. The poverty reduction literature has found that, though their performance can vary significantly by context, PMT tends to perform better than community-based targeting (CBT) in terms of targeting errors when poverty is measured in terms of per-capita consumption. But CBT can better consider local definitions and nuances of poverty and vulnerability. Either way, targeting costs can be substantial, particularly in the absence of a pre-established targeting system. And even national targeting systems may result in inclusion and exclusion errors, highlighting a trade-off between accuracy and scalability.

There is a lack of standardized and comprehensive reporting on costs of smart subsidy programs. Several metrics could be used to assess the cost-effectiveness of a smart subsidy program. One is the cost per poor qualified household achieving basic access. An additional metric is the total program cost per community achieving a benchmark level of basic sanitation access (e.g., 80 percent or 100 percent). Another is leverage—the amount of household investment in latrines per dollar spent on a subsidy program. Ideally, having a coherent set of metrics for reporting the implementation costs of diverse subsidy programs would enable a systematic comparison of subsidy design elements. Future research should prioritize addressing this gap to further understand subsidy program effectiveness.

Poor households face a host of non-affordability barriers that can limit their ability to take up a subsidy offer. These can include distance, lack of understanding, or distrust in the process. Addressing these barriers is crucial for achieving gender equality and social inclusion goals due to the fact that the barriers are highly correlated, forming "clusters of disadvantage" that trap poor households, and due to the tendency of barriers to be under-perceived by implementers.

REFLECTIONS ON SCALE AND SUSTAINABILITY

One of the key challenges facing smart subsidy programs operating within an AWS context is their ability to scale. While the evidence suggests that smart subsidy programs can increase access to basic sanitation in the short term, the associated financial costs, including implementation and targeting, can be substantial. These costs may present significant barriers to program initiation and continuation and may be difficult to justify if the long-term benefits of a program are uncertain.

Even when households have utilized subsidies to construct improved latrines, they may face obstacles that hinder their long-term adoption and use. These barriers can stem from a variety of factors, including physical or environmental limitations, as well as cultural, social, and behavioral norms related to latrine usage. Left unaddressed, such barriers can undermine the long-term impact of subsidy programs. While it is impractical—if not impossible—to eliminate them all, subsidy programs working within an AWS context can deploy various strategies to mitigate their effect and improve sustainability. These include ensuring sufficient follow-up with households to ensure correct toilet installation and minimum standards of usability and hygiene; providing additional support to beneficiary households, particularly the most vulnerable, to support sustained maintenance, management, and use of sanitation facilities and access to sanitation services; and monitoring latrine usage and safe management over the long term, in addition to uptake.

RECOMMENDATIONS

While this review did not set out to expressly provide guidance to sanitation subsidy program developers or policymakers, it did highlight some common "do's" for subsidy programs intending to operate at scale within an AWS context. These are listed below as a set of recommendations, understanding that they can and should be further informed by future research and evidence.

1. **In designing and implementing voucher and rebate programs, implementers should identify, account for, and take active measures to ease the barriers experienced by the most poor and vulnerable households to access and use the offered subsidy.** Barriers can work to frustrate, confuse, and even deter households from uptake, particularly the poorest households, whose lack of resources, social connections, know-how, reliable access to transportation, and even control over their daily lives constrain their capacity to act.
2. **In determining the most viable targeting method, sanitation subsidy programs or policymakers should consider using existing national targeting systems—**but seek to understand the potential targeting errors and the trade-off between accuracy and scalability. Policymakers should also consider other criteria, such as satisfaction (and community acceptability) and cost.
3. **To address the gap in evidence on subsidy program costs, targeted subsidy programs and studies going forward should systematically collect and publish cost data.** Proposed metrics concern (1) the cost per poor qualified household achieving basic sanitation access, and (2) the total program cost per community achieving a benchmark level of basic sanitation access.
4. **To determine the size of subsidies in the context of AWS, policymakers should seek to understand the trade-offs along key policy criteria (e.g., sustainability, household affordability/equity, scale of disbursement) of providing larger versus smaller amount subsidies.** This could include investing in well-designed willingness to pay studies to determine the demand curve for the subsidized product, and/or designing a smaller-scale evaluation that tests how variations of amounts perform along these criteria before introducing the subsidy program at scale.

1.0 INTRODUCTION

Governments use household toilet subsidies as one of several financial tools for promoting universal access to sanitation goods and services. These subsidies are typically offered in the form of hardware to a portion of households, chosen based on criteria such as ability to pay and lack of access to a functional and hygienic latrine. The popularity of household hardware subsidies in the sanitation sector has waxed and waned over the past few decades: widespread throughout the latter half of the 20th century, the use of subsidies declined throughout the early 2000s before making a comeback in more recent years. From these cycles emerged a shift in the types of subsidies most often deployed in the sector—from direct hardware provision to a broad array of more targeted ("smart") and market-compatible hardware subsidies, often implemented alongside other types of sanitation programs.

1.1 DIRECT HARDWARE PROVISION

Direct hardware provision was once a popular instrument for promoting sanitation. The main assumption underlying these programs was simple: that the key barrier preventing most households from practicing good sanitation was their inability to afford latrines. By supplying latrine hardware to households, direct hardware subsidy programs sought first to remove that barrier, promising an immediate remedy for the problem of access. These programs also hoped to promote the use of latrines among the community's non-beneficiary households, which might have some means to pay but lack familiarity with the technology. The expectation was that non-beneficiary households would copy the "demonstration" technology subsidized for one or two neighbors, thus producing a "multiplier effect" of latrine uptake across the community (Jenkins, Sugden, and Scott 2008). Another envisioned benefit was the "trickle down" effect. The premise was that as more middle-income households took up latrines, it would stimulate the sanitation market, driving down costs over time. This reduction in costs would eventually enable poorer households to access more affordable facilities and services (A. Robinson, personal communication, 2023).

Despite initial hopes, direct hardware subsidy programs showed significant limitations. First, they were expensive. Governments often hit financial shortfalls due to unexpected costs in the purchasing and distribution of so much hardware; in some cases, public funds had to be redirected from other sectors to close the gap (Evans, van der Voorden, and Peal 2009; Trémolet, Kolsky, and Perez 2010; Andres et al. 2019). Second, the results were underwhelming. A study of direct hardware subsidies programs in Senegal and Ecuador found that for every 1,000 United States Dollars (USD) spent on subsidies, only 1.6 and 2.5 households gained access to sanitation services, respectively (Trémolet, Kolsky, and Perez 2010). Other programs were found to disproportionately benefit well-off households while leaving out poor families—their intended beneficiaries (Andres et al. 2019).

Furthermore, these "supply-driven" subsidy programs have often failed to induce real demand, which has led to counterproductive effects in the long term. Because programs relied primarily on one-off provision of physical materials, the beneficiary communities failed to develop real demand for improved sanitation or a durable market in the long term (Jenkins and Sugden 2006). This problem often took the form of a phenomenon called "buying participation," in which households acquire latrine parts without actually using them (Jenkins and Sugden 2006). Some studies have even found that such programs can backfire—discouraging household purchases for years—by creating the expectation of continued subsidies in the future (Robinson and Gnilo 2016; International Development Enterprises [iDE] 2019c; United States Agency for International Development [USAID] 2019). Lastly, these subsidies can undermine alternative approaches (e.g., behavior change programming) being deployed simultaneously by disengaging and stoking resentment among non-subsidized households (USAID 2019).

For these reasons, the use of direct hardware provision subsidies went into decline throughout the early-2000s. Instead, the sanitation community moved away from subsidies toward other measures more responsive to demand, such as behavioral change programming and demand creation through community-led total sanitation (CLTS).

1.2 EMERGENCE OF "SMART" SUBSIDIES

In recent years, the use of household toilet subsidies has undergone a resurgence within the sector, aided by a new set of financing modalities and implementation structures that aim to overcome past challenges (Halcrow, Rautavuoma, and Choden 2014). This resurgence was fueled in part by evidence that, on their own, demand-driven and market-based approaches were insufficient to boost latrine uptake and sustain use among the poorest segments of the population. Moreover, the sanitation sector has come to acknowledge the strong track record of household subsidies across a variety of social protection programs outside the sector. **Increasingly, household subsidies are recognized as a powerful tool to promote access to sanitation goods, so long as they are designed and implemented with care** (Andres et al. 2019).

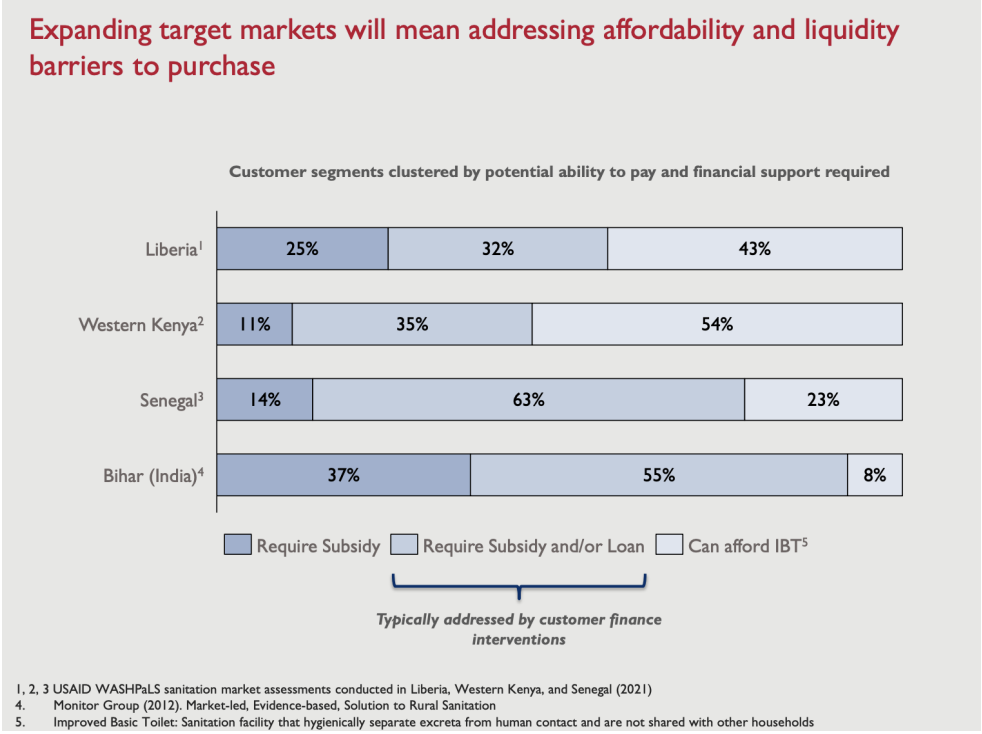
Recent subsidy efforts, termed "smart" subsidies, have sought to improve upon their predecessors in several ways. First, they have attempted to narrow the eligibility criteria to a portion of poorer households in a community, in an effort to reduce distortionary effects on the market (USAID 2019; Kohlitz et al. 2021) and to reduce overall costs of the subsidy program. Second, implementing organizations and sector experts—including the World Bank and USAID—have begun to experiment with strategies that rely on local knowledge (e.g., community consultation) and innovative technologies (e.g., geospatial techniques) to identify poor and vulnerable households more accurately or cost-efficiently (USAID 2020; World Bank 2020). Finally, organizations have moved away from directly supplying hardware, relying instead on a diverse set of mechanisms for deploying funds. Some of these include:

- Discount vouchers that can be used to purchase a specific product available in the market;
- Discount vouchers with supplier results-based payment (RBP) ("Voucher + RBP") where households pay a discounted price to suppliers, and suppliers are only reimbursed after toilet construction has been verified; and
- Cash rebates to the household, provided after toilet construction has been verified.

This review focuses on "smart" subsidies because they are an important tool that offers promise in advancing the goals of equity and universal coverage in an area-wide sanitation (AWS) framework (USAID 2023). Sanitation market surveys in Liberia, Western Kenya, Senegal, and Bihar (India) have estimated that a majority of households may require some form of financial support (e.g., loans or installment payment to address a liquidity barrier) to buy a latrine, while a sizable proportion of the poorest (11–37 percent) could require a hardware subsidy to directly offset the market cost of one (see Figure 1). Additionally, the review primarily focuses on the use of smart subsidies to achieve access to basic sanitation, as defined by the Joint Monitoring Programme (JMP).[1]

[1] The JMP defines each sanitation service level as follows (WHO [World Health Organization] UNICEF [United Nations Children's Fund] JMP n.d.):

1. Open Defecation: "Disposal of human feces in fields, forests, bushes, open bodies of water, beaches and other open spaces or with solid waste."
2. Unimproved: "Use of pit latrines without a slab or platform, hanging latrines or bucket latrines."
3. Limited: "Use of improved facilities shared between two or more households."
4. Basic: "Use of improved facilities which are not shared with other households."
5. Safely Managed: "Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or removed and treated offsite"



Source: USAID Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) Sanitation Market Assessments conducted in Liberia, Western Kenya, and Senegal (2021).

Figure 1. Customer Segmentation Based on Potential Ability to Pay for an Improved Basic Toilet

1.3 SECTION ROAD MAP

This review synthesizes the evidence on smart hardware subsidies (hereafter, "subsidies"), presenting a practical overview of the elements of design and implementation that can affect the effectiveness of subsidies in reaching poor and vulnerable households. Section 2 examines ways that smart subsidies have been integrated with other interventions to accomplish programmatic goals (e.g., attaining open defecation free [ODF] status, reversing slippage, expanding basic sanitation coverage) and broader AWS objectives—reaching poor and vulnerable groups whose needs are unmet by existing sanitation programs. Sections 3 and 4 focus on factors affecting the design, targeting, and uptake of targeted subsidies. The review concludes with a reflection on the questions surrounding the cost-effectiveness of subsidy programs, the challenges of balancing targeting costs against accuracy, and on strategies for ensuring the sustainable usage of subsidized sanitation goods and services.

The review will draw largely from the subsidy programs and studies listed in Table 1.

TABLE 1. SUBSIDY PROGRAMS AND STUDIES

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION
Pattanayak et al. 2009	India	Subsidies implemented in combination with an "intensified version of the information, education, and communication (IEC)" campaign (inspired by CLTS)	Discount on price of latrine construction	Households falling below the poverty line (BPL) (i.e., those with monthly per-capita consumption expenditure of Indian Rupee 356, or roughly USD 9)

TABLE 1. SUBSIDY PROGRAMS AND STUDIES

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION
Guiteras, Levinsohn, and Mobarak 2015	Bangladesh	Subsidies implemented in combination with a latrine promotion program (LPP) (similar to CLTS)	Voucher given to individual households	Households in the bottom 75 percent of the wealth distribution (determined via landholdings, a proxy for wealth)
Ljung et al. 2015	Vietnam	Consumer rebates implemented within a Community Hygiene Output-Based Aid (CHOBA) program. Accompanying incentives were IEC, access to credit, supply chain improvement, and financial incentives to households.	Consumer rebates	Households in the income groups that comprise the poorest 40 percent of the rural population (i.e., owning a certificate of poverty, classified as near-poor, suffering from economic hardship)
Nicoletti et al. 2017	Cambodia	Subsidies implemented in combination with market-based sanitation (MBS) program	Vouchers given to individual households	IDPoor 1 and IDPoor 2 households[2]
Batmunkh et al. 2019	Philippines	Partial financial subsidies implemented in combination with behavioral promotion, CLTS, and hardware subsidies	Subsidized loans to households. The program pays part of the cost of the subsidized latrines up front, and households pay the remaining balance in weekly installments.	Beneficiaries of the Pantawid Pamilya Pilipino Program (4Ps)
Cameron et al. 2021	Laos	Subsidies implemented in combination with CLTS	Rebates given to individual households upon verification of latrine installation	The poorest 30 percent of households (determined via a scorecard system)
Kohlitz et al. 2021 (SNV program)	Cambodia	Stand-alone subsidy program implemented within a broader context of the Sustainable Sanitation and Hygiene for All program	Supplier discount	IDPoor households in communes with 80 percent improved latrine coverage and that do not have an improved latrine
Kohlitz et al. 2021 (WaterSHED program)	Cambodia	Stand-alone subsidy program	Voucher to households	IDPoor households in villages with 80 percent improved latrine coverage and that do not have an improved latrine
USAID 2021b; Trimmer et al. 2022	Ghana	Stand-alone subsidy program implemented after a CLTS program	Voucher with artisan RBP (upon verification of substructure and	"Households that either were not able to feed themselves all year round or included a "vulnerable" member (e.g., elderly person, person with a

[2] The IDPoor is the national system used by the Cambodian government to identify poor households in order to determine eligibility for targeted subsidies. Through an assessment of households' wealth, the system places households in one of three categories: IDPoor 1, IDPoor 2, and Non-Poor, with IDP 1 being the poorest (iDE 2019).

TABLE 1. SUBSIDY PROGRAMS AND STUDIES				
STUDY	**PROGRAM COUNTRY**	**INTERVENTION TYPE**	**MECHANISM**	**ELIGIBLE POPULATION**
			superstructure by UNICEF staff)	severe disability or chronic illness resulting in inability to farm or work, widow, or orphan/child-household head) and received no support from relatives."
Hoo et al. 2022	Cambodia	Subsidy integrated with sanitation marketing/MBS - CHOBA	Consumer discount/rebate to service provider	Households belonging to the IDPoor 1 and IDPoor 2 categories

2.0 SUBSIDY TIMING AND INTEGRATION

Key takeaways

1. The introduction of subsidies within sanitation programs varies considerably by context and programmatic factors. Subsidies have typically been introduced after a community's achievement of ODF status, but studies showed that introduction of subsidies before or irrespective of ODF achievement or at low levels of coverage may have similar beneficial effects on latrine uptake among targeted populations.
2. Some programs and protocols[3] have linked subsidy rollout to a predetermined threshold of basic latrine coverage, although there is no consensus regarding the optimal level of basic latrine coverage for introducing subsidies to both maximize uptake and usage and reach all segments of the population. A few rigorously designed studies have found introducing subsidies at lower basic coverage rates does not only drive uptake, but can also generate positive spillovers, avoiding the feared market distortion. In reality, subsidy introduction is often strongly informed by program life cycles, timelines, and funding availability, with potential high impacts on program results.
3. Current evidence suggests that subsidies, when implemented in concert with other programs (e.g., behavioral change, CLTS, MBS) or after program completion, can lead to temporary increases in rates of basic latrine access and ownership. That said, more evidence is needed—especially in the African context—to determine whether these outcomes are lasting and whether they accelerate attainment of universal basic or safely managed sanitation coverage.

One of the principal challenges in subsidy design is determining when and how to distribute them. The timing of subsidy introduction may depend on the type of sanitation intervention (e.g., CLTS or MBS) that has taken place prior to or alongside the subsidy program. Recent studies have experimented with various strategies for timing and integrating subsidy programs (UNICEF Philippines 2015; UNICEF 2016; WaterAid 2017; Cameron et al. 2021; Guiteras, Levinsohn, and Mobarak 2015; Pattanayak et al. 2009; Kohlitz et al. 2021; iDE 2019c). Below we examine the available evidence regarding different subsidy timing and integration approaches.

2.1 SUBSIDY TIMING

The literature suggests that there is no universal approach to timing the introduction of subsidies. Rather, implementers have often based the introduction of subsidies on different considerations and milestones. These include after or before the attainment of ODF status, based on basic latrine access coverage level, based on the program life cycle, and concurrently with another sanitation intervention.

2.1.1 AFTER ATTAINMENT OF ODF STATUS

One approach is to introduce subsidies after a community has achieved ODF status. Developed in late 2013 by UNICEF in the Philippines, this "phased" approach involves first effecting ODF outcomes without any direct financial assistance to households, but rather via behavioral change programming (i.e., CLTS) to promote acceptance of building and using latrines. Subsidies are introduced only after the community has adopted the new behavior and built simple latrines to meet the ODF goal, where latrine quality can range from "unimproved" to "basic." At this stage, households facing genuine

[3] For example, the Ethiopian National Sanitation Subsidy Protocol stipulates that subsidies should be introduced in woredas having at least 50 percent private household coverage of improved sanitation facilities (FMoH 2022).

financial constraints and unable to build hygienic and durable latrines can be targeted by a subsidy program and use the subsidies to either purchase or upgrade their latrines (Robinson and Gnilo 2016).

This approach is believed to have several advantages. First, it assumes that by delaying the introduction of subsidies until households facing genuine financial barriers can be easily identified, subsidies can serve those who actually need them and, in theory, minimize demand distortions among the non-poor (Robinson and Gnilo 2016). Second, this approach makes use of the mere-exposure effect: households, through their experience with latrine use during CLTS, may become more willing to invest in improved sanitation afterward. Furthermore, achieving ODF status can galvanize communities, motivating households to invest in further improving their latrines, as well as contribute to additional development activities (A. Robinson, personal communication, 2023). With widespread support in the Philippines, this strategy was adopted in the country's Phased Approach to Total Sanitation (PhATS) program, and later in the 2017 pilot subsidy program by WaterAid in Timor-Leste (UNICEF Philippines 2015; UNICEF 2016; WaterAid 2017). A similar timing strategy was pursued in 2019 by UNICEF in Northern Ghana, in which subsidies were introduced more than one year after the community had achieved ODF via CLTS measures (Trimmer et al. 2022).

A potential challenge in studying this approach is the wide variation in the definition of ODF across countries that have adopted CLTS. While countries agree on the minimum requirements of eliminating fecal exposure from the open environment and ensuring all households have access to a fly-proof latrine (USAID 2018a), they diverge in other aspects. These include the specificity of their ODF criteria, as well as in the details regarding (1) the rate of access and/or latrine ownership in a community, (2) the quality and physical characteristics of latrines, (3) specifications for accompanying sanitation and hygiene practices (e.g., handwashing, safe water storage, waste disposal) and, in some cases, (4) mechanisms for enforcing community action to achieve and sustain ODF status (e.g., the existence of a clear community strategy) (USAID 2018). The following examples highlight the variation in country guidelines concerning coverage rate and service level, as these directly relate to questions of equity, sustainability, and universal coverage within the AWS framework.

For instance, Indonesia explicitly requires that 100 percent of households within a community use a private latrine (USAID 2018a). Meanwhile, Kenya's guidelines neither explicitly require latrine ownership[4] by every household nor specify the quality of the latrine, so long as every person within the community uses a latrine—shared or private—that meets certain specifications (USAID 2018a). Ghana's guidelines set the threshold for ODF status at 80 percent private latrine ownership, without specifying the quality of latrines, and up to 20 percent sharing, in addition to zero open defecation (OD) (Delaire et al. 2022). The Cambodian government's standard for ODF requires that 100 percent of households use a latrine and at least 85 percent have basic access (iDE 2019b). The variation and occasional ambiguity in countries' ODF criteria make it challenging to draw conclusions regarding the conditions (e.g., threshold for basic coverage) under which subsidies should be implemented in a post-ODF setting.

Some subsidy programs target communities that have attained ODF status, but that have since shown signs or are deemed at risk of slippage (i.e., reversion to OD). In the 2017 subsidy pilot by WaterAid in Timor-Leste, subsidies were introduced in communities that had previously been certified as ODF specifically to address concerns of slippage and low-durability latrines (WaterAid 2017). A select number of municipalities were targeted for subsidies after instances of slippage had been identified in some of their communities. In one, WaterAid found that 16 percent of households had reverted to OD. Partly as a way to reverse slippage, WaterAid tested smart subsidies in the form of vouchers for toilet materials, targeted to vulnerable households that already had toilets to incentivize

[4] Toilet ownership may not be an accurate indicator of good sanitation practices, for it overlooks questions of the toilet's state of repair and individual habits. A more meaningful indicator is whether toilets (private or communal) are hygienic and safely managed. This, however, can be difficult and is rarely monitored at scale.

upgrade and hence progression up the sanitation ladder.[5] The results showed that 76 percent of households redeemed their vouchers within only two weeks; of those, 94 percent had initiated construction on a follow-up visit (WaterAid 2017). It is unclear, however, if this uptake has been sustained, and whether these subsidies affected the speed of achieving universal basic coverage. Meanwhile, the 2019 subsidy intervention by UNICEF in Northern Ghana targeting 59 communities more than a year after ODF achievement was found to reduce the overall percentage of households experiencing slippage in treatment communities by 15 percentage points relative to control communities,[6] though it failed to increase demand for toilet substructures. Moreover, the findings attributed the reduction in slippage to the sharing of subsidized latrines between subsidized and ineligible households living within the same compound (USAID 2021).

2.1.2 BEFORE ATTAINMENT OF ODF STATUS

An alternative is to introduce subsidies before the attainment of ODF status during the implementation of CLTS. The rationale for this approach is to spare poor households the burden of constructing latrines twice—first, unimproved latrines during CLTS activities, then improved latrines with the aid of subsidies once ODF is achieved. When poor households have already expended their labor and resources on building an unimproved latrine to achieve ODF status, they might hesitate to immediately make additional investments for improvements, which often entail constructing a new facility altogether. An alternative would be to introduce targeted subsidies shortly after CLTS triggering and prior to ODF achievement, irrespective of the existing coverage levels (M. Jenkins, personal communication).

However, this approach has rarely been tested in practical settings. In Lao People's Democratic Republic, Cameron et al. (2021) conducted a randomized controlled trial (RCT) in 160 villages to evaluate the impact of household- and village-level subsidies integrated within a standard CLTS program. The 40 villages assigned to the control group received only a CLTS intervention. The 120 treatment villages were divided equally into three arms, each receiving CLTS and a different form of subsidy after triggering. These were (1) a household subsidy, where partial rebates were given to individual households after the construction of latrines had been verified; (2) a village-level reward distributed to a local committee conditional on the entire village becoming ODF; and (3) both a household subsidy and village-level reward. After three years, the authors found the coverage rate of pour-flush toilets in villages offered the household incentive to be 16 percentage points higher than that in control villages. Meanwhile, that rate was 14 percentage points higher in villages offered the village-level incentive compared to control villages. Across the sample, pour-flush latrine ownership increased by 22 percentage points, from 42 percent to 64 percent (Cameron et al. 2021). That said, since the study does not report on ODF outcomes, it is unknown which arm produced the highest rate of ODF villages by the endline and does not offer insights into the effect of subsidies on ODF outcomes in the context of a standard CLTS program.

2.1.3 BASED ON BASIC ACCESS COVERAGE LEVEL

In certain cases, targeted subsidies have been introduced in areas with local sanitation markets that already existed or had been established through past or ongoing MBS interventions. These MBS

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5 Levels of slippage in target communities at the time of the study were not reported; the report stated that eligibility was restricted to ODF communities and specifically households that already had toilets, but it did not assess the extent to which slippage was present at the time of the pilot.

6 Between baseline and endline, the study found that the percentage of households that reported practicing OD increased from 25 percent to 69 percent in control communities, and from 25 percent to 54 percent in treatment communities (USAID 2021).

interventions may be implemented after or concurrently with CLTS. Oftentimes, governments have adopted MBS as a means to improve the quality of latrines constructed under CLTS campaigns.

In such settings, **a question facing implementers of subsidy programs is the threshold of basic sanitation coverage—i.e., the proportion of households owning a basic latrine in a community—at which to introduce subsidies**. In theory, delaying the introduction of subsidies until a community has achieved high levels of basic coverage may help identify households unable to pay for basic latrines completely out-of-pocket. An example of this approach was found in Cambodia, where WaterSHED staff provided vouchers valid for one month to IDPoor households without latrines in villages that had achieved at least 80 percent pour-flush toilet coverage via MBS activities (UNICEF 2020). That said, there are ethical and economic arguments for introducing subsidies sooner. From an ethical standpoint, it can be considered unjust to purposefully place those who bear the greatest burden of inadequate sanitation at the end of the priority list. Not announcing the possibility of subsidies until after achievement of the threshold will also likely see vulnerable, eligible households put themselves in debt or lose assets to construct a basic latrine, as has happened in CLTS settings where there is peer pressure to fulfil the ODF target (House, Cavill, and Ferron 2017). From an economic perspective, the highest marginal gains can arguably be realized by providing sanitation to those who most lack it. Thus, subsidizing the poor can be seen as the optimal use of public finance (A. Robinson, personal communication, 2023). Regarding this debate, the available evidence is limited and inconclusive.

There is correlational evidence that lower basic coverage rates are associated with lower demand among non-subsidized households, suggesting market distortion. An RCT conducted by iDE in the Kandal Province of Cambodia between 2015 and 2016 underscores the potential risks of introducing subsidies at low village coverage (and low active demand) levels, i.e., where few if any households have basic sanitation and are aware of or have purchased the MBS latrine product packages that will be subsidized. In this study, iDE offered IDPoor 1 (the poorest) households a discount of USD 25 on a USD 56 improved pour-flush latrine, IDPoor 2 households a USD 12.5 discount, and non-poor households no discount. The analysis found that lower village coverage rates at baseline correlate weakly with lower sales of latrines to non-poor households (iDE 2019). This finding suggests that introducing subsidies at lower basic sanitation coverage levels, especially in contexts where many non-poor households do not have a latrine, may end up suppressing demand among these households and distorting the sanitation market, or the latrine product may still be unaffordable.

However, other *prima facie* evidence shows that introducing subsidies at lower basic coverage rates can yield positive outcomes. In Bangladesh, Guiteras, Levinsohn, and Mobarak (2015) conducted an RCT evaluating a program that introduced subsidies in villages with 42 percent ownership rate of a hygienic latrine, and 53 percent access rate to a hygienic latrine.[7] The authors found a 14 to 15 percentage point increase in access and ownership rates among households in villages assigned to subsidy treatment.[8] At the sub-village level,[9] the authors observed slight increases of 15, 23, and 22 percentage points in ownership of hygienic latrines among subsidy-recipient households in neighborhoods receiving low, medium, and high voucher saturation, respectively. Access to hygienic latrines among recipient households in these respective neighborhoods followed a similar pattern,

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7 The cited figures represent the percentages of households owning and having access to hygienic latrines in "LPP + subsidy" treatment villages (Guiteras, Levinsohn, and Mobarak 2015). See Table S1 in the Supplementary Material of the publication for details.

8 These subsidies were implemented alongside an LPP in one arm, and an LPP and Supply in another ("Supply" treatment in the paper refers to an information intervention, implemented by training as local resident to be a latrine supply agent (LSA) to provide information on latrine purchase and maintenance).

9 The authors randomized the share of voucher lottery winners at the neighborhood level into low (25 percent), medium (50 percent), and high intensity (75 percent) categories.

increasing by 15, 23, and 20 percentage points (Guiteras, Levinsohn, and Mobarak 2015). In Section 2.3, we discuss the potential limitations of this study's findings concerning the observed positive spillover effects.

The task of synthesizing the available evidence is further complicated by variations in the geographic unit within which the coverage threshold applies.[10] For example, while SNV and WaterSHED both set an 80 percent basic coverage threshold, SVN applied that threshold at the commune level, whereas WaterSHED implemented subsidies at the village level (Kohlitz et al. 2021). This discrepancy makes it difficult to meaningfully compare results across programs.

2.2 BASED ON MBS PROGRAM LIFE CYCLE

Some programs have also experimented with sequencing subsidies with market-based approaches and delaying subsidy implementation until later in the program's life cycle to when the poorest households—or, in some cases, the non-adopters—are identified. iDE tested this in Cambodia with their "sweeps" method, where sanitation marketing is carried out in three "sweeps" or phases along what iDE refers to as the "technology adoption curve" (Wei et al. 2016). The three phases include (1) early adopters who pay for latrines using cash with no financing ("early adopters" and "early majority"), (2) more reluctant households that require targeted marketing and available sanitation financing ("late majority"), and (3) the remaining households that require targeting with financial assistance or subsidies to minimize any negative impacts on sanitation markets (some "late majority" and "laggard" households). iDE reached some of these "laggard" households using vouchers that households could redeem directly with sanitation businesses (Wei et al. 2016). However, iDE has since abandoned this approach in favor of a more concurrent rollout approach with subsidies.

2.3 CONCURRENTLY WITH OTHER TYPES OF SANITATION INTERVENTIONS

The evidence suggests that the integration of subsidies with other types of sanitation interventions (i.e., CLTS, MBS, other behavioral change programs) has led to an increase in latrine uptake among the targeted group. However, the extent of this increase varies and is typically observed in the short term.

In India, Pattanayak et al. (2009) conducted a cluster RCT testing the effect of subsidies in combination with behavior change programming in the form of an IEC campaign. The authors compared the treatment arm, where households falling BPL received a government subsidy, with a control arm that received no intervention. Using a difference-in-difference (DID) estimation, the authors found that the intervention led to a 29 percent increase in overall individual household ownership of off-pit latrines. Specifically, in treatment villages, BPL households experienced a treatment effect of 34 percent, while other households had a treatment effect of 21 percent compared to control villages (Pattanayak et al. 2009). To determine the relative contributions of subsidies and behavioral change programming to the treatment effect, the authors calculated the difference between the DID estimates for BPL households and those above the poverty line, resulting in a 13 percentage point difference. The authors then concluded that subsidies contributed to roughly a third of the treatment effect, suggesting that subsidies can significantly improve intended impact when combined with behavior-change programming. In Bangladesh, Guiteras, Levinsohn, and Mobarak (2015) conducted a cluster RCT testing the effectiveness

[10] Cambodia's 2016 National Guiding Principles on Hardware Studies for Rural Household Sanitation specified that subsidies should not be introduced in communes with at least 60 percent of households using an improved latrine (Cambodian Ministry of Rural Development 2016).

of subsidies for a hygienic latrine against various sanitation interventions—i.e., an LPP[11] consisting of community motivation and health information campaigns (Treatment 1), subsidies vouchers for a subsidy[12] in conjunction with LPP (Treatment 2), and an informational intervention that informed households about suppliers and sanitation products (Treatment 3). The authors found that at the end of the intervention, households receiving both LPP and subsidies were on average 14.3 percentage points more likely to have access to a hygienic latrine compared to the control group (Guiteras, Levinsohn, and Mobarak 2015).

In Cambodia, Nicoletti et al. (2017) found that iDE's poverty-targeted subsidy scheme in Kandal Province yielded positive impacts on the uptake of pour-flush latrines among poor households. Building on iDE's existing sanitation marketing (SanMark) program,[13] the subsidy scheme provided discount vouchers of USD 25 and USD 12.5 to households classified as IDPoor 1 and IDPoor 2, respectively. Under this scheme, households were required to pay the remaining balance between the market price of the pour-flush latrines (USD 56) and the subsidized amount upon successful latrine installation. The subsidy scheme produced on average a 16.9 percent increase in uptake of pour-flush latrines among IDPoor 1 households in treatment villages. Among IDPoor 2 households, uptake rates increased by 14.7 percent compared to the control group (Nicoletti et al. 2017). These results suggest that when integrated within an MBS approach, targeted subsidies are effective at increasing latrine uptake among the poor. It is important to note, however, that the study defines uptake in terms of registered orders of pour-flush latrines, without specifying if those orders effectively translated to latrines that were installed and used by customer households. As such, it is uncertain if this metric captures actual uptake and long-term use.

Also in Cambodia, Hoo et al. (2022) conducted a study in rural villages across six provinces to assess the impact of combining a SanMark program implemented by iDE and WaterSHED over several years, with a poverty-targeted subsidy scheme called Community Hygiene Output-Based Aid (CHOBA), implemented by East Meets West/Thrive networks. The CHOBA subsidies were designed as rebates to service providers who would be paid an amount equivalent to the consumer discount once they have been verified to have installed hygienic latrines, including the superstructure, for poor households (Hoo et al. 2022). Results-based incentives payments were paid to each village chief, and to each district water, sanitation, and hygiene (WASH) official for every qualified household who installed a subsidized hygienic latrine within a fixed window as part of the program. These financial incentives were critical for achieving the desired outcomes and ensuring suppliers received their rebate payments, which were significant. When implemented separately, the CHOBA subsidies were more effective than SanMark at increasing hygienic latrine coverage among IDPoor 1 and IDPoor 2 households. In combination, the likelihood of new hygienic latrine purchase was 26 percentage points higher compared to SanMark alone (Hoo et al. 2022). Furthermore, the authors found that the likelihood of the hygienic latrine being installed and functional at endline was 24 percentage points higher when CHOBA and SanMark were implemented together, compared to when only SanMark was implemented (Hoo et al. 2022).

In Laos, Cameron et al. (2021) conducted a cluster RCT to test the effectiveness of CLTS intervention integrated with three different types of monetary incentives—cash rebate for the poorest 30 percent

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11 The LPP was a behavior change program modeled after CLTS, with the main difference being that LPP emphasized hygienic latrine ownership in addition to ending OD practices (Guiteras, Levinsohn, and Mobarak 2015).

12 The vouchers offering a 75 percent discount on a package of components to build any of three hygienic latrine models, priced (post-subsidy) at USD 5.5, USD 6.5, and USD 12. Vouchers were awarded via a public lottery. Households were responsible for financing delivery and installation costs (USD 7–10) and paying the balance (Guiteras, Levinsohn, and Mobarak 2015).

13 According to Nicoletti et al. (2017), iDE's existing MBS program in Cambodia had established supply and sales chains "in and around" the study villages, suggesting that the degree of exposure to MBS among individual villages may have varied.

households who installed a latrine (Treatment 1), monetary reward to the entire village for achieving ODF (Treatment 2), and the two in combination (Treatment 3)—relative to CLTS alone (Control). Among the key results, the authors found a 16.2 percentage point increase in village-level pour-flush latrine ownership relative to the control group (Cameron et al. 2021).

Among these studies, some present tentative evidence that combining targeted subsidies with other interventions may yield positive, if modest, spillover effects. In Cambodia, Hoo et al. (2022) observed that where CHOBA was implemented, after years of market development and in conjunction with sanitation marketing, the likelihood of latrine purchase among non-poor households was highest (at 36 percent), compared to communities in which only one of the two interventions was implemented.

In Bangladesh, Guiteras, Levinsohn, and Mobarak (2015) found slight increases in access and ownership rates among non-voucher recipient households in medium- and high-saturation neighborhoods relative to eligible households LPP-only villages.[14] A positive effect was also observed among ineligible households in subsidy villages. While this may imply a potential positive spillover effect, a closer examination of the subsidy design casts doubt on this interpretation. Since vouchers were given to a large portion of households (i.e., those within the bottom 75 percent of the wealth distribution), and since the subsidy eligibility criteria did not screen for households lacking hygienic latrines, it is conceivable that many households receiving vouchers had already owned a functional, hygienic latrine. As such, the observed increases in access and ownership rates among non-recipient households could potentially be a result of voucher transfer or resale. It is not possible, therefore, to conclude that these findings provide definitive evidence for positive spillover effects among non-recipient households.

All in all, more evidence is required to conclude that, and how, combining targeted subsidies with other interventions will yield positive spillover effects. As described above, the spillover effects observed in both Hoo et al. (2022) and Guiteras, Levinsohn, and Mobarak (2015) have been at best modest. In fact, iDE's study in Cambodia presents weak contradicting evidence, suggesting that when subsidies are introduced prematurely into a market, they might actually lower demand among non-poor households (iDE 2019).

Moreover, it is crucial to consider the contextual factors surrounding the maturity of sanitation markets when introducing subsidies. In many cases, subsidies were introduced after a series of sanitation behavior changes and marketing interventions had already taken place over an extended period. For instance, MBS programs are estimated to take five years or more to scale and become effective (USAID 2018). In these cases, a significant portion of the recipient communities had already made investments in basic sanitation before the subsidy programs were even implemented.

In addition, we recognize the limitations of the existing evidence in capturing long-term uptake patterns. It is important to note that none of the studies reviewed tracked the uptake and sales of latrines beyond the subsidy period. This limitation hinders understanding of the effects of targeted subsidies on uptake among poor and non-poor households that still lacked access to basic sanitation when the subsidy programs ended (M. Jenkins, personal communication, 2023).

[14] The authors randomized the share of lottery winners at the neighborhood level into low (25 percent), medium (50 percent), and high intensity (75 percent) categories. They observed statistically significant increases in ownership of hygienic latrine by eligible households who lost the lottery in medium- and high-intensity neighborhoods, compared to control neighborhoods (+2.7 percentage points and 6.9 percentage points, respectively). That said, no statistically significant difference was observed between eligible households who lost the lottery in low-intensity neighborhoods and control (Guiteras, Levinsohn, and Mobarak 2015).

2.4 KNOWLEDGE GAPS

In the context of CLTS interventions, the evidence provides no indication whether introducing subsidies before a community attains ODF status leads to better (and faster) short- and long-term outcomes, compared to waiting until after ODF achievement. In theory, introducing subsidies after triggering may ultimately help avoid slippage by sparing households the burden of having to construct latrines twice. In practice, this approach has been rarely tested, with the only documented case being Cameron et al. (2021) in Laos. That said, this study does not report on ODF outcomes, thus offering little insight into the potential effectiveness of introducing subsidies prior to ODF attainment on sustaining ODF in the near and long terms.

The evidence provides little information regarding the ideal time frame for introducing subsidies after a community achieves ODF status. In the study by WaterAid (2017), observed incidents of slippage and concerns over the sustainability of past CLTS triggering prompted a targeted subsidy intervention. However, the study does not specify the time lapse between communities' attainment of ODF and the start of subsidy implementation. A future area of inquiry is whether subsidies will be needed in all contexts, and, if so, when should they be implemented—before or after ODF certification—to prevent slippage and/or sustainability issues with low-durability latrines. We recognize, however, that it may be challenging to experimentally test this question.

With regard to MBS, a proposed positive outcome of subsidy programs is that they could stimulate, rather than distort, the market. To further assess this, research should further examine the short- and medium-term impacts of subsidy programs on local enterprises. Future programs would also benefit from additional research on factors that enable subsidies to complement, rather than crowd out, market-based approaches (some of which are discussed in the below sections), and the correlation between subsidy timing and the relative maturity of the market.

Given the current state of evidence, one further possible avenue of inquiry concerns the effect of baseline basic coverage on the long-term impact of subsidies. This includes examining the speed at which a community achieves universal basic coverage once the subsidy program ends.

In the context of MBS programs, the evidence suggests a lack of consensus as to the ideal level of basic sanitation coverage at which to implement subsidies. Due to the scarcity of available studies, it is difficult to conduct a comparative analysis of the effectiveness of subsidies at varying levels of basic sanitation coverage, and over the short, medium, and long terms. Potential metrics for defining subsidy effectiveness may include (1) dimensions of cost-effectiveness (e.g., subsidy program cost per eligible household achieving basic access for the first time, program cost per community achieving 100 percent basic access, and/or "leverage"—the amount of household investment in latrine per dollar spent on a subsidy program); and (2) basic coverage gains among both eligible and ineligible households in integrated subsidies programs, compared to those undergoing only CLTS or MBS.

The above limitation is likely due to the long time horizon, large sample of communities required, and logistical burdens required for such an experiment. For instance, researchers would need to identify many comparable treatment and control communities, ensuring sufficient sample size for each level of baseline basic coverage. Furthermore, outcomes would need to be measured periodically, and over extended durations. Given the practical challenges of experimentation at this scale, a potential avenue of inquiry could be to document the implementation factors that enable subsidies to complement, rather than crowd-out, market-based approaches.

Current evidence suggests that subsidies are effective when implemented in concert with other sanitation interventions, but more research is needed (Cameron et al. 2021; Guiteras, Levinsohn, and Mobarak 2015; Pattanayak et al. 2009 Nicoletti et al. 2017). These studies provide preliminary (and positive) evidence that integrating subsidies can lead to higher levels of latrine access and ownership.

However, not all interventions incorporate multiple treatment arms that allow for disaggregated comparisons of subsidies alone, CLTS or MBS alone, and a combined approach. Additionally, the existing studies are concentrated in Asia (e.g., Bangladesh, Cambodia, India, Laos), leaving significant room for learning in the African context.

Illustrative research questions are provided in Table 5 in Annex A.

3.0 ELEMENTS OF DESIGN

Key takeaways

Delivery mechanism

1. Vouchers and rebates are among the most common smart subsidy mechanisms and come with distinct advantages and pitfalls. A key drawback of voucher and rebate systems is their high implementation costs, stemming from the need for extensive monitoring and human resources with the expertise and skill levels required for their effective implementation.
2. While both vouchers and rebates offer flexible, targeted, and empowering means of delivering subsidies to targeted households, they may impose administrative burdens on programs and therefore should be designed with care.
3. A subsidy's validity period is typically chosen to satisfy operational constraints rather than to optimize sanitation outcomes. When subsidy programs set validity periods to meet internal constraints, the evidence suggests the outcomes can suffer.
4. The relative merits of different validity periods remain a matter of debate.

Subsidy amount

1. Price is a key determining factor for consumer uptake of sanitation. While there is evidence to suggest that even small subsidies can incentivize poor households to invest in sanitation, the relative impacts of different subsidy amounts, their relationship with willingness to pay, and broader impact on market actors and broader sanitation uptake remain understudied.

This section examines three elements of program design that may affect a subsidy program's ability to reach and benefit their targeted populations: (1) how a subsidy is delivered, (2) the amount of time given to redeem the subsidy offer, and (3) the amount of the subsidy.

3.1 DELIVERY MECHANISM

The first key element in the design of a subsidy program is the mechanism through which the subsidy is delivered to the beneficiary population. Implementers are typically presented with a choice among a variety of mechanisms, among which are vouchers and rebates, each with distinct advantages and limitations that must be carefully weighed while considering the local context in which the subsidy will be deployed. While there are situations where subsidies might need to be distributed outside of a market, and in these cases other mechanisms are commonly used (including actual distribution of hardware), we do not consider these distribution mechanisms here since the focus of our review is on "smart" subsidies.[15] Here we will examine the two most common options: vouchers and rebates.

A prerequisite for voucher and rebate programs is the existence of local sanitation markets in which latrines are manufactured and sold to customer households. In most cases, this requires that some elements of a local market already exist, on its own or due to recent MBS interventions. The critical elements of a market include availability of eligible product systems, local suppliers for latrine sales and installation, arranging transportation of products to households, and promotional and sales activities that connect the supply chain to customers. The presence of an actual (MBS or sanitation) program is also highly beneficial to enable implementing the mechanics of the subsidy. Since many MBS programs involve door-to-door marketing by trained sales agents, key

[15] While cash transfers are another financing option, we did not include it in the review given limited documented examples of using cash transfers to promote latrine uptake (or comparable products), outside humanitarian applications.

implementation and data-gathering activities like targeting, outreach, verification, and voucher redemption can be conducted as part of these routine activities without incurring significant extra cost. These elements must be in place prior to or concurrently with the introduction of the subsidy (M. Jenkins, personal communication, 2023). For instance, to set up a voucher system, Guiteras, Levinsohn, and Mobarak (2015) devised a community-based intervention in which they worked with the Village Education and Research Committee to identify, train, and employ individuals in randomly selected neighborhoods as Latrine Supply Agents (LSAs). These LSAs played a crucial role in connecting households to the sanitation markets by offering product information, aiding with delivery and installation, and delivering maintenance and upgrade services (Guiteras, Levinsohn, and Mobarak 2015).

3.1.1 VOUCHERS

Vouchers are widely used for delivering subsidies in the health and sanitation sectors. These are coupons that beneficiaries can exchange for a set of predefined sanitation products (e.g., latrine components) and services (UNICEF 2020). These coupons typically cover a portion of the physical latrine substructure and sometimes the installation service, leaving households to cover additional costs (e.g., those incurred by building the superstructure). Vouchers can be in paper or electronic form and typically have a limited validity period.

A standard voucher scheme consists of a series of transactions among several actors. A funder (typically the government or a donor) provides funding to a management agency (typically a government actor, a nongovernmental organization [NGO], or a private enterprise) to set up, run, and monitor the program. Among other tasks, the agency produces vouchers and trains distributors (typically an NGO or a team of community health workers), who are charged with selling or giving vouchers to the targeted clients, for instance, households meeting specified eligibility criteria. Once the client receives the voucher, they may visit a vendor (a public or a private actor preselected and accredited by the management agency) or be approached by an accredited vendor's sales agent, to exchange it for products or services subsidized by the voucher program. Vouchers often provide households an element of choice, enabling households to select from a set of subsidized products. The vendor then submits voucher claims to the management agency, who in turn conducts a verification process before reimbursing the vendor. At the end of the program, the management agency reviews and validates program data and submits reports to the funder. Some voucher programs may engage an external party to conduct regular audits to hold all stakeholders accountable (Menotti and Farrell 2016).

Vouchers can be a powerful tool for addressing barriers to accessing sanitation goods and services, especially among the poor and vulnerable. Vouchers seek to reduce the financial burden on poor households by allowing them to pay for products and services at a discounted (or in some cases zero) cost. Vouchers are redeemed *at the time and place of purchase*, which means households do not have to pre-finance the subsidy with their own cash (Alliance for Water Efficiency n.d.). This feature allows vouchers to ease the burden on populations facing liquidity constraints. In addition, it may appeal to the user's present bias—the tendency to value rewards more highly in the short term, which has led households to systematically underinvest in health-promoting technologies (Dupas 2011).

For implementers, voucher programs provide a good degree of operational flexibility and transparency. The relative ease with which to adjust a voucher's cash value lets implementers tailor programs to different segments of the population based on their ability to pay (Jenkins 2012). Because each voucher is tied to a single beneficiary, voucher programs also provide a natural mechanism for tracking implementation and uptake. For example, WaterAid's voucher program in Timor-Leste paired each voucher with a unique and randomized code, which reduced the risk of forgery and let implementers track the movement of vouchers with relative ease (WaterAid 2017).

Moreover, the evidence suggests a strong synergy between voucher programs and other demand-creating strategies. Jenkins (2012) argues that voucher schemes can be used to stimulate emerging sanitation markets in program areas by engaging private sector actors. The literature provides several examples in which vouchers were used to complement other measures—especially sanitation marketing in Cambodia, as discussed by Nicoletti et al. (2017). Vouchers have also been implemented following a behavioral change intervention in Bangladesh (Guiteras, Levinsohn, and Mobarak 2015) and CLTS in Ghana (USAID 2019).

Yet, voucher programs come with certain risks. The long, complex implementation chain required by most voucher programs presents ample opportunities for implementation error and even fraud (Jenkins 2012). Each of the program's many stakeholders—from funders, to voucher management agencies, distributors, vendors, and clients—can conceivably manipulate the system for illicit gains. For instance, distributors may collude with vendors (and even clients) to demand reimbursement without actually providing services, clients may forge vouchers, and vendors may reject voucher clients (Gorter et al. 2012). If unaddressed, these risks can result in substantial waste, distort program outcomes, and even exacerbate the inequities that the program has set out to redress (Jenkins 2012).

For this reason, voucher programs often require intensive administrative oversight, which can come at significant financial cost. These costs tend to peak at the program's initial stage, at which point significant resources are required to put in place both the program and the accompanying monitoring infrastructure (Jenkins 2012). In the Ghana subsidy program, for example, the costs of training, implementing, and managing the subsidy program (averaging 1,106 USD per community or 148 USD per beneficiary household) were on the same order as the costs of the subsidies themselves (897 USD per community or 120 USD per beneficiary household) (USAID 2021b). These high overhead costs may mean that voucher schemes are less suited to contexts where implementers do not have the resources to scale up the program (Menotti and Farrell 2016).

3.1.2 CONSUMER REBATES

Another subsidy mechanism used in the sanitation sector is the rebate. Rebates are a form of output-based aid (OBA), a financing strategy in which funds are paid to a service provider or a household "upon the achievement of a predefined result or output" (UNICEF 2020). Our review focuses on *consumer* rebates, that is, OBA given to households upon the construction of a latrine meeting certain criteria (USAID 2019), i.e., *after* initial purchase. Depending on the household's level of need, a rebate can be provided for the full cost of the latrine or for a part of it.

The sanitation literature provides a few documented instances of the use of consumer rebates. These include the Government of India's longstanding Total Sanitation Campaign (TSC)—namely, Swachh Bharat Abhiyan—and the CHOBA program in Vietnam, as well as the program studied by Cameron et al. (2021) in Laos.

Although a consumer rebate scheme can take many forms, an example may look as follows. A funder (typically a government or a donor) provides funding to a management agency (typically an NGO or a private enterprise) to design, run, and supervise a rebate program. The agency may work alongside one, or several, implementing partners (e.g., other NGOs or private enterprises) to run on-the-ground operations, which include coordinating with suppliers, promoting the program, and identifying, reaching, and informing qualified households. An implementing partner may dispatch a team of community health workers or their own sales agents to encourage eligible households to construct a latrine, and to submit the information of those who agree to the management agency for eligibility verification. Like vouchers, households can select what components to use for installation, depending on the number of substitutable product components available in the market. Once eligible households successfully build latrines, the implementing partner submits a list of these households to claim (1)

rebates for these households, and (2) incentive payments for their organization. Upon receiving this list, the management agency dispatches verifiers (their own staff or volunteers) to program areas to confirm that a randomly selected sample of households on the list (1) meet the eligibility criteria, and (2) have indeed built latrines that meet the program's standards. Once the verification process is completed, the management agency disburses the rebates to households and implementing partners (Larson and Connell 2015).

Some evidence suggests that, like vouchers, rebates can be successfully implemented in concert with other demand-creating programs. In Laos, Cameron et al. (2021) found that a 13 percent rebate (USD 20 equivalent) offered on the price of the lowest-priced pour-flush toilet, including superstructure, to the poorest 30 percent of households without basic sanitation in each community and implemented alongside CLTS produced a 16 percentage point increase in village ownership rate of basic latrines.

Rebates also require latrine construction as a precondition for reimbursement. Because the rebate is provided only after installation has been certified, households are incentivized to actually install and use the latrine (Jenkins 2012). Furthermore, this approach does not require management of retail stocks and therefore imposes less of a logistical burden on implementers (USAID 2019).

That said, **rebate programs are not without limitations.** Rebates place a heavy cost on households since the latrine materials and construction need to be paid for by the household up front (USAID 2019). Whereas under voucher schemes, some of the financial burden falls on implementers in covering the subsidy (by reimbursing the retailer). Under rebate schemes, households are responsible for financing and redeeming the cash, which may come with significant delays. Although voucher and rebate programs may theoretically produce the same outcome on the household's balance sheet, beneficiaries may be reluctant to take on the up-front cost and perceived risk of a rebate, making them less effective at incentivizing uptake among the poor. The financial burden on households may be aggravated when rebates are conditional on the installation of both the latrine substructure and the much more expensive superstructure components, a notable example of which was the CHOBA program in Vietnam.

In some cases, the burden on poor households is exacerbated by the incentive structure of rebate programs. For instance, the CHOBA programs in Laos and Cambodia employed RBP for field promoters, who were tasked with enlisting eligible households to meet the rebate deadline. Consequently, promoters were sometimes incentivized to exert pressure on poor, eligible households to meet the rebate deadline to secure their payments. (M. Jenkins, personal communication, 2023).

3.1.3 COMMON STRENGTHS

Both voucher and rebate programs are flexible, targeted means of delivering subsidies that can stimulate markets. By targeting only those financially unable to purchase latrines, these programs are less likely to have a distortionary effect on sanitation markets. Moreover, vouchers and rebates encourage use of local market actors and can help grow local markets by engaging private actors and stimulating demand among households (Jenkins 2008). This can positively impact the short- and long-term viability of sanitation enterprises, and their availability to other potential customers.

From the beneficiaries' point of view, vouchers and rebates are empowering. Unlike direct hardware handouts, vouchers and rebates do not treat beneficiaries as passive recipients of handouts. Rather, they are participating agents in the marketplace, with the ability to evaluate different models and services, and, in principle (though not always in practice), would be able to choose those that best meet their needs. Helping poorer households exercise their freedom of choice—a right often denied to them by circumstances—is a worthwhile endeavor and a vital step toward the achievement of gender equality and social inclusion (GESI) goals. More practically, having a voice in the process can instill among

households a sense of ownership of the latrine and sustain its use over the long term (Robinson and Gnilo 2016).

3.1.4 COMMON PITFALLS

With choice, however, come financial and administrative burdens, which both vouchers and rebates impose on beneficiaries in various ways. For instance, beneficiaries living in remote areas need to travel —in some cases long distances—to redeem vouchers or claim rebates (WaterAid 2017), thus having to forgo time that could otherwise be spent on income-generating activities. In addition, some households may miss the (sometimes very short) time window within which a voucher can be redeemed—whether it be because of difficulty traveling, inability to mobilize funds in time to finance their share of the product's cost, or a simple lack of knowledge about how the program works (Kohlitz et al. 2021). These burdens often work to frustrate, confuse, and even deter households from uptake. Ironically, they tend to fall hardest on the poorest households, whose lack of resources, social connections, know-how, reliable access to transportation, and even control over their daily lives constrain their capacity to act. In designing and implementing voucher and rebate programs, implementers should account for and take active measures to ease these burdens, which might otherwise make it much more difficult for households to reap the benefits of the subsidy.

3.2 SUBSIDY VALIDITY PERIOD

Among programs included in this review, the validity periods of subsidies vary widely, ranging from on-the-spot to 18 months. For instance, households participating in iDE's program in Cambodia were asked to decide on-the-spot whether to place an order for a subsidized latrine. Those participating in WaterSHED's Closing the Gap subsidy program had one month to redeem vouchers (Kohlitz et al. 2021). Guiteras, Levinsohn, and Mobarak (2015) allowed households a voucher redemption timeline of six weeks. Vouchers distributed to eligible households in the UNICEF program in northern Ghana were valid for three months (USAID 2021). Meanwhile, SNV's targeted subsidy program in rural Cambodia provided discounts for anywhere from 1–18 months (Kohlitz et al. 2021).

These validity windows are typically chosen to satisfy program operational constraints rather than to optimize sanitation outcomes. For example, when programs have faced time pressure to achieve ODF status, redemption windows have sometimes been shortened to encourage beneficiary households to build latrines quickly (A. Robinson, personal communication, 2022). In another case, WaterAid's subsidy pilot program in Timor-Leste was implemented close to the end of WaterAid's financial year, which meant that implementers had only one month to carry out program activities before the year's budget ran out. To meet the deadline, implementers required beneficiary households to redeem vouchers within only 1–2 weeks after they were disbursed (WaterAid 2017).

On the other hand, rebate programs may introduce varying delays from the presentation of rebates to the repayment period. Although precise figures for the qualifying periods of rebates are not readily available in the literature, it is plausible that rebate programs may encounter significant delays in reimbursing households due to the time required for verifying latrine installations. For example, in the CHOBA program implemented by East Meets West in Vietnam, project staff needed to cross-check the list of claimant households against a central dataset and then send it to verifiers for physical verification of the identity, poverty status, and latrine installation of at least 30 percent of the claimant households, which took a long time to complete. In cases where mistakes occur, rebate payments may be further delayed until these mistakes are corrected (Thrive Networks/East Meets West Foundation 2016).

When programs set validity periods to meet internal constraints, the evidence suggests program quality can suffer. According to WaterAid's learning report, the rushed redemption timeline meant that the program could not distribute vouchers to households in time, nor keep up with

demand for latrines (WaterAid 2017). In this case, the trade-off came at the expense of the programs' intended beneficiaries—poor and vulnerable households who lacked the time, information, and cash to redeem vouchers quickly. An analysis of programs run by SNV and WaterSHED drew a similar conclusion: some households reported that they were not able to plan and decide with extended family members (who were away) or borrow money in time to buy or construct a latrine (Kohlitz et al. 2021). These findings suggest that determining an effective redemption timeline is critical to achieving program objectives and thus warrants careful consideration on the part of program implementers.

The relative merits of different validity periods remain a matter of debate. Shorter windows could motivate households to act quickly, which may in turn accelerate the achievement of ODF status. Or the shorter windows may put poor and vulnerable households at a disadvantage, as evidenced by WaterAid's experience in Timor-Leste. Empirical evidence on this is limited and contradictory. For example, SNV's program, in which the subsidy availability was as long as 18 months for many households, achieved a 56 percent redemption rate (Kohlitz et al. 2021). Meanwhile, with a redemption window of one month, 26 percent of WaterSHED's targeted households redeemed their vouchers (Kohlitz et al. 2021). In the UNICEF/USAID Ghana study, the redemption window was three months and 100 percent of vouchers were redeemed (USAID 2021).

3.3 SUBSIDY AMOUNT

The question of the "optimal" subsidy value has been debated across the sanitation sector and given the many (contextual) factors that influence subsidy value and uptake, there is no single answer. The question is mainly relevant to understand the lowest possible subsidy size that can result in (the highest) intended subsidy uptake outcomes, therewith theoretically making available subsidy funds stretch further and potentially reach more households. Among the programs reviewed, the amounts and sizes of subsidies vary widely (see Table 3 in section 6.1). Subsidy value relative to the cost of a "complete" latrine (substructure and interface[16] and superstructure) is also very different across regions, with toilets in Asia, where most of the cited studies were focused, generally costing magnitudes less (in USD) than in Sub-Saharan Africa (Ulrich et al. 2016). Even a higher percentage subsidy value may still require a substantial investment by households in such a context.

A key challenge presented in the literature is the lack of standardized metrics for reporting subsidy amounts or sizes. For instance, in some programs (e.g., Guiteras, Levinsohn, and Mobarak 2015 in Bangladesh, Trimmer et al. 2022 in Ghana), only the voucher value relative to a package of subsidized materials is reported. Similarly, in programs by iDE Cambodia, SNV, and WaterSHED, the subsidy is reported relative to a package of materials for the substructure and its minimum installation (Nicoletti et al. 2017; Kohlitz et al. 2021). This lack of uniformity in reporting makes it difficult to compare and analyze subsidy data across different programs.

The cost of a latrine to the consumer, and therefore the subsidy amount, is very important. Beyond latent demand (e.g., due to competing household priorities) and other non-financial barriers, affordability and liquidity barriers form key deterrents for customers to invest in sanitation (USAID 2018b). Peletz et al. found that households' willingness-to-pay for improved latrine platform products was directly correlated with subsidy amounts (Peletz et al. 2017, Peletz et al. 2019, Peletz et al. 2021). For instance, the authors found that while 60 percent of households in Tanzania were willing to purchase plastic sanitation platforms with a 90 percent discount, only 5 percent would do so with a 15 percent discount (Peletz et al. 2017). In Kenya, the authors found that while 90 percent of households in

[16] Substructure and interface include the pit, slab, and slab support for pit latrines, as well as pans for pour and pour-flush toilets, and pit lining where relevant. Superstructure refers to a shelter that provides privacy and protection for the user of the latrine.

low-income areas would consider building latrines at a 90 percent subsidy, only 5 percent would pay the full price (Peletz et al. 2021).

That said, the above evidence comes with a few caveats. First, these studies did not specifically target vulnerable households; thus, their findings may not represent the preferences of the populations of interest for smart subsidies and, if anything, just confirm that price matters to every consumer, not just the poorest households. In the 2017 study in rural Tanzania, only 35 percent of voucher recipient households in the Kilosa district and 15 percent in Ludewa district were in the bottom two wealth quintiles (Peletz et al. 2017). Second, it is unclear if the choice of products presented in these studies aligned with the actual preferences of households. A potential indicator of households' lack of interest in the products offered is the low redemption rates, at roughly 36 percent, observed among households in rural Tanzania receiving discount vouchers for improved latrine platform products (Peletz et al. 2017). Although the authors noted a higher level of interest among Kenyan households in the product offered (i.e., plastic latrine slab), this interest was measured via households' stated preference, which introduces the potential for courtesy bias (Peletz et al. 2021). As such, the relationship between subsidy size and its potential effect on uptake among eligible households, as suggested by these studies, remains largely speculative. Furthermore, the impact of subsidy size on uptake by non-eligible households (either those who incorrectly qualify due to inclusion errors, or those who do not qualify but see others purchase at highly reduced prices) on the viability of sanitation enterprises and on the subsidy rollout mechanism and infrastructure, may be substantial.

Some evidence suggests that it may be possible to achieve significant impact using small subsidies only. For instance, Cameron et al. (2021) in Laos found that even modest subsidies (in this case, equivalent to just under 15 percent of the market price of a full toilet with a superstructure) can boost village-level improved sanitation coverage by 16 percentage points. In other circumstances, even poor households may be able to bear a significant part of the cost burden. A sample of three poor voucher recipient households surveyed during the WaterSHED program who built their latrine with the voucher spent an additional USD 180–USD 400 on materials for a brick superstructure, considerably more than the subsidized amount of USD 10–USD 20 (Kohlitz et al. 2021).[17] SNV had similar results, with subsidy recipient households spending an average of USD 159 on their latrine and superstructure—five to six times the subsidy value of USD 25.30–USD 31.50 (Kohlitz et al. 2021). These cases suggest that a small subsidy can serve as incentive for some poor households to cover the remaining expense.

Large subsidies are costly for funders and therefore may be difficult to maintain at scale. In Senegal, an increase in subsidy amount from 50 percent to 75 percent of latrine cost led to such a surge in demand that the program ran out of funds and had to be shut down (Trémolet, Kolsky, and Perez 2010). Balancing household accessibility with financial affordability will likely be a challenge for most subsidy programs seeking to achieve both equity and scale, even more so at the area-wide level.

That said, the relative impacts of different subsidy amounts remain understudied. To the team's knowledge, only one program—the World Bank Sanitation for the Poor Initiative, which was implemented in partnership with the 4Ps in the Philippines—rigorously compared the effectiveness of different subsidy amounts side-by-side (Batmunkh et al. 2019).[18] The results were underwhelming: a 25 percent subsidy had no significant effect, while a 50 percent subsidy amount increased ownership of

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[17] It is unknown whether IDP households that spent this amount have additional income sources (e.g., remittance from family members) that are not captured by the IDP system, thus allowing them to spend more on sanitation hardware while also qualifying for a subsidy.

[18] Comparatively, in Nicoletti et al. (2017), the 50 percent and 25 percent subsidies that were implemented were tested on different populations, with the higher subsidies given to households meeting a higher classification of poor (IDPoor 1) than the lower subsidies (IDPoor 2). As they were tested on different populations, their performance cannot be directly compared against each other.

improved latrines by only five percentage points (Batmunkh et al. 2019). Future research can consider testing various subsidy amounts experimentally, as well as exploring scalable approaches to determine an appropriate subsidy amount in a given context.

3.4 KNOWLEDGE GAPS

From a program design perspective, a key takeaway from our findings is that subsidy programs should focus on prioritizing reaching targets for uptake versus rigidly following an implementation schedule and strict timeline. However, recognizing that programs operate within constraints and need for planning, a potential area of research is to explore the time frame and/or timing for voucher redemption or rebate qualification, taking into account implementers' budget constraints. To do so, researchers could consider varying the redemption window (in length or times of the year) and assessing impact on latrine uptake, especially on poor and vulnerable households. In addition, researchers could investigate factors that affect the length of validity periods—i.e., supply-side providers' preferences, as well as factors that may influence the amount of time poor and vulnerable households need to redeem vouchers and rebates. In addition, formative exploratory research involving suppliers and target households within a specific market context could provide valuable insights into the supply- and demand-side factors that influence the choice of validity periods. Such research has the potential to generate practical insights that can inform effective subsidy design and implementation strategies.

Further research is needed on the scalability and cost-effectiveness of implementing intensive follow-up and monitoring measures to ensure high subsidy redemption rates in area-wide contexts. While smaller-scale studies, such as the UNICEF/USAID study in Northern Ghana, have shown the potential effectiveness of follow-up and monitoring in ensuring high redemption rates, implementing these measures is likely more challenging and expensive in larger, area-wide programs (USAID 2021). Examining the feasibility of such efforts at a large scale would provide valuable insights for future subsidy programs with an AWS mandate.

More evidence is needed on how subsidy sizes are determined and what the "right" amount in a given context should be. While subsidy amounts are informed by several factors, including benefit levels for comparable social protection programs, amounts of previous subsidy programs, comparisons to other contexts, financial considerations, political feasibility, and more, there remains much to be learned. In a given policy context, it is important to first gain an understanding of what the trade-offs are along key policy criteria (e.g., sustainability, household affordability/equity, scale of disbursement) when it comes to implementing larger versus smaller amounts and consider designing a smaller-scale evaluation that tests how variations of amounts perform along these criteria before introducing the subsidy program at scale.

Illustrative research questions are provided in Table 5 in Annex A.

4.0 TARGETING

Key takeaways

1. Indicators of a household's level of poverty and vulnerability are often used as criteria for targeting, though their inherent flexibility makes them liable to subjective—and even political—interpretations.
2. Different targeting methods have resulted in different inclusion and exclusion errors, levels of accuracy, and acceptability. Proxy means testing (PMT) and community-based targeting (CBT) have been most studied, but evidence does not clearly support one method over the other. Context, the risk of bias, elite capture, and transparency of targeting criteria and their application all play roles.
3. Costs associated with various targeting methods can vary across contexts, although making use of existing government-run poverty identification programs can be one of the more cost-effective options.

One of the most challenging tasks facing implementers of subsidy programs is identifying who should receive the subsidies. The sanitation sector typically targets households based on a combination of the following metrics: (1) latrine status, (2) poverty status, and/or (3) vulnerability status. By identifying households using an array of metrics, subsidy programs hope to reach populations experiencing diverse forms of disadvantage or vulnerability.

4.1 WHOM TO TARGET: TARGETING CRITERIA

Table 2 provides a summary of targeting criteria used by a selection of programs across latrine status, poverty status, and vulnerability status. These are introduced below.

4.1.1 LATRINE STATUS

A household's latrine status is determined by (1) whether its members have access to basic sanitation (or higher), defined as the use of improved facilities that are not shared with other households; and (2) whether that toilet facility/latrine is functional. Given that all subsidy programs seek to improve households' access to at least basic and sometimes to safely managed sanitation, latrine status is the most direct indicator for eligibility for sanitation subsidy programs. In addition, it is arguably the easiest of the three criteria to define and verify.

4.1.2 POVERTY STATUS

Subsidy programs within the sanitation sector measure poverty or rank wealth using metrics tracking material well-being, such as income, per-capita consumption/expenditure, and/or levels of food security, which are shared across the poverty reduction literature. For instance, the TSC in Maharashtra (India) targeted hardware subsidies to households that had a BPL card, indicating they fell BPL according to national surveys (Trémolet, Kolsky, and Perez 2010). Likewise, the Dishari project in Bangladesh targeted households having an estimated income of less than USD 290 a year (Trémolet, Kolsky, and Perez 2010). That said, the definition of poverty is also subject to local interpretations, which can sometimes diverge from standard welfare benchmarks (Premand and Schitzer 2020).

4.1.3 VULNERABILITY STATUS

Vulnerability status refers to a broader view of social disadvantage and is often interpreted quite differently from program to program. In some contexts, it is used interchangeably with poverty (Van Domelen 2007). Other programs consider other social factors when assessing vulnerability. For instance, the UNICEF/USAID Ghana Subsidy Program defined the vulnerable as those who are either over 65 years of age, have severe disability or chronic illness preventing work, or are widows, orphans, and child heads of household, living without the support of relatives (USAID 2021).

4.1.4 CHALLENGES OF IDENTIFICATION

Because of their inherent flexibility, the concepts of poverty and vulnerability are liable to subjective, and even political, interpretations, presenting a challenge for targeted subsidy programs. A common issue arises when the local community does not share the same understanding of vulnerability as program implementers (Water Supply and Sanitation Collaborative Council [WSSCC] 2019). If implementers defer to the community's pre-existing notions of vulnerability, subsidies might exacerbate the very inequities that the program is meant to address. However, identifying a new class of "deserving poor" based on some objective criterion might generate new social tensions while failing to account for local knowledge. Selecting eligibility criteria for subsidies requires great care. Defining poverty and vulnerability in a way that is both sensitive to local contexts and safe from political capture will likely remain a challenge for subsidy programs in pursuit of GESI.

Identifying meaningful targeting inclusion and exclusion criteria is critical to the success of targeted subsidy programs. This is true first because these criteria inform the choice of subsidy mechanism. For instance, subsidy mechanisms requiring bank accounts may not be effective for households experiencing some form of social or economic vulnerability. This, in turn, can have direct consequences on a subsidy's effectiveness in reaching its intended beneficiaries (see Section 5). Thus, choosing effective criteria—those that account for the specific needs and circumstances of the intended beneficiaries—is the first step to designing well-targeted subsidies that can help ensure access to sanitation services for all.

4.2 HOW TO TARGET: TARGETING METHODS AND RELATED SUCCESS FACTORS

Several methods have been used for targeting sanitation subsidies. These targeting methods are well-documented and summarized by others (USAID 2019; Schnitzer and Stoeffler 2021; Hillebrecht et al. 2019). In Annex B (drawing on USAID 2019), we describe five major approaches: Categorical Targeting, Geographic Targeting, Self-Selection, CBT, and PMT.[19] To this list, we add Machine Learning and Artificial Intelligence (AI)-based targeting, as in recent years this has been proposed as an additional method for targeting within poverty reduction programs. Below we summarize the evidence for how these methods perform by three metrics of interest to policymakers and implementers: (1) *accuracy* in identifying poor households, (2) *cost* of implementation, and (3) *acceptability* to the local communities in which they are implemented.

[19] The table in USAID (2019) also includes Means-Tested Targeting: Verified and Means-Tested: Simple; we exclude these as the former is not practically implementable in low- and middle-income countries due to lack of data on income and known difficulties in calculating reported income. Means-Tested: Simple has also, to our knowledge, not been applied in WASH settings and similarly relies on reported income.

TABLE 2. TARGETING CRITERIA: POVERTY, VULNERABILITY, AND LATRINE STATUS				
REFERENCE	**PROGRAM**	**COUNTRY**	**POVERTY AND/OR VULNERABILITY CRITERIA**	**LATRINE STATUS CRITERIA**
USAID 2021	UNICEF/USAID Ghana Subsidy Program	Ghana	• Poverty: Households that were not able to feed themselves all year round, OR • Include a vulnerable person receiving no support from relatives: – Elderly persons over 65 years of age; – Persons with a severe disability or chronic illness preventing work; or – Widows, orphans, and child heads of household.	• Lack a functional, private (non-shared) latrine with durable substructure[20]
IDinsight 2018[21]	PhATS – Milagros Sanitation Subsidy	Philippines	• Not specified	• Not having a sanitary toilet • A willingness to build a toilet[22]
Nicoletti et al. 2017	iDE subsidy + MBS program	Cambodia	• IDPoor 1 (Very Poor) AND • IDPoor 2 (Poor)[23]	• Unspecified
Kohlitz et al. 2021	SNV Netherlands Development Organization	Cambodia	• IDPoor 1 (Very Poor) AND • IDPoor 2 (Poor)	• Not owning an improved private household latrine
Kohlitz et al. 2021	Closing the Gap (WaterSHED)	Cambodia	• IDPoor 1 (Poor) AND • IDPoor 2 (Very poor)	• Not owning an improved private household latrine
Trémolet, Kolsky, and Perez 2010	TSC + small hardware subsidies for the poorest households	Maharashtra (India)	• BPL households (average income of less than USD 400 per year) identified through national surveys	• Not having received a government latrine subsidy previously

20 "Presence of concrete or plastic slab and pit lining with plastic, rocks, bricks, or concrete. Such substructures are not likely to collapse or be damaged during floods. Nevertheless, latrines with durable substructures are not necessarily functional (e.g., the pit can be full)." (USAID 2019).

21 This is an offline resource that is available upon request.

22 According to IDinsight's report, there were no clearly established household selection criteria. These two criteria were named by the former Rural Sanitary Inspector, but apparently not shared by all involved in the selection process. Most staff interviewed did mention "not having a sanitary toilet" as a criterion; however, some named other criteria, including "household vulnerability" or "poverty," with varying definitions (IDinsight 2018).

23 Cambodia's IDPoor system uses a community consultation process to identify poor households (through village representative groups), and those households are then tested through PMT for eligibility. PMT determine which group a household falls into. A village consultation meeting is held to review the first round of results and to submit comments and complaints before the final list is released (MRD 2019).

TABLE 2. TARGETING CRITERIA: POVERTY, VULNERABILITY, AND LATRINE STATUS				
REFERENCE	**PROGRAM**	**COUNTRY**	**POVERTY AND/OR VULNERABILITY CRITERIA**	**LATRINE STATUS CRITERIA**
Trémolet, Kolsky, and Perez 2010	Decentralized Integrated Sanitation, Hygiene, and Reform Initiative (Dishari)	Bangladesh	Eligibility criteria: ● Landless households, OR ● Pavement dwellers/homeless, OR ● Main earning person or the head of family is day laborer, owning less than 50 decimal of agriculture land or residing in a rented premise lesser than 200 square feet and having no fixed source of income, OR ● Households headed by disabled or females or old aged (65+ years) persons. Exclusion criteria: ● Households that own more than one acre of land (cultivable and homestead) ● Households with an income level greater than the income corresponding to the "poverty line" (income level below Bangladeshi Taka 622 per person/month for urban areas and Bangladeshi Taka 551 per person/month for rural areas).	● Not having a hygienic (improved) private latrine
Trémolet, Kolsky, and Perez 2010	*Programa de Agua y Saneamiento para Comunidades Rurales y Pequeños Municipios*	Ecuador	● Households within municipalities with cantonal capitals of fewer than 10,000 inhabitants	● Unspecified
WaterAid 2017	WaterAid	Timor-Leste	● The house is not in the category "very good"[24] ● The house meets a minimum of three of the seven indicators: – Land ownership category is "not good" – House type category is "sufficient" or "not good" – Animal ownership is "sufficient" or "not good" – Income category is "not good" – Someone in the house receives "bolsa da mae," "terceira idade," or "feto faluk" payments – Cook only once per day – Someone in the house has a disability	● The household already has a latrine (type of latrine unspecified) in an ODF community

[24] WaterAid included four categories in its wealth ranking methodology, including "not so good life," "sufficient life," "good life," and "very good life" to cluster households based on several indicators, including land ownership, income, animal ownership, etc.

4.2.1 ACCURACY

Arguably, the most important metric for evaluating the performance of a targeting method is whether it accurately identifies the beneficiary population. Methods with high accuracy have low inclusion and exclusion errors (broadly, "targeting" errors). *Inclusion errors* occur when non-eligible beneficiaries are identified as eligible. For instance, if the intended beneficiaries are poor households, the inclusion error represents non-poor households that are identified as eligible for the program via the targeting method. Meanwhile, *exclusion errors* occur when potentially eligible households are not identified as eligible by the targeting method.

Figure 2 illustrates how inclusion and exclusion errors can be calculated by breaking down the identified population into four quadrants. An inclusion error is quantified as the proportion of the population identified as eligible despite not being so. An exclusion error is quantified as the proportion of the population who are actually eligible but are misidentified as ineligible (Cornia and Stewart 1993). Although analyses of targeting outcomes tend to focus on inclusion errors, exclusion errors are just as important for assessing the performance of sanitation programs.

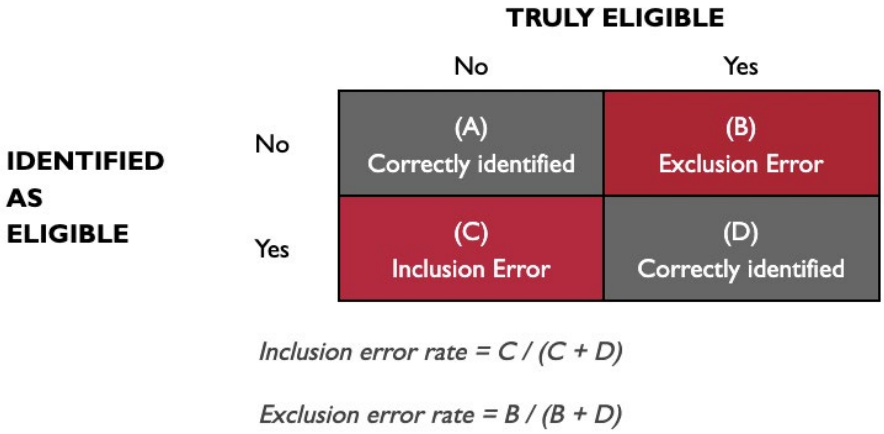

Figure 2. Calculating Inclusion and Exclusion Errors

Different targeting approaches can lead to varying proportions of the population being identified as eligible. PMT and CBT both predict which households count as "poor" but utilize different methods to determine poverty or vulnerability. For instance, PMT methods rely on predicting household income or consumption from a limited set of observable household characteristics or asset ownership variables. It generates a score per household with those ranked in the bottom quintile of the distribution of scores being classified as eligible. Applications of PMT can differ in the selection of household characteristics that are used to determine poverty, thereby also leading to differing proportions of the population being identified as "poor" within the same method. A study comparing different targeting approaches, including variations of PMTs, found that depending on the exact method used, between 4 and 27 percent of the population were identified as "poor" (Poulin et al. 2022).

The evidence from the poverty reduction literature suggests that, although their performance can vary significantly by context (Van Domelen 2007), PMT tends to perform better than CBT and categorical methods in terms of targeting errors when the economic measure of poverty is measured by per-capita consumption metrics. When comparing targeting errors for both methods in six Sahelian countries across nine poverty reduction programs, Schnitzer and Stoeffler (2021) found that the median targeting error for CBT was 50 percent while that of PMT was 39 percent. In Kenya, both PMT and CBT were more effective than categorical targeting (Monchuk

2017). However, Alatas et al. (2012) found that even when PMT performs better than CBT, differences in targeting errors are driven by households near the cutoff for inclusion and are not driven by including very wealthy households or excluding very poor ones. All three methods tested (PMT, CBT, and a hybrid approach) contained similar proportions of richer households. The difference in the error rate across the three treatments was driven by differences in the near poor (purchasing power parity [PPP$] 1 to PPP$ 2) and the middle-income group (those above the PPP$ 2 poverty line, but with log income less than 6.5). In the study setting (Indonesia), if the goal is to avoid elite capture (and therefore minimize inclusion errors) and include the most vulnerable (minimize exclusion errors), these methods perform similarly well, even if PMT performed best on average.

On the other hand, CBT is credited with the ability to better take into account local definitions and nuances of poverty and vulnerability. Alatas et al. (2012) found that CBT allows for incorporating information about households' ability to smooth shocks, which may not be captured by a snapshot view of consumption. Poulin et al. (2022) found similar results when comparing targeting methods used for their WASH subsidy program in Ghana: households identified as poor and vulnerable via CBT were often affected by "chronic poverty that may not be associated with assets and other standard proxies for wealth." Yet, by construction, CBT identifies poor households based on each community's own definition of poverty, making it hard to compare against a "true measure of poverty" or compare across geographies and programs. Furthermore, although well-executed CBT is a highly effective measure for identifying poor and vulnerable households, it requires significant training and monitoring and is thus difficult to implement at scale. Without the right type of community mobilization and solidarity (Trémolet, Kolsky, and Perez 2010), CBT processes are liable to be influenced by local politics, which can lead to targeting errors.

It can be argued that as targeting errors are large for both methods (especially in very poor and homogenous settings), targeting methods do not make a significant difference in terms of reaching the intended population. Policymakers should also consider other criteria, such as satisfaction (and community acceptability) and cost, when weighing targeting methods for specific programs.

Within the WASH sector, many subsidy programs leverage government-run targeting methods from pre-existing anti-poverty programs. Latrine subsidy programs commonly use established government poverty identification (ID) classifications and systems to target poor households. When available, implementing organizations can leverage government-run ID systems to avoid expending time and resources on designing a (possibly redundant) targeting mechanism from scratch. Examples of this include SNV and WaterSHED's and iDE's subsidy programs in Cambodia that leverage IDPoor levels to target poor households (Kohlitz et al. 2021). However, programs that leverage government-run poverty ID systems inevitably inherit the inclusion and exclusion errors produced by those targeting methods, which can be large in some cases (Poulin et al. 2022). In rural northern Ghana, Trimmer et al. (2022) used an eligibility protocol that relied on community consultation and found the protocol to be more selective (i.e., identifying a smaller number of eligible households) and able to identify households with vulnerability characteristics that are not captured by Livelihood Empowerment Against Poverty (LEAP) metrics.

Process evaluations of subsidy initiatives have also presented suggestive evidence that some government-run ID systems can produce large inclusion errors, that is, including significant shares of non-vulnerable households. For instance, SNV and WaterSHED targeted subsidy programs to IDPoor households in Cambodia with the stated goal of supporting poor families who would otherwise not be able to purchase or build a latrine (Kohlitz et al. 2021). The authors found that cost was not a significant barrier for latrine purchase for many households that utilized the subsidy (Kohlitz et al. 2021). The fact that these households have spent much more on a latrine than the

relatively small subsidy amount they received suggests that they may not have faced an income constraint and, therefore, may not have been the most in need of a subsidy.[25]

Few sanitation subsidy studies systematically compare targeting methods, but those that do can provide useful information for targeting subsidies at scale. Many programs do not undergo additional data collection to validate the performance of the targeting method relative to a reference measure of poverty. This is likely because it is often outside the focus of a given program and validation exercises can be prohibitively expensive ex-post, particularly if not budgeted for in earlier stages of program design. For example, in one subsidy program in Lao People's Democratic Republic, toilet rebates were provided to the poorest 30 percent of households in each community determined by a scorecard system that was developed for the intervention but is not explained (Cameron et al. 2021). However, the study mentions no comparisons to national poverty estimates and does not verify recipient households' vulnerability against any reference measure for poverty status. In Ghana, the UNICEF/USAID subsidy program that distributed vouchers to households identified as vulnerable by community members using CBT reported possible instances of inclusion and exclusion errors, but it suggested that these were examples of errors due to issues with targeting implementation (USAID 2020). Poulin et al. (2022) is the only study that compared error rates of five methods for targeting the poorest for water subsidies in Ghana (three PMT approaches, one CBT approach, and a PMT + CBT mixed approach) against a reference definition of poverty. Studies like these, conducted before large-scale targeted subsidy programs, can be useful in providing evidence of targeting accuracy.

In sanitation poverty-targeting, subsidy programs may also target households based on their sanitation status, in addition to poverty status, i.e., programs may specifically target households that do not own a toilet or those with an unimproved toilet that requires an upgrade. Quantifying the size of errors in targeting methods requires validating both predictions of poverty against a reference measure for poverty status, as well as verifying the true status of latrine ownership (if this is an eligibility criteria).

An outstanding question is whether latrine status alone is a sufficient criterion for subsidy targeting, or whether it needs to be supplemented by poverty-based targeting. This largely depends on programmatic goals. In the absence of an established poverty ID system, verifying latrine status may be less time-intensive and lower cost than verifying poverty measures. However, if the program goal is to provide subsidies to the poor, and within that particular geographic area pre-existing latrine ownership does not correlate strongly with poverty status, then targeting this way may fall short of addressing equity objectives. Even when latrine status is the only household-level eligibility criteria, unclear processes around verification can still lead to targeting errors. An example of this is IDinsight's process evaluation in Milagros, Philippines, that assessed the implementation of a sanitation subsidy under the PhATS program. For the program, households in previously certified ODF communities were targeted and deemed eligible based on whether or not they owned a sanitary latrine (IDinsight 2018). However, the program was found to have significant targeting errors due to poor implementation of the eligibility criteria; many government staff implementing the program had differing understandings of eligibility, as did beneficiary households. Additionally, household visits by local government officials that had been mandated to assess toilet presence often failed to occur. These issues contributed to wide gaps in latrine coverage: after subsidy distribution, survey results revealed an estimated 36 percent of eligible households already had a sanitary toilet.

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[25] For WaterSHED's beneficiaries, the value of the subsidy ranged from USD 10–USD 20, while households that redeemed them purchased materials and superstructures with a cost around USD 180–USD 400 (Kohlitz et al. 2021). SNV had similar results, with households spending an estimated USD 159 on average on their latrine and superstructure purchase despite a subsidy value of only USD 25.30–USD 31.50 (Kohlitz et al. 2021).

4.2.2 COST

The costs associated with targeting can vary significantly across methods and contexts. In Indonesia, PMT targeting cost an estimated USD 153 per village, while a comparison of three different PMTs in Ghana (Poverty Probability Index, Demographic and Health Surveys, and AI-based PMT) were all found to cost USD 760 per neighborhood (Alatas et al. 2012; Poulin et al. 2022). The cost of PMT can be high due to the need for all households in a program area to be surveyed but can vary across contexts. Cost factors can include, for example, population density of the program area, which affects implementation costs, with higher density areas minimizing the travel and timing costs needed for data collection and/or verification (Poulin et al. 2022). Implementation costs can also vary for CBT in different program contexts, even within the same country. In Ghana, implementing community consultation cost USD 286 per community in a USAID program compared to USD 412 per neighborhood according to Poulin et al. 2022 (USAID 2020; Poulin et al. 2022). However, implementation costs for CBT in Indonesia were significantly lower at USD 65 per village[26] (Alatas et al. 2012). The main costs for CBT can be attributed to the need for well-trained facilitators that are familiar with the local program area and can facilitate community engagement and coordination efforts (USAID 2021a).

Leveraging existing government-run poverty ID programs can be a cost-effective targeting method. Leveraging existing ID systems is often cheaper to implement (USD 89 per neighborhood) when compared to PMT and CBT methods because targeted households have already been identified (outside of any additional eligibility criteria) (Poulin et al. 2022). However, there is insufficient evidence on the cost of any singular targeting method across program and geographic contexts to identify a gold standard (Monchuk 2014). The largest difficulty in comparing costs across contexts stems from the lack of standardization in their reporting. Most of the above studies calculate costs at an aggregated geographic level (e.g., village, neighborhood, or less so at the household/beneficiary level), which does not allow for comparisons across methods or contexts.

4.2.3 ACCEPTABILITY

Acceptability of targeting methods is influenced by (perceived) risks of bias, elite capturing, the level of transparency of the targeting criteria used, and process in which they are applied. Very few studies have investigated and compared the satisfaction or acceptability of each targeting method, and results from current studies vary across contexts (Alatas et al. 2012; Premand and Schnitzer 2020). Opposite results have been reported on satisfaction levels, suggesting that different factors are at play in different contexts. For example, several studies found that, in some contexts, CBT can be liable to elite capture (Pan and Christiaensen 2012; Alatas et al. 2012; Basurto, Dupas, and Robinson 2020). However, it is argued that in a very homogenous context, even local elites are not significantly wealthier than the poorest households. In Indonesia, Alatas et al. (2012) found that formal elites[27] are nine percent wealthier than non-elites and that eliminating elite targeting would improve welfare gains by only one percent. Poulin et al. (2022) found that community members preferred PMT targeting as it is based on individual surveys with households and that vulnerable households could feel embarrassed to disclose their status during an open meeting or in front of influential members of the community. However, in a separate study in Ghana, community members generally felt that CBT accurately identified poor and vulnerable households that were deserving of subsidies, although some

[26] Costs of CBT increased to USD 110 when factoring in the value of community members' time, although it is unclear how these are calculated.

[27] The term "formal elites" is used by the authors to refer to villagers occupying formal leadership positions (village heads, heads of hamlets, etc.), as distinct from those occupying informal leadership roles (i.e., respected members of the community whose influence and power is derived from social acceptance).

felt that poor households could still be excluded (USAID 2020). Poulin et al. (2022) is one of the few papers that compared satisfaction among communities with different targeting methods. They found mixed results with communities overwhelmingly reporting preferring PMT because it seemed less prone to bias as households would be more honest during individual visits than during public community meetings. Furthermore, stakeholders reported that transparency regarding targeting criteria is hard to convey when using CBT where the community comes up with its own definition of what makes a household vulnerable.

4.3 TARGETING IMPLEMENTATION

After the targeted population has been identified, the next step is to ensure that this population actually receives the subsidies. This process comes with its own set of pitfalls, which can prevent subsidies from reaching their intended beneficiaries—or even be delivered to the wrong recipients. Often viewed as a component of targeting errors, these inefficiencies are in fact independent of the targeting process and hence merit their own consideration.

Drawing from past experiences, we discuss below some common causes for errors in delivering subsidies through voucher and rebate programs but note that this section focuses solely on aspects of implementation that concern the delivery of subsidies to targeted households. Thus, we exclude the many other implementation activities—identifying and accrediting vendors, training vendors and distributors to run the program, setting up a funding structure, and submitting and verifying claims, to name only a few.

Experience has shown that implementation errors are likely to occur when the eligibility criteria are poorly communicated to program stakeholders. In the subsidy program run by WaterAid in Timor-Leste, program staff's poor understanding of the eligibility criteria caused vouchers to be distributed to the wrong community (WaterAid 2017). Meanwhile, findings from the PhATS program conducted by the municipal government of Milagros, Philippines, reveal that program staff reported conflicting eligibility criteria. It is possible that this confusion affected program quality: visits by program staff to households appeared unsystematic, with only 83 percent of eligible households (and 67 percent of those ineligible) visited (IDinsight 2018).

Another opportunity for error arises when members of an eligible household are not present at the time vouchers are distributed. When this happens, neighbors may accept the vouchers on behalf of the absent household, as was the case in the WaterAid program in Timor-Leste. Program staff observed that several households obtained multiple vouchers with the intention of passing them on to their neighbors (WaterAid 2017). While most intended recipients ultimately redeemed their vouchers, this practice heightens the risk of voucher transference to non-eligible households. This risk most likely increases when vouchers have high monetary value, making them attractive to non-intended users. Although the literature identifies this risk as one arising during the process of targeting *verification*, it is conceivable that the same risk can occur during the targeting implementation as well (Gorter et al. 2012).

Lastly, it can be difficult to ensure that the incentives of distributors are aligned with those of the program. For instance, distributors paid on a commission basis (i.e., earning a fee for each voucher sold) may have a perverse incentive to sell vouchers to the non-poor to maximize sales (Gorter et al. 2012). In Cambodia, village health volunteers were charged with distributing vouchers without any additional compensation, causing them to neglect distribution in favor of paid tasks (Gorter et al. 2012). To mitigate this risk, program implementers may consider a variety of strategies to align distributors' incentives with the program's goal of reaching the intended households—whether it be monitoring distributors' adherence to program protocols, providing them with additional compensation

for distributing vouchers, or even rewarding them for successfully delivering the vouchers to the right households.

A potential avenue of future research is to systematically document the challenges to targeting implementation. To date, the empirical literature on this topic remains relatively thin, presenting few documented cases where these challenges have been detected, analyzed, and addressed in sanitation subsidy programs. While we have attempted to distill some notable instances from the available literature, there are most likely other bottlenecks that the review has not identified, which can significantly affect a program's ability to reach those in need and thereby attain GESI goals.

4.4 KNOWLEDGE GAPS

Few studies in the WASH sector have rigorously assessed targeting methods, and many sanitation programs do not report their targeting effectiveness or projected/actual inclusion and exclusion errors. This is likely because many subsidy programs make use of existing poverty ID systems without verifying targeting outcomes against metrics specific to sanitation (e.g., access to or ownership of latrines), resulting in large targeting errors. For programs using independent targeting methods, targeting errors are often not reported due to the time and costs required to conduct additional validation exercises necessary to quantify these errors. This lack of transparency prevents a broader comparison among different methods and their respective accuracy.

Errors in targeting implementation remain under-documented in the WASH literature. The examples listed in this review are drawn from just two reports on past sanitation subsidy programs and one systematic review of voucher programs in the health sector. Furthermore, those reports present these errors as just one in a long list of findings, without providing much interpretation or context. Further research may significantly expand our understanding of this area by systematically documenting the challenges that may cause targeted households to be excluded during the process of targeting implementation.

In contexts that utilize existing government-run ID systems with known targeting errors (e.g., Ghana's LEAP) or no existing system at all, **few studies have tested the performance of alternate targeting methods against a set of reference indicators for poverty status used in the poverty reduction literature,** such as per-capita consumption and food insecurity. Assessing several methods on accuracy and other program outcomes can provide policymakers useful information on the cost-effectiveness and equity implications of each method.

Few studies have attempted to incorporate secondary data sources (geo-spatial, satellite images, mobile and social media data, etc.), and machine learning techniques may serve as one method to potentially improve poverty/vulnerability targeting at area-wide scale. Most of the latrine subsidy programs we reviewed target vulnerable households once a community has been already selected. Machine learning methods using alternate data sources would enable implementers to first target geographic areas that are predicted to be vulnerable and either provide subsidies to all households within that area or apply a second level of targeting households. These approaches can predict poverty levels for fairly granular geographic areas; in the Philippines, poverty mapping was done using a combination of satellite and social media data to identify areas of only 2–5 km in diameter (Ledesma et al. 2020). This has potential to be applied in an "area-wide" framework, where sanitation programming is planned across larger geographic areas (e.g., a district), and for contexts with limited or poor-quality administrative data at the village or community level for geographic targeting. iDE and Causal Design have an upcoming study testing this two-stage approach, first identifying climate-vulnerable regions in Cambodia using pre-existing flood incidence spatial data, and then carrying out household-level targeting using PMT methods (iDE, forthcoming). So far, applications of this approach in

the WASH sector are quite limited, and existing instances are still far from being accurate enough to be used for implementation.

Illustrative research questions are provided in Table 5 in Annex A.

5.0 BARRIERS TO PROGRAM UPTAKE

Key takeaways

1. Financial barriers form important barriers to household uptake of sanitation subsidies. These include affordability barriers, where households cannot afford to cover the remaining costs not covered by the subsidy, or liquidity barriers, where households face case flow constraints to avail of the money within the time window stipulated by the subsidy program.
2. As important, but less well understood, are non-financial barriers that can impede or deter households from accessing and using the subsidy, such as those related to physical distance or access, knowledge and understanding, or social exclusion. These barriers are often highly correlated and tend to be most common among poor households, and require concerted program action to identify, account for, and address.

Thus far, the review has highlighted several barriers that may prevent a subsidy program from reaching the targeted households. But even after a voucher or a rebate has found its intended user, the user may still not use it for several reasons.

5.1 FINANCIAL BARRIERS

The most common constraint is a household's liquidity. Oftentimes, affordability has less to do with the actual ability to pay than the ability to access funds within the subsidy's redemption timeline (Kohlitz et al. 2021). This is often difficult for poor households, who tend to have unpredictable cash flows and therefore lack the means to amass the lump sum needed to finance a latrine (UNICEF 2020). When under pressure to build one, poor households may resort to selling their already limited assets, making them more vulnerable to contingencies (WSSCC 2019). This barrier can be overcome by careful design—for instance, by enabling households to access loans, by using vouchers instead of rebates (which require an up-front cost), or by selecting an appropriate redemption timeframe (e.g., aligned with harvest-related cashflow cycles), or extended redemption timeline and subsidy amount (UNICEF 2020). Notably, future programs may consider subsidizing a portion of or the full cost of a latrine's superstructure—a burden often borne entirely by households, even though it can exceed the cost of the subsidized substructure.

5.2 NON-FINANCIAL BARRIERS

Less well-understood, however, are the many non-financial barriers that may inhibit households from taking advantage of subsidies. These barriers take many forms—from physical challenges to lack of knowledge to negative perceptions toward subsidy programs—and are often difficult for implementers to accurately perceive or assess. Below are some examples from the available literature, noting that this list may not be exhaustive.

One social hurdle arises when household members are reluctant to accept a subsidy in the absence of a key decision-maker. This absence happens when the able-bodied members of a household leave for work during the day or migrate elsewhere in search of employment (Chambers 1979). Since these members often have final say in major decisions, other members are unlikely to make an investment in a latrine without their input. For instance, interviews of participants in the WaterSHED program in Cambodia revealed that some female members chose not to take up the subsidy without the consent of their male relatives, who were away from home during the period of the program (Kohlitz et al. 2021).

Similarly, **households may be unable to handle the construction of a latrine or its superstructure**—a requirement of many subsidy programs—due to labor shortages. Households with female heads or members who are elderly, sick, injured, or handicapped may have no one available to help dig the pit or install the latrine. In very poor households, able-bodied members may have left for work elsewhere, and hiring laborers may be economically infeasible. While this concern can be addressed by including a direct build component in the program (Ahmed and Hrybyk 2016), many subsidy schemes still leave the responsibility upon the family's shoulders.

Sometimes, households simply may not understand how vouchers or rebates work (Gorter et al. 2012). This barrier tends to affect poor households, whose physical isolation and lack of political power may cut them off from social forums (e.g., public meetings, community gatherings, ceremonies, rituals) through which knowledge and information on programs are often transmitted (Chambers 1979). This lack of understanding can persist in the face of substantial investments made by program implementers in education and outreach, not least because these efforts often rely precisely on the social channels that poor households cannot access.

Poor households may distrust the processes required to obtain the subsidy or the benefits promised. These households may have experienced various forms of exploitation, have little access to and experience with government programs, and have little recourse for redressing abuse (Chambers 1979). For this reason, they may shy away from engaging with the formal procedures put in place by program implementers. In addition, households may be skeptical of the benefits of installation—whether it be because they have little space in which to install the latrine (Awunyo-Akaba et al. 2016; Kohlitz et al. 2021; Tamene and Afework 2021), because they lack the rights to private land (Awunyo-Akaba et al. 2016), or because they assume that it will inevitably collapse in some natural calamity (Tamene and Afework 2021).

Even when households are keen to take up the subsidy, they are faced with yet another barrier: distance. Poor households tend to live in areas far removed from main roads, from centers of commerce, or from other forms of social activities (Chambers 1979). For them, travel is often a difficult and costly endeavor, both in the money needed to procure transportation and in the time lost during travel to the vendor (WaterAid 2017). When presented with the prospect of such a long, costly journey, many households may decide to forgo the subsidy entirely. While some subsidy programs have sought to overcome this barrier by selling latrines door-to-door, this approach may simply pass the burden of travel from households to vendors. It remains unclear whether vendors would be incentivized to traverse long distances in search of remote households when they can reach wealthier, better-connected clients in less time.

Households may also be unwilling to adopt latrines due to the lack of space and other environmental challenges. Several studies have found that households have little motivation or ability to invest in a private latrine if they live in densely populated areas, rent their home, or do not own enough land (Awunyo-Akaba et al. 2016; Kohlitz et al. 2021; Tamene and Afework 2021). In addition, a hostile climate and poor geological conditions (e.g., poor soil quality, flooding) can make it difficult to build latrines and may even cause latrines to eventually collapse, thus discouraging households from construction and repair (Tamene and Afework 2021; Busienei, Ogendi, and Mokua 2019).

Even after households have managed to surmount each of the above barriers and arrive at the vendor, their voucher may not always be accepted. For instance, a vendor might refuse vouchers because of the administrative burdens required to process and submit voucher claims, because of collusion with distributors, or even because of sheer prejudice against their clients. Though we have found no documented instance of this challenge in the sanitation sector, the literature cites denial of vouchers as a real threat to uptake in other health sectors (Gorter et al. 2012).

The review identified some common features of non-financial barriers. First, **non-financial barriers are often highly correlated and tend to be most common among poor households.** For example, members of a poor household might be physically weak because of their inability to pay for food and healthcare, physically isolated because they lack the money to afford transportation, undereducated because they cannot afford schooling, socially marginalized because of the association between lack of wealth and low status, and politically powerless because they lack the means to buy influence (Chambers 1979). These barriers can be mutually reinforcing, creating "clusters of disadvantage" that impose a heavy burden on poor households' ability to take advantage of a subsidy, especially as compared to their wealthier, better-connected peers (WSSCC 2019).

Second, non-financial barriers are often overlooked because they primarily affect those least able to make them known. Due to their isolation and relative lack of social power, poor households are often underrepresented in communal processes and deliberations (Chambers 1979). This presents a profound challenge for subsidy implementers, who rely on these feedback channels when designing and implementing their programs. For instance, experience suggests that when implementers default to mass media and scripted events to promote their programs, they end up leaving out much of their targeted audience, for whom these communication channels may be out of reach (UNICEF 2020). In another example, a review of the program by WaterAid in Timor-Leste found that many poor, vulnerable households were absent from community discussions during its targeting process due to a combination of distance, infirmities, and social exclusion (WaterAid 2017). Unless program implementers take deliberate measures to solicit input from marginalized populations, they run the risk of systematically neglecting the challenges affecting those beneficiaries—or worse, deepening the existing inequities within the community.

6.0 ACHIEVING SUBSIDY SCALE AND SUSTAINABILITY WITHIN AN AWS FRAMEWORK

Key takeaways

1. The potential contribution of subsidy programs to AWS outcomes needs to be understood in their relative value and opportunity cost—in other words, whether they are the best use of limited resources or the best "value for money" in ensuring sustained outcomes at scale. While subsidy programs have shown to be effective at increasing access to basic sanitation among poor and vulnerable households, evidence suggests that their financial costs are substantial. However, few programs report cost data, and none use a standardized metric, making it difficult to assess subsidy program cost-effectiveness or weigh up different subsidy mechanisms or targeting methods.
2. There is limited evidence on the long-term impact of subsidy programs, and households face many obstacles to ensuring sustained use of their subsidized facilities. Subsidy programs can deploy a variety of strategies to improve sustainability within an AWS context, assuming a mix of sanitation and hygiene interventions and systems strengthening, GESI, and adaptive management practices as outlined in the AWS framework (USAID 2023).

A key consideration facing subsidy programs operating within an AWS context is their ability to scale. That is, how financially and operationally feasible is it for subsidies to contribute to universal coverage across the entire target geography, state, or country, ensuring that all individuals, especially the poor and marginalized, have access to basic sanitation? A program's scalability is determined in large part by its cost-effectiveness: can it achieve significant impact without requiring excessive funding? An additional related factor is the sustainability of its outcomes: are they long-lasting enough to justify the financial investment of the program's funders?

The potential contribution of subsidy programs to AWS outcomes is strongly affected by their ability to scale and to ensure sustained, long-term benefits. On one hand, the evidence gives some indication that, at least in the short term, subsidy programs have been effective at increasing access to basic sanitation among poor and vulnerable households. On the other hand, the same body of evidence also suggests that the financial costs involved in achieving these outcomes can be substantial. These costs include both that of the subsidies themselves and those incurred during activities conducted over the course of program implementation—e.g., establishing the voucher redemption infrastructure (including sanitation supply chain), financial management, promotional efforts, setting up subsidy payment systems, and putting in place a monitoring infrastructure, to name a few. In addition, the costs of targeting can be significant in settings where implementers cannot leverage pre-existing targeting systems. These costs can present a significant barrier to program initiation and continuation, especially when the proposed long-term benefits remain uncertain, as discussed in previous sections.

As such, it is of practical interest to review the available evidence regarding the cost of known subsidy programs. In this section, we focus first on program implementation costs and later on the costs of targeting. Last, we examine the potential limitations of subsidy programs in sustaining long-term usage of basic sanitation products and offer some recommendations to overcome them, in the context of the broader AWS framework.

6.1 PROGRAM COST-EFFECTIVENESS

The cost-effectiveness of a subsidy program can be defined using a variety of metrics, but few programs report any cost data at all. An important first step is to standardize the assessment

of and comparison between programs along a common set of "effectiveness" metrics. In this section, we propose defining effectiveness in terms of:

1. Total program cost per poor, eligible household achieving basic access; and
2. Total program cost per community achieving a target level of basic sanitation access (e.g., 80 or 100 percent).

Table 3 presents available data from the literature. This table is intended to illustrate the usefulness of reporting costs in this standardized way but is currently limited in what we can conclude from it due to missing information on costs. As few published studies report data on program costs, many rows contain "No data." The lack of program costs data could be due to the reluctance on the part of implementing organizations and/or availability only in programmatic reports that are not easily searchable. In addition, studies often differ in their approaches to calculating cost-effectiveness. For example, Nicoletti et al. (2017) calculate program cost-effectiveness by dividing the total program cost (including fixed and marginal costs) by the number of improved pour-flush latrines sold. On the other hand, the study conducted by UNICEF/USAID in Ghana reports program cost (including subsidies and program implementation) per study community and per household that no longer practices OD and has upgraded to durable latrines. Meanwhile, Batmunkh et al. (2019) determined cost-effectiveness as program cost per household that adopts improved sanitation. This lack of standardization among studies hinders attempts to compute incremental net costs of programs or draw broader conclusions regarding their relative cost-effectiveness. To address this gap in the evidence base on subsidy program costs, targeted subsidy programs and studies going forward should systematically collect and publish cost data.

Nonetheless, the limited available data in Table 3 illustrates that costs per household of a subsidy program are higher in the African context (USAID 2021b) than in the Asian context, that increased scale of a program can substantially reduce costs per household (Nicoletti et al. 2017), and that subsidies can have a marked leveraging effect on private investment in sanitation facilities (Ljung et al. 2015). Only the Ghana study provided information by household and by community served as per our two proposed metrics, but while this subsidy pilot had a 100 percent redemption rate, it did not result in the target level of basic sanitation access, with 54 percent of the households in treatment communities still practicing OD at endline.

6.2 TARGETING COST

In addition to program implementation costs, the cost of targeting can be significant, particularly in settings where implementers cannot default to pre-established systems for identifying poor households. As such, implementers are presented with two alternatives: either (1) save on identifying the right households, distribute subsidies to a broader population, and accept the possibility of inclusion error; or (2) spend more on finding the right beneficiaries and distribute fewer subsidies.

To identify the option most suited to their context, implementers may consider the following two factors: budget size and composition of the potential beneficiary population.

TABLE 3. COST-EFFECTIVENESS OF SUBSIDY PROGRAMS UNDER REVIEW						
STUDY	**PROGRAM COUNTRY**	**COST METRIC REPORTED**	**METRIC DEFINITION**	**COST AMOUNTS REPORTED**	**PROGRAM COST PER ELIGIBLE HOUSEHOLD ACHIEVING BASIC ACCESS**	**PROGRAM COST PER COMMUNITY ACHIEVING 100 PERCENT BASIC ACCESS**
Pattanayak et al. 2009	India	No data	No data	No data	No data	No data
Guiteras, Levinsohn, and Mobarak 2015	Bangladesh	No data	No data	No data	No data	No data
Ljung et al. 2015	Vietnam (CHOBA)	Leverage	Private investment in latrine/public funds	USD 46.7 (Public/donor funding) USD 373 (Private sanitation investment) Leverage = 8.0	No data	No data
Nicoletti et al. 2017	Cambodia	Average cost per improved pour-flush latrine sold in Treatment and in Control groups	[Total Fixed Costs + (Marginal Costs * Number of Latrines Sold)]/Number of Latrines Sold	Pilot estimates USD 153 per latrine in Treatment (USD 254 per latrine in Control) Program-wide estimates USD 39 per latrine in Treatment (USD 66 per latrine in Control)	No data	No data
Batmunkh et al. 2019	Philippines	Cost per household to adopt improved sanitation[28]	(All households who took up intervention * Per household cost)/Number of households adopting improved sanitation between baseline and endline	See next column	USD 97 per household on the 25% subsidy loan USD 174 per household on the 50% subsidy loan	No data

[28] The authors stated that operating costs were omitted since data for them were not available (Batmunkh et al. 2019).

TABLE 3. COST-EFFECTIVENESS OF SUBSIDY PROGRAMS UNDER REVIEW

STUDY	PROGRAM COUNTRY	COST METRIC REPORTED	METRIC DEFINITION	COST AMOUNTS REPORTED	PROGRAM COST PER ELIGIBLE HOUSEHOLD ACHIEVING BASIC ACCESS	PROGRAM COST PER COMMUNITY ACHIEVING 100 PERCENT BASIC ACCESS
Cameron et al. 2021	Laos	No data	No data	No data	No data	No data
Kohlitz et al. 2021 (SNV program)	Cambodia	Unit cost of subsidy per household.	Unit cost of subsidy includes hardware and operational costs.	USD 47–USD 53	No data[29]	No data
Kohlitz et al. 2021 (WaterSHED program)	Cambodia	No data	No data	No data	No data	No data
USAID 2021b	Ghana	1. Average implementation cost per study community 2. Average implementation cost per household no longer practicing OD or upgrading to durable latrine	1. [Subsidy Costs + Program Costs (training, implementation, program management)]/Number of study communities 2. [Subsidy Costs + Program Costs (training, implementation, program management)]/Number of study communities	USD 3,150–USD 3,590 per community in Treatment USD 1,560 per community in Control USD 129–USD 147 per household in Treatment USD 1,560 per household in Control	Unspecified[30]	Unspecified[31]
Hoo et al. 2022	Cambodia	No data	No data	No data	No data	No data

29 The reported amount accounts only for the cost of subsidy and not the cost of implementing other program activities.

30 The figure reported was calculated over all households reporting this outcome and therefore does not represent only *eligible* households.

31 This figure reported was calculated over all study communities and therefore does not represent only those that ended up achieving basic access.

6.2.1 BUDGET SIZE

Implementing a new targeting procedure using CBT or PMT may only be feasible when the government and its partners have a substantial budget at their disposal. Sometimes, however, implementers may not be able to afford the extensive data collection and verification exercises required for CBT or PMT; in these cases, they may consider leveraging data collected via existing social protection programs. It might also be cheaper to implement "geographic"-only targeting (i.e., entire villages or smaller administrative areas within a district deemed poor on average based on administrative data).

6.2.2 COMPOSITION OF POTENTIAL BENEFICIARY POPULATION

Depending on the poverty metric used, a large proportion, or in some cases, entire communities may meet the poverty criteria.[32] Cases like these can be handled in several ways: first, a more stringent measure can be determined that isolates the "extreme" poor; for instance, using food security measures to assess acute poverty on top of more commonly used asset-based measures. Second, if there is reason to believe that poverty or vulnerability as they relate to actual ability to pay for a latrine is indeed homogenous within an area (e.g., if an entire area, which could be a small as a village, has been subjected to exogenous shock factors like extreme climate events or conflict), there is arguably less value in undertaking an expensive verification process using indicators of poverty status, and targeting based on latrine ownership status alone may be sufficient. The reason is simple: if everyone is poor, then the risk of exclusion error is low.

Table 4 lists various targeting approaches, considering their verification burden, associated costs, and error rates.

TABLE 4. TARGETING COSTS VS. ACCURACY

VERIFICATION BURDEN	APPROACH	COSTS OF TARGETING	EXCLUSION ERROR	INCLUSION ERROR
Existing data available	Geographic	Low	Low	High
	Government ID	Low	Medium	Medium
Household-level verification/data collection required	Eligibility based on latrine status only	Medium	Low	High
	Eligibility based on PMT methods	Medium/High	Low	Medium
	Eligibility based on CBT process	High	Low	Medium

6.3 ENSURING EFFECTIVENESS AND SUSTAINABILITY

The potential sustainability of sanitation subsidy programs is strongly linked to how well the program is integrated into a broader AWS framework. As proposed in the Area-Wide Sanitation Desk Review (USAID 2023), effective delivery of sustained, equitable, universal access and use of safely managed sanitation and hygiene requires a set of core components: a set of national and

[32] As was the case in the Timor-Leste WaterAid pilot, where eligibility had to be revised to be more stringent after discovering 100 percent of households met at least two of seven poverty criteria, and the "distinction between vulnerable and non-vulnerable was based on very slight variation in house type or animal ownership" (WaterAid 2017).

subnational building blocks needed to implement AWS—including, for example, sector policies and strategies, planning and financing, institutional arrangements, capacity strengthening, and monitoring, evaluation, and learning—complemented by a mix of necessary sanitation and hygiene interventions, and system strengthening, adaptive management, and GESI mainstreaming as cutting processes that can strengthen intervention and service delivery efforts (USAID 2023).

The above sections have highlighted that many of the factors influencing the potential impact and cost-effectiveness of sanitation subsidy programs depend on and interact with these AWS elements: targeting methods are impacted by the (non) existence of sector systems to identify and target vulnerable households, and by the strength and reliability of existing household data collection, analysis, and reporting systems, including on existing sanitation access levels. The timing and preferred delivery mechanism for subsidies need to be considered vis-à-vis broader behavior change and MBS interventions, and a range of financial and non-financial GESI barriers can affect household uptake of subsidies if they are not explicitly identified, accounted for, and addressed. The ability of a sanitation subsidy program to contribute to long-term, sustained outcomes is similarly affected by its integration into an AWS framework.

By design, targeted subsidies are a one-time intervention seeking to reduce the immediate financial constraints that prevent households from purchasing a latrine. The many cases cited in this review have demonstrated the ability of subsidies to help poor, vulnerable households gain *access* to sanitation (Jenkins and Scott 2007; Whaley and Webster 2011; Sara and Graham 2014). As important as immediate uptake is the continued maintenance and *usage of* sanitation goods and services over the long term. Achieving this ultimate objective requires moving from a "one-time intervention" approach to active planning and monitoring of subsidies within the wider context and objectives of an area-wide program. AWS programs with a subsidy component can deploy a variety of strategies to mitigate risks related to sustained access and use of sanitation facilities and services. These strategies target several components of a sanitation program with a subsidy component—from its product (i.e., latrines), to its users (i.e., beneficiary households), to its activities and outcomes (e.g., usage and upkeep).

1. **Ensure sufficient follow-up with households to ensure subsidized components are correctly installed and fit within minimum standards of usability and hygiene.** As many subsidy programs subsidize latrine components, program success may be based on the sheer number of units installed versus their quality and how they fit within broader requirements around hygiene and privacy. As such, the design of these programs should, at a minimum, incorporate measures to ensure that installation is done correctly and that the latrine subsidized is constructed within a durable structure with safe containment, as well as equip households with information on latrine maintenance (both self-maintenance and connecting them to a local vendor in case of follow-up questions). Where possible, programs should provide additional information and encouragement to households to set up a superstructure that meets standards of durability, accessibility, and privacy. However, this should be done with care to avoid introducing perverse incentives or coercion (i.e., avoid making superstructure construction a requirement for vendor reimbursement).
2. **Provide additional support to beneficiary households—particularly the most vulnerable.** Some households and individuals in rural communities need more support than others to access and use durable, safely managed sanitation services. Over time, these communities and households also face a variety of shocks (migration, population change, economic crisis, climate crisis, etc.), which may affect the sustained use of sanitation services. To combat these threats, future efforts may explore various types of institutional support for poor, vulnerable households during, or after, the implementation of subsidies. Examples include planning for risks or hazards that may affect the sustainability of latrines, hosting additional information sessions for households on latrine maintenance and management, expanding

households' access to supplemental financing for latrine upgrade or emptying, and establishing "point persons" on the ground who can directly counsel households and relay customers' feedback to program implementers.

3. **Monitor latrine usage and safe management over the long term, in addition to uptake.** Rather than reporting on only uptake—a poor indicator of a program's long-term impact—AWS programs with a subsidy component should also monitor usage and safe management of subsidized sanitation services, particularly among those from poor and marginalized groups, as well as examine factors that sustain the use of latrines over time. Future subsidy programs may consider adding to their monitoring system indicators that specifically track, for instance, the physical state and use of latrines over time, levels of satisfaction reported by households, or signs and incidents of slippage.

7.0 CONCLUSION AND RECOMMENDATIONS

While sanitation subsidies are being reconsidered after a period of reduced popularity during the spread of CLTS, there remain challenges and important unknowns in their design and implementation. Getting a subsidy program to work effectively is far from straightforward, as evidenced by the many trade-offs facing implementers at each stage of the program's life cycle—from design, to targeting, to implementation, to uptake. This review uncovered key knowledge gaps and questions around when subsidies should be introduced within area-wide programming, who should receive subsidies and what programs can do to increase the chances of correctly identifying and including them, and how the subsidies should be designed to encourage uptake among the most vulnerable households and increase the likelihood of sustainable usage over time. Answering these questions is a critical next step to understanding how subsidies can be effectively leveraged within an area-wide framework to the objectives of equity and universal coverage.

This review set out to provide an overview of available evidence and knowledge gaps concerning effective use of sanitation subsidies in an area-wide context, rather than to expressly provide guidance to sanitation subsidy program developers or policymakers. Nonetheless, the review highlighted some common "do's" for subsidy programs. These are listed below as a set of recommendations, understanding that they can and should be further informed by future research and evidence.

1. **In designing and implementing voucher and rebate programs, implementers should identify, account for, and take active measures to ease the barriers experienced by the most poor and vulnerable households to access and use the offered subsidy.** Barriers can include distance or inability to travel, inability to mobilize funds or otherwise redeem vouchers within the time window, lack of understanding or trust in the subsidy program, or other barriers that work to frustrate, confuse, and even deter households from uptake, particularly the poorest households, whose lack of resources, social connections, know-how, reliable access to transportation, and even control over their daily lives constrain their capacity to act.
2. **In determining the most viable targeting method, sanitation subsidy programs or policymakers should consider the use of existing national targeting systems—**but seek to understand the potential targeting errors and the trade-off between accuracy and scalability. Policymakers should also consider other criteria, such as satisfaction (and community acceptability) and cost.
3. **To address the gap in evidence on subsidy program costs, targeted subsidy programs and studies going forward should systematically collect and publish cost data.** Proposed metrics concern (1) the cost per poor qualified household achieving basic sanitation access, and (2) the total program cost per community achieving a benchmark level of basic sanitation access. Such data can help inform future sanitation policies and programs needing to determine the best possible use of limited available resources to reach area-wide, sustained sanitation outcomes.
4. **To determine the size of subsidies in the context of AWS, policymakers should seek to understand the trade-offs along key policy criteria (e.g., sustainability, household affordability/equity, scale of disbursement) of providing larger versus smaller amount subsidies.** This could include designing a smaller-scale evaluation that tests how variations of amounts perform along these criteria before introducing the subsidy program at scale.

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ANNEX A. ILLUSTRATIVE RESEARCH QUESTIONS

TABLE 5. ILLUSTRATIVE RESEARCH QUESTIONS

EVIDENCE AND KNOWLEDGE GAPS	RESEARCH QUESTIONS
INTEGRATION, TIMING, AND SEQUENCING	
The relative performance of subsidies in a market-based sanitation (MBS) context, given different levels of sanitation coverage at the time they are introduced	What is the optimal threshold for basic sanitation coverage in a district with a functioning market that should be attained through other sanitation interventions (such as MBS, community-led total sanitation [CLTS]) before introducing subsidies, in order to achieve impactful and cost-effective outcomes?
Effectiveness and timing of combining subsidies with other sanitation interventions in increasing sanitation coverage	1. How can subsidies be set up in a way to complement planned CLTS/MBS programming, and what implementation lessons can be drawn from those complementarities? 2. What types of information collected via CLTS and/or MBS programs are the most helpful for designing targeted subsidies?
Channels through which subsidies have enabled districts/countries to achieve area-wide sanitation (AWS) coverage	1. When planning for large-scale AWS implementation, what is the relative importance of targeting subsidies accurately versus increasing coverage, from a cost/public financing perspective? 2. How are smart subsidies planned for and used within an AWS approach? What are the lessons from implementation of subsidies within AWS programming? 3. Are there cost-effective ways to scale up "gold-standard" targeting methods in resource and capacity-scarce settings, or are lower-accuracy but more affordable measures more appropriate? In other words, what are affordable, cost-effective, replicable, trusted, and scalable ways to target subsidies to individual households? 4. In contexts where large segments of the population have built unimproved latrines, in the process of rebuilding them, how should subsidies be designed and targeted to reach these households to ensure sustainability?
ELEMENTS OF DESIGN	
Effect of selecting different subsidy redemption windows on latrine uptake and on program administrative costs	What effects do varying these aspects (e.g., redemption windows) have on program outcomes and cost-effectiveness?
How subsidy percentages are determined, and effectiveness of different amounts of subsidies on sanitation outcomes	1. How can subsidy programs be designed to maximize the value of program budget and resources (value defined as equity/inclusion and sustainability) at the area-wide level? a. What product components/traits should be subsidized to ensure scalability and sustainability? What tools can be used to determine optimal value or product traits that are practical and scalable? b. What logistical elements should be considered to simplify implementation and maximize cost-effectiveness? 2. What is the optimal ratio of subsidy to household contribution, and how should this ratio vary by population groups?

TABLE 5. ILLUSTRATIVE RESEARCH QUESTIONS	
TARGETING METHODS	
The relative strengths of different subsidy targeting methods in sanitation, as measured by accuracy, cost, and cost-effectiveness	What are the relative strengths of different subsidy targeting approaches in sanitation, as measured by accuracy, cost, and cost-effectiveness?
Whether, and how, machine learning techniques and secondary data sources can improve poverty/vulnerability targeting at area-wide scale	Can targeting approaches leveraging existing administrative or secondary data sources (e.g., geospatial data, satellite images) be used accurately and cost-effectively at area-wide scale?

ANNEX B. TARGETING APPROACHES

TABLE 6. TARGETING APPROACHES

METHOD	DEFINITION	ACCURACY	COST	SATISFACTION/LEGITIMACY (TO TARGET COMMUNITY)
Categorical	"Targeting households based on a set of simple characteristics" (United States Agency for International Development [USAID] 2019, 9)	Poverty reduction programs: • Inclusion error:[33] – Targeting based on age (>55 years old): 4% (Kenya) – Targeting based on dependency ratio:[34] 30% (Kenya; Sabates-Wheeler, Hurrell, and Devereux 2015) • Exclusion error: – Targeting based on age (>55 years old): 17% (Kenya) – Targeting based on dependency ratio: 23% (Kenya; Sabates-Wheeler, Hurrell, and Devereux 2015)	Cost per neighborhood or beneficiary is not explicitly stated for Kenya	Acceptability of categorical targeting methods by the community are not explicitly mentioned
Geographic	"Geographic targeting identifies entire areas that are deemed poorer than average." (USAID 2019, 8)	Sanitation subsidy programs: • Inclusion and exclusion error not reported for Ecuador and Senegal (Trémolet, Kolsky, and Perez 2010)	Sanitation subsidy programs: • Targeting costs were not explicitly reported for Senegal and Ecuador (Trémolet, Kolsky, and Perez 2010)	Acceptability of geographic targeting by the community was not explicitly mentioned for Senegal and Ecuador (Trémolet, Kolsky, and Perez 2010)
Self-Selection	"Targeting a specific population segment based on ability to pay, by offering a lower-cost product or service that	Sanitation subsidy programs: • Inclusion and exclusion error not reported for Mozambique case study (Trémolet, Kolsky, and Perez 2010); in theory, inclusion error likely high as "non-poor can easily engage if they are interested" (Dershem, 2013); exclusion error can occur if households do not	Sanitation subsidy programs: • Not explicitly reported, but theoretically this approach is the "cheapest and easiest to	• Acceptability of geographic targeting by the community was not explicitly mentioned for Mozambique (Trémolet, Kolsky, and Perez 2010)

[33] These errors were calculated through a program simulation and not for a real-world program.

[34] Number of individuals who are not working (under 18 or over 55 years of age, chronically ill, or disabled) as a proportion of total household size.

TABLE 6. TARGETING APPROACHES

METHOD	DEFINITION	ACCURACY	COST	SATISFACTION/LEGITIMACY (TO TARGET COMMUNITY)
	would only appeal to the poorest households" (USAID, 2019,8)	have means to learn about the program (Dershem, 2013).	implement" as there are, by definition, no associated targeting costs. (Trémolet, Kolsky, and Perez 2010)	
Proxy Means Testing (PMT)	"Targeting a specific population segment based on wealth-related household characteristics" (USAID 2019, 10) Can also be conducted based on other types of data (e.g., the wealth index[35]) or produced by smaller, quicker surveys (e.g., poverty probability index (PPI),[36] poverty scorecard,[37] the Equity Tool, etc.	**Water, sanitation, and hygiene (WASH) subsidy program** (Ghana, Poulin et al. 2022) • Inclusion errors: – 10% through an artificial intelligence (AI) PMT – 20% through a wealth index system – 30% through the PPI • Exclusion errors: – 60% through an AI PMT – 50% through a wealth index system – 20% through the PPI Non-WASH poverty reduction programs: • 32% of households incorrectly targeted (including both errors) in Indonesia (Alatas et al. 2012). • 39% of households incorrectly targeted in six Sahel countries[38] (Schnitzer and Stoeffler 2021). • Inclusion error: 14.9%, 17.9%, 18.5%, and 18.2% of households targeted, respectively, through econometric PMT, asset index, poverty scorecard, and	Sanitation subsidy program: • From USD 89[39] to USD 760 per neighborhood (Ghana, Poulin et al. 2022) Poverty reduction programs: • USD 153 per village (Indonesia, Alatas et al. 2012) • From USD 16 to USD 23.8 per beneficiary (*six Sahel countries*, Schnitzer and Stoeffler 2021) • Cost of PMT targeting not explicitly mentioned (Burkina Faso, Hillebrecht et al. 2019)	• In Ghana (Poulin et al. 2022), no local officials were willing to rely on the government-run Livelihood Empowerment Against Poverty program (a poverty ID system using a PMT method and validated through community consultation). A vast majority of interviewed community members did not see it as an appropriate method because they perceived it as being influenced by politics and as leaving behind vulnerable households. Still, community members said they preferred PMT methods over CBT (based on household surveys) as they think people are more honest during one-to-one surveys than community sessions.

35 Defined by USAID as "a survey-specific measure of the relative economic status of households based on analysis of household assets and service amenities at a particular point in time" (USAID 2014, IX).

36 Defined by USAID as "a method to calculate relative poverty in a community in which a 10-question survey is given to the head of a household, the answers to which are used to calculate the likelihood that the household is living below the poverty line" (USAID 2019, 5).

37 A method involving collecting data using household surveys to generate a poverty score assigned to a household (Alatas et al. 2010, 11).

38 Burkina Faso, Cameroon, Chad, Mali, Niger, and Senegal.

39 All costs are measured in USD.

TABLE 6. TARGETING APPROACHES				
METHOD	**DEFINITION**	**ACCURACY**	**COST**	**SATISFACTION/LEGITIMACY (TO TARGET COMMUNITY)**
		multidimensional poverty index (Burkina Faso, Hillebrecht et al. 2019). ● Exclusion errors: 54.9%, 65.9%, 68.1%, and 67% of households targeted, respectively, through econometric PMT, asset index, poverty scorecard, and multidimensional poverty index (Burkina Faso, Hillebrecht et al. 2019).		● Acceptability of PMT not explicitly discussed in Indonesia (Alatas et al. 2012). ● Acceptability not explicitly discussed in a comparison of six different Sahel countries (Schnitzer and Stoeffler 2021). ● Acceptability not explicitly discussed in Burkina Faso (Hillebrecht et al. 2019).
Machine Learning and AI-Based	Machine learning and AI-based targeting utilize algorithms to predict poverty, enabling the use of a wider variety of data, including, for example, satellite imagery and phone data.	AI-based satellite imagery: ● No instance of inclusion or exclusion error due to only experimental studies existing and not having been used yet in existing programing (World Bank 2020) Machine learning with phone data: ● Reduction of exclusion errors by 4–21% compared to geographic targeting options considered by the Government of Togo for cash transfer targeting (Togo, Aiken et al. 2022) ● Increase of exclusion errors by 9–35% compared to using a comprehensive social registry (Togo, Aiken et al. 2022)	● N/A for AI-based satellite imagery due to not being used in programming ● Implementation cost for targeting is not explicitly mentioned for Togo	● N/A for AI-based satellite imagery due to not being used in programming ● Acceptability is not explicitly mentioned for Togo

ANNEX C. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
Pattanayak et al. 2009	India	Subsidies implemented in combination with an "intensified version of the information, education, and communication (IEC)" campaign (inspired by CLTS)	Discount on price of latrine construction	Households falling below the poverty line (BPL) (i.e., those with monthly per-capita consumption expenditure of Indian Rupee 356, or roughly USD 9)	Model: • Off-pit latrine Market price: • Roughly USD 50 (latrine construction)	Subsidy dollar amount: • USD 42.5 Percentage subsidized: • 85% of the full latrine cost Household contribution: • USD 7.5	+13% increase in off-pit latrine ownership for BPL households (attributable to subsidies) +34% increase in off-pit latrine ownership for BPL households (combined effect of subsidies and IEC)
Guiteras, Levinsohn, and Mobarak 2015	Bangladesh	Subsidies implemented in combination with a latrine promotion program (similar to CLTS)	Voucher given to individual households	Households in the bottom 75% of the wealth distribution (determined via landholdings, a proxy for wealth)	Models: • Three models of hygienic (pit) latrine. All models included a ceramic pan, lid, and water seal.[40] Market price: • Model 1: USD 22 • Model 2: USD 26 • Model 3: USD 48	Subsidy dollar amount: • Model 1: USD 16.5 • Model 2: USD 19.5 • Model 3: USD 36 Percentage subsidized: • 75% of the cost of the components of any of three models of latrine Household contribution:	+22 percentage points among targeted poor households +14.3 percentage point increase in access to a hygienic latrine[41]

[40] Below are the details concerning three models of hygienic latrines offered to households (Guiteras, Levinsohn, and Mobarak 2015):

- Model 1: single pit, 3 ring. Subsidized price USD 5.5; unsubsidized price USD 22.
- Model 2: single pit, 5 ring. Subsidized price USD 6.5; unsubsidized price USD 26.
- Model 3: dual pit, 5 ring. Subsidized price USD 12; unsubsidized price USD 48.

[41] This increase was the average effect calculated at the village level.

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
						Latrine cost: • Model 1: USD 5.5 • Model 2: USD 6.5 • Model 3: USD 12 Delivery, installation costs: • USD 7–USD 10	
Ljung et al. 2015	Vietnam	Consumer rebates implemented within a Community Hygiene Output-Based Aid (CHOBA) program. Accompanying incentives were IEC, access to credit, supply chain improvement, and financial incentives to households.	Consumer rebates	Households in the income groups that comprise the poorest 40% of the rural population (i.e., owning a certificate of poverty classified as near-poor, suffering from economic hardship).	Model: • Double-pit ventilated or pour-flush latrines • Septic tank Market price: • Above USD 250 (including the superstructure)[42]	Subsidy dollar amount: • USD 28 for septic tank • USD 20 for double pit ventilated, or pour-flush latrine Percentage subsidized: • At most 10% of the cost of latrine construction Household contribution: • Around USD 220–USD 230	+11.9% in the probability of using a septic tank latrine in Hai Duong province No statistically significant effect observed in usage of septic tank latrine in Tien Giang province
Nicoletti et al. 2017	Cambodia	Subsidies implemented in combination with MBS program	Vouchers given to individual households	IDPoor 1 households	Model: • Pour-flush latrine	Subsidy dollar amount: • USD 25 Percentage subsidized: • Roughly 45% of the cost of on the market price for a latrine substructure only	+16.9% among IDPoor 1 households in treatment group

[42] "The investment costs of new sanitary latrines meeting MOH standards typically being well over VND 5 million (including the superstructure)" (Ljung et al. 2015).

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
					Market price: • Roughly USD 56[43]	Household contribution: • USD 31 Households cover the cost of superstructures	
				IDPoor 2 households		Subsidy dollar amount: • USD 12.5 Percentage subsidized: • Roughly 22% of the cost of on the market price for a latrine substructure only for IDPoor 2 households Household contribution: • USD 43.5	14.7% among IDPoor 2 households in treatment group

[43] This figure is the reported amount in the article. It likely refers to the price of only below-ground installation, excluding that for the floor or superstructure. Typically, the costs for the floor and superstructure are usually 2–4 times higher than the below-ground material and installation costs (M. Jenkins, personal communication, 2023). From the supplier's perspective, the cost-effectiveness analysis provided by the authors indicates that iDE effectively sold at an average cost of USD 153.30 per latrine in the treatment group, and an average cost of USD 254.06 per latrine in the control group (Nicoletti et al. 2017).

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
Batmunkh et al. 2019	Philippines	Partial financial subsidies implemented in combination with behavioral promotion, CLTS, and hardware subsidies	Subsidized loans to households. Program pays part of the cost of the subsidized latrines up front, and households pay the remaining balance in weekly installments.	Beneficiaries of the Pantawid Pamilya Pilipino Program	Model: • Concrete ring septic tank and two options for superstructure Market price: • Model 1: USD 180–USD 200 • Model 2: USD 200–USD 220 (Prices include labor and hardware)	Subsidy dollar amount: • Model 1: USD 45–USD 50 • Model 2: USD 50–USD 55 Percentage subsidized: • 25% of the cost of latrine construction Household contribution: • Model 1: USD 135–USD 150 • Model 2: USD 150–USD 165	No significant impact on improved latrine uptake
						Subsidy dollar amount: • Model 1: USD 90–USD 100 • Model 2: USD 100–USD 110 Percentage subsidized: • 50% of the cost of latrine construction Household contribution: • Model 1: USD 90–USD 100 • Model 2: USD 100–USD 110	+5 percentage points in improved latrine uptake
Cameron et al. 2021	Laos	Subsidies implemented in combination with CLTS	Rebates given to households upon verification of latrine installation	The poorest 30% of households (determined via a scorecard system)			+7 percentage points in household ownership of pour-flush latrine for households that received a household subsidy

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
					Model: • Pour-flush latrine Market price: • Roughly USD 154[44]	Subsidy dollar amount: • Roughly USD 20 Percentage subsidized: • 13% of the price of the lowest-priced pour-flush latrine, including superstructure Household contribution: • USD 134	+16 percentage points in village-level ownership rate of pour-flush latrine
Kohlitz et al. 2021 (SNV program)	Cambodia	Stand-alone subsidy program implemented within a broader context of the Sustainable Sanitation and Hygiene for All program	Supplier discount	IDPoor households in communes with 80% improved latrine coverage and do not have an improved latrine	Model: • Pour-flush latrine (substructure only) Market price: Material costs: • USD 36.5 Installation costs: • USD 7.5	Subsidy amount: • IDPoor 1: USD 31.5 • IDPoor 2: USD 25.25 Percentage subsidized: • IDPoor 1: 72% • IDPoor 2: 57% Household contribution: • IDPoor 1: USD 12.5 • IDPoor 2: USD 18.75 Households covered the cost of superstructures	Findings regarding causal impact of subsidy on latrine uptake not available.[45]

[44] Based on the information provided in the study:

- The subsidized amount is USD 20, as mentioned in the study.
- This subsidy constitutes approximately 13 percent of the total cost of the lowest-priced pour-flush latrine, including the superstructure.
- Therefore, the estimated cost of the entire product would be around USD 100 * USD 20/13 = ~ USD 154.
- Therefore, households would need to contribute approximately USD 154–USD 20 = ~ USD 134 for the latrine.

[45] The study did not measure the gains in improved latrine coverage as a direct outcome of subsidies.

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
Kohlitz et al. 2021 (WaterSHED program)	Cambodia	Stand-alone subsidy program	Voucher to households	IDPoor households in villages with 80% improved latrine coverage and do not have an improved latrine	Model: • Pour-flush latrine (substructure only) Market price: • USD 50	Subsidy amount: • IDPoor 1: USD 20 • IDPoor 2: USD 10 Percentage subsidized: • IDPoor 1: 40% of the cost of latrine substructure • IDPoor 2: 20% of the cost of latrine substructure Household contribution: • IDPoor 1: USD 30 • IDPoor 2: USD 40 Households covered the cost of superstructures	Findings regarding causal impact of subsidy on latrine uptake not available.[46]
USAID 2021b	Ghana	Stand-alone subsidies program implemented after a CLTS program	Voucher with artisan results-based payment (upon verification of substructure and superstructure by UNICEF staff)	"Households that either were not able to feed themselves all year round or included a 'vulnerable' member (e.g., elderly person, person with a severe disability or chronic illness	Model: Three dry, lined pit latrine options: 1. Digni-Loo 2. Pre-cast concrete rings and slab 3. Concrete slab + masonry lining	Subsidy dollar amount: • USD 103–USD 135, depending on toilet option, district, and distance to town. Percentage subsidized: • Full (100%) subsidy on substructure (slab, pit lining,	+54 percentage points for subsidy recipients that owned a functional toilet[47] +70 percentage points for subsidy recipients that owned a durable toilet[48]

[46] The study did not measure the gains in improved latrine coverage as a direct outcome of subsidies.

[47] Defined by USAID "as having a complete or partial superstructure and a usable pit that was not collapsed or full (verified through observation)" (USAID 2021b, 4).

[48] Defined by USAID "as functional toilets with full superstructures and durable substructures (plastic, rock, brick, or concrete pit lining, and concrete or plastic slab)" (USAID 2021b, 4).

TABLE 7. SUBSIDY AMOUNTS, TARGET GROUP, AND SUBSIDY IMPACT ON TARGET GROUP UPTAKE

STUDY	PROGRAM COUNTRY	INTERVENTION TYPE	MECHANISM	ELIGIBLE POPULATION	LATRINE MODEL AND PRICE	HOUSEHOLD SUBSIDY AMOUNT AND PERCENTAGE OF TOTAL LATRINE COST	PROGRAM IMPACT (CAUSAL IMPACT OF SUBSIDIES ON LATRINE UPTAKE AMONG ELIGIBLE GROUP)
				resulting in inability to farm or work, widow, or orphan/child-household head) and received no support from relatives."		ventilation pipe; USAID 2021b) Household contribution: • Excavation of the pit and construction of superstructure.	
Hoo et al. 2022	Cambodia	Subsidy integrated with sanitation marketing/MBS - CHOBA	Consumer discount/rebate to service provider	Households belonging to the IDPoor 1 and IDPoor 2 categories	Model: • "Hygienic" latrine substructure; model unspecified Market price: • USD 55[49]	Subsidy amount: • USD 18 Percentage subsidized: • 32% of substructure product package Household contribution: • USD 37	+26 percentage points in likelihood of purchasing a hygienic latrine among IDPoor 1 and IDPoor 2 households, (relative to SanMark alone) + 24 percentage points in likelihood that the hygienic latrine was installed and functional at the time of the endline survey among IDPoor 1 and IDPoor 2 households (relative to SanMark alone)

[49] Source: USAID 2018b.

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