



Cambodia Climate Resilient Water, Sanitation and Hygiene Scale-Up Program (CR-WASH-SUP)

CR-WASH-SUP End of Program Report, January 2023 to November 2024



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Acronyms

ADP	Alternating Dual Pit
ASU	All Seasons Upgrade
CARD	Council for Agricultural and Rural Development
CCWC	Commune Committee for Women and Children
CR-WASH-SUP	Climate Resilient WASH Scale-Up Extension Project
DCWC	District Committee for Women and Children
DFAT	Australian Department of Foreign Affairs and Trade
E. coli	Escherichia coli
EWB-A	Engineers without Borders Australia
FS	Fecal Sludge
FSM	Fecal Sludge Management
GEDSI	Gender Equality, Disability, and Social Inclusion
HCD	Human Centred Design
IDPoor	Identified Poor by the Cambodian Government
LBO	Latrine Business Owner
MH	Menstrual Health
MHM	Menstrual Health Management
MRD	Ministry of Rural Development
NGO	Non-Governmental Organization
ODF	Open Defecation Free
PPI	Poverty Probability Index
PPIF	Paul Polak Innovation Fund
PPP	Public Private Partnerships
PWD	Persons With Disabilities
RLA	Research & Learning Assistant
SBA	Sanitation business advisor
SCE	Sanitation Challenging Environments
SMS	Safely Managed Sanitation
SMSU	Sanitation Marketing Scale-Up
SBCC	Social and behaviour change communication
SSI	Safe San Index
SFF	Stone Family Foundation
USAID	United States Agency for International Development
UTS-ISF	University of Technology Sydney's Institute for Sustainable Futures
WASH	Water, Sanitation and Hygiene
WASH-GEM	Water, Sanitation and Hygiene - Gender Equality Measure (WASH-GEM)
WfW	Water for Women

EXECUTIVE SUMMARY

During the Climate Resilient Water, Sanitation and Hygiene Scale-Up Program (CR-WASH-SUP), by building markets for sanitation iDE strategically focused on reaching the most systematically marginalized and climate-vulnerable without latrines across Siem Reap Province, Cambodia. CR-WASH-SUP began January 1, 2023 and ended December 31, 2024.

Through a systems strengthening and inclusive, market-based approach, iDE increased the equitable and universal access to and use of water, sanitation and hygiene (WASH) services in rural Cambodia at scale. CR-WASH-SUP, in partnership with 20 local sanitation businesses in Siem Reap province, sold and delivered WASH products to 5,097 rural Cambodian households and contributed to the increase in latrine coverage in Siem Reap from 80% to 88% of households owning improved, pour-flush latrines. iDE supported 67 villages to claim ODF status in collaboration with Cambodian authorities. Through door-to-door sales, post-open defecation free training and social and behaviour change communication (SBCC) training, CR-WASH-SUP reached 66,904 people with WASH behavior change messaging.

iDE deepened its focus on ensuring climate resilient WASH access in seasonally flooded and high groundwater sanitation challenging environments (SCE) in order to leave no one behind. Climate change adaptations were introduced throughout all interventions, from supporting local authorities with climate-risk village mapping and progressing towards achieving climate-resilient open defecation free (ODF) status, aligned with Cambodia's national WASH goals.

iDE continued to focus on the sustainability of sanitation supply chain actors, specifically female sanitation entrepreneurs, and deployed gender-transformative business training throughout its network of latrine businesses.

CR-WASH-SUP is the continuation and evolution of iDE's long standing sanitation market development work in Cambodia. Since the start of iDE's WASH program in 2009, more than two million individuals (approximately 412,000 households) have gained access to improved sanitation through iDE-connected entrepreneurs, representing one in five of all rural Cambodian households. By motivating stakeholders such as households, businesses, and local authorities to invest in their own sanitation solutions, iDE fosters a sense of local ownership and commitment, which is essential for sustaining sanitation achievements.

INTRODUCTION

iDE's CR-WASH-SUP program is the harmonized combination of multiple donors: Australian Department of Foreign Affairs and Trade (DFAT) under the Water for Women (WfW) Fund, the Church of Jesus Christ of Latter-day Saints (the Church), The American people through the United States Agency for International Development (USAID), the Stone Family Foundation (SFF) and the Vitol Foundation. The Paul Polak Innovation Fund (PPIF)¹ provided additional support in conducting formative research and prototyping for the storage and disposal of menstrual health (MH) products. CR-WASH-SUP is the continuation of Sanitation Marketing Scale Up (SMSU), a rural sanitation and hygiene market development program that began with a pilot in 2009 and is on its fourth iteration. For CR-WASH-SUP, iDE scaled down geographical operational efforts from six provinces to one, and continued sanitation marketing efforts with an emphasis on low-coverage, climate-vulnerable, flood-prone environments across Siem Reap province, one of the poorest provinces in Cambodia.² From January 2023 until December 2024, CR-WASH-SUP was active in rural communities in Siem Reap, Cambodia.

This report summarizes methods and findings from iDE's monitoring, evaluation, research and learning efforts throughout CR-WASH-SUP, from January 2023 to November 2024. This report will reference progress made since the inception of CR-WASH-SUP as well as progress since the beginning of the SMSU program (since February 2012). These results inform ongoing program decision-making and will also be used to shape and influence iDE's sanitation program from 2025 onwards.

We organize our principal findings into a narrative that follows the course of the CR-WASH-SUP program. We first look at changes in latrine coverage over time in Siem Reap and how iDE has contributed to that improvement. We then examine our WASH products, deliveries and usage, and how they were developed through a human-centered design (HCD) approach, as well as iDE's contribution to improved sanitation through exploring sales trends and examining customer behaviors and perceptions around purchase, installation, and satisfaction. From there, we explore what all of these results mean for market sustainability, key program partners and stakeholders. We also dive deeper into the integration of gender equity, disability and social inclusion (GEDSI) into the CR-WASH-SUP program. Finally, we provide insights into our current research achievements on the topics of fecal sludge management (FSM), health impacts of sanitation coverage and how we continually strive towards expanding sector knowledge.

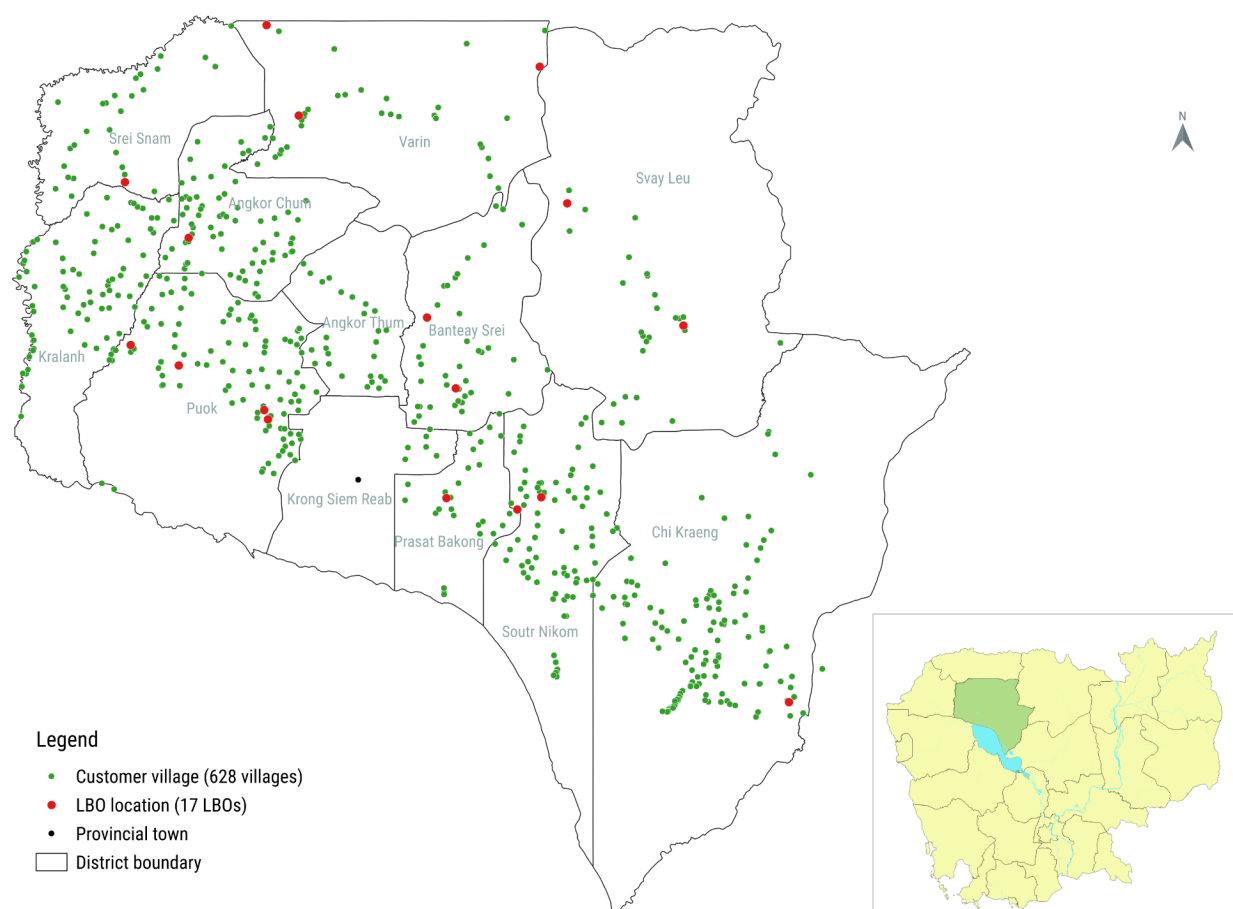
WHERE WE WORK

From 2009 to 2022, [iDE Cambodia's SMSU program](#) was active across six Cambodian provinces: Kampong Thom, Kandal, Oddar Meanchey, Prey Veng, Siem Reap, and Svay Rieng. From January 2023 to November 2024, iDE scaled down SMSU operations and has continued sanitation marketing efforts in Siem Reap province. Within CR-WASH-SUP, iDE is operational throughout rural Siem Reap in 11 out of 12 districts. However, iDE has prioritized efforts reaching the lowest sanitation coverage, most flood-prone households and environments in the province. The majority of households reached during CR-WASH-SUP are considered climate-vulnerable (Figure 1).

¹ The Paul Polak Innovation Fund is an internal iDE funding mechanism launched in 2021, named after founder, Paul Polak. The fund aims to support innovative projects designed to combat poverty in developing countries by providing grants for the development and testing of new ideas that can lead to scalable solutions.

² [Cambodia | MDG Fund](#)

FIGURE 1: CR-WASH-SUP PROGRAM MAP



SANITATION COVERAGE INCREASE

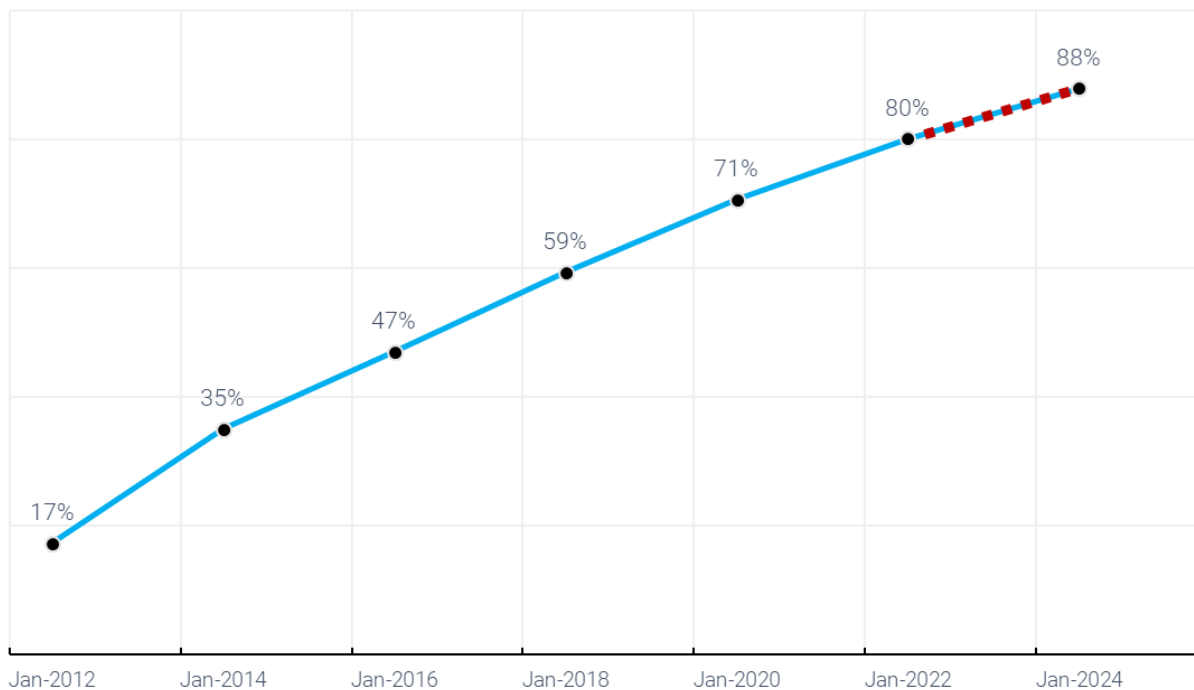
Basic sanitation coverage levels, which indicate the percentage of households owning basic latrines, are positively associated with positive health outcomes.³ Figure 2 shows a graph of Siem Reap's latrine coverage over time, demonstrating broad progress over the course of SMSU and CR-WASH-SUP. By the end of SMSU3 in 2022, Siem Reap had reached 80% basic sanitation coverage, and by the end of CR-WASH-SUP in 2024, we estimate that Siem Reap reached approximately 88% latrine coverage.⁴ Using 2022 and 2024 population estimates from the Ministry of Planning's IDPoor Database, we estimate that this 8 percentage point increase in sanitation coverage represents approximately 36,500 latrines added in the province. The 3,965 basic latrines (including Easy Latrines and Sky Latrines) delivered through iDE-connected businesses therefore indicates that for every one latrine sold by iDE, there are approximately eight non iDE-connected connected latrines sold in the CR-WASH-SUP target area. Provincial coverage of

³ Sanitation Marketing Improving Health Outcomes

⁴ To project latrine coverage for CR-WASH-SUP (as CR-WASH-SUP did not conduct the Latrine Count Survey which was previously conducted every two years during SMSU), historical latrine count data from SMSU, population data, and the number of latrine deliveries from CR-WASH-SUP was utilized to run a multiple linear regression model. However, different variables from CR-WASH-SUP have been used to compare with data from SMSU to depict latrine coverage, which is a limitation as it could lead to inconsistencies and incomplete results.

safely managed sanitation (SMS) was not assessed due to the complexity of measurement and lack of established precedent in Cambodia for monitoring this threshold of sanitation progress.

FIGURE 2 : LATRINE COVERAGE RATE OVER TIME, SIEM REAP PROVINCE



(Source: [Latrine Coverage Projection in Siem Reap](#))

CUSTOMER POPULATION

In total, through the sale of 5,097 sanitation products to households, iDE reached 24,423 individuals in CR-WASH-SUP (Table 1).

TABLE 1: TOTAL NUMBER OF INDIVIDUALS IN HOUSEHOLDS PURCHASING WASH PRODUCTS, DISAGGREGATED BY GENDER

Gender	Household Members
Female	12,366
Male	12,010
Self-identified	47
Total	24,423

The total number of household members with disabilities directly reached during CR-WASH-SUP following the purchasing of WASH products from iDE-powered latrine businesses, disaggregated by gender are shown in Table 2. During CR-WASH-SUP, based on results from our 2024 Customer Survey, 1.39% of all customers (0.75% women, 0.63% men) were persons with disabilities (PWD). Disability status of iDE customers was assessed in the 2024 Customer Survey by using the Washington Group Short Set Questionnaire, which assesses the self-reported type and degree of impairment of an individual. Households reporting either “a lot of difficulty” or “cannot at all” with regards to visual, auditory, mobility or cognitive functions were assessed to have a disability.

TABLE 2: TOTAL NUMBER OF INDIVIDUALS IN HOUSEHOLDS PURCHASING WASH PRODUCTS WITH DISABILITIES, DISAGGREGATED BY GENDER

Gender	Household Members
Female	167
Male	187
Total	354

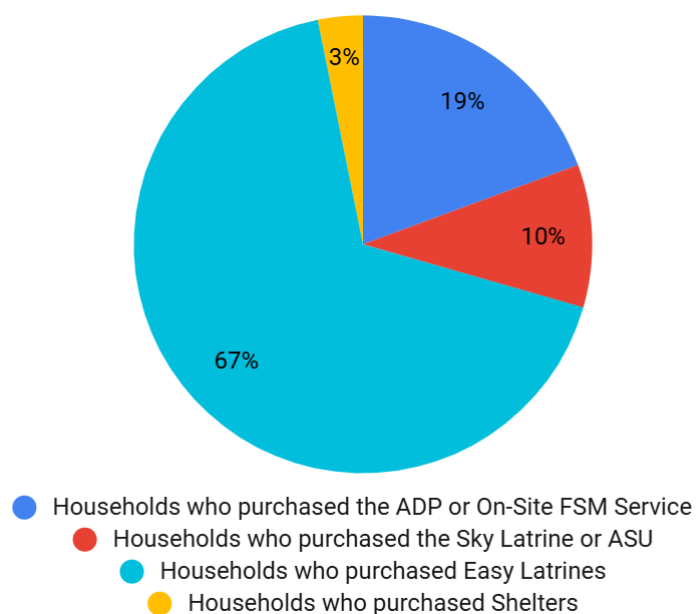
Siem Reap’s climate vulnerability index indicates significant exposure to floods, storms and droughts, thus placing it among the top provinces affected by climate change in Cambodia.^{5 6} While most households in the province are exposed to significant climate risk, households who purchased the All Seasons Upgrade (ASU), and the Sky Latrine are considered to be among the “most climate vulnerable,” as the areas where these products are promoted are those where the geographical context – including flood-proneness, high ground water, and dense soil conditions – make sanitation systems likely to fail in the instance of heavy rainfall and flooding. iDE designed the ASU and Sky Latrine to enable year-round functionality of sanitation systems and the capacity to withstand such seasonally disruptive climate events. Out of a total of 24,423 customers, 2,453 (10%) have purchased the ASU and Sky Latrine products. In comparison, only 0.1% of “most climate vulnerable” households were reached during SMSU3, signalling a shift in focus amongst the customer base within CR-WASH-SUP (Figure 3).

A nearly universal lack of affordable, safe FSM services in rural areas compounds the risk of unsafe FSM behaviors and environmental contamination when floods and heavy rain cause sanitation systems to fail. Recognizing this risk, iDE is pivoting its focus from basic sanitation towards safely managed sanitation (SMS) solutions that treat waste and reduce the concentration of pathogens nearby households. Currently, the two solutions iDE promotes for FSM are the Alternating Dual Pit (ADP) and a new on-site latrine pit treatment and emptying service. Out of a total of 5,097 households, 983 have purchased the ADP or on-site FSM service. In a trial for iDE’s on-site FSM service, 22 households bought and received the latrine pit emptying service (see [Closing the Market Gap for Rural Safely Managed Sanitation: Trialling a Model for On-site Treatment and Emptying](#)). In CR-WASH-SUP, 19% of households purchased an on-site FSM product or service, compared to 11% of households during SMSU3 (Figure 3).

⁵ [Think Hazard - Siem Reap](#)

⁶ [Vulnerability Index](#)

FIGURE 3: MOST-CLIMATE VULNERABLE AND SAFELY MANAGED SANITATION CUSTOMERS COMPARED TO EASY LATRINE AND LATRINE SHELTER CUSTOMERS



(Source: [CR-WASH Data from Jan 2023 to Nov 2024](#))

The Cambodian government estimates that the IDPoor population in iDE operating areas is 18% of the total population.⁷ In CR-WASH-SUP, iDE sold 1,612 sanitation products to IDPoor households which equates to 32% of all customers, reflecting the program's pro-poor focus. While in SMSU3, 43% of all WASH product sales were to IDPoor households, the lower IDPoor reach in CR-WASH-SUP can likely be attributed to limited subsidy resources, which were prioritized for the Sky Latrine, ASU and ADP only and not the Easy Latrine (which in SMSU historically drove the greatest number of subsidized sales).

PROGRAM COST EFFECTIVENESS

Between January 2023 and December 2024, a total of over USD \$2 million donor funding was invested into CR-WASH-SUP between DFAT through the WfW Fund, the Church, USAID, the SFF (through the Cambodian Rural Sanitation Development Impact Bond), the Vitol Foundation and iDE's PPIF. CR-WASH-SUP was designed as a harmonized sanitation program, incorporating funding from multiple donors into unified activities and goals.

The program's cost effectiveness, calculated as the dollars spent by the program per sanitation product delivery for CR-WASH-SUP was USD \$397. Calculated as the dollars spent by CR-WASH-SUP per customer reached was \$85. These findings highlight that the cost effectiveness of CR-WASH-SUP is significantly lower than SMSU, in which the program spent approximately USD \$200 per household customer (\$43 per person).⁸ This decrease in efficiency was to be expected, as the SMSU program was operating across six provinces and able to leverage economies of scale in its work. Additionally, SMSU was more focused on expanding sanitation coverage to as many areas as possible, without a focus on harder-to-reach SCE. In

⁷ [Government IDPoor Database](#)

⁸ [Measuring WASH Cost-Effectiveness](#)

contrast, CR-WASH-SUP's emphasis on promoting products like the Sky Latrine in remote, flood prone areas, leads to iDE field teams spending more time traveling and dealing with comparatively more complex logistical and supply chain issues. The relatively lower-income context of climate-vulnerable areas, coupled with a more expensive product (even after subsidies) results in fewer, more challenging sales, further decreasing operational cost-effectiveness. Also important to note is that due to resource constraints in CR-WASH-SUP, iDE discontinued offering targeted subsidies for the Easy Latrine, iDE's most popular sanitation product. This resulted in a comparative decline in Easy Latrine sales versus SMSU. This decline was reinforced by market pressures; as market penetration and saturation has increased, it becomes more difficult for latrine businesses to sell basic sanitation products as usual with fewer non-latrine owning customers available.

PRODUCTS, DEMAND GENERATION, HOUSEHOLD USE AND SATISFACTION

Key Learnings and Findings:

- The Sky Latrine, a new climate resilient sanitation technology introduced in CR-WASH-SUP, has enabled seasonally flooded households residing along the Tonle Sap to use toilets for the first time. However, the flooding survey indicates that while flushing problems during the flood season have reduced from 2023 to 2024, there is a need to further improve the design to enhance year-round functionality with reduced flushing problems.
- While originally not conceived as a disability-focused product, The Sky Latrine has made a major impact on the lives of PWDs, young children, pregnant women, and the elderly. Fixed inside stilted homes in flood-prone communities, the Sky Latrine prevents the need for scaling high ladders and stairs to leave and re-enter the home to defecate.
- Temporary “Soft Shelter” sales were not successful during CR-WASH-SUP as households did not receive subsidies for soft shelters and expressed preference for permanent latrine shelters.
- There is a critical need for safe latrine pit emptying services in rural areas. iDE’s on-site latrine pit treatment/emptying trial showed that emptying pits and disposing of waste on the household premises through burying can be done safely and households are willing to pay for it.
- While latrine use within customer households is reported to be equitable between genders at all age groups, roughly two thirds of caregivers of children between two and five years report “always” using the toilet, opposed to nearly 100% of all other age groups besides infants reporting “always” using the toilet. Sanitation needs of younger children and their caregivers are currently not being met.
- Household intentions to add new latrine pits to their existing system (ostensibly for extending the time before needing to empty) decreased notably between SMSU and CR-WASH-SUP. This could indicate growing awareness and availability of alternatives to FSM through self-organized or contracted pit emptying services.
- Only a small portion of customers (12% for the Easy Latrine and ASU, 4% for the Sky Latrine, and 8% for the ADP) listed peer or community pressure as a reason for purchasing a product. This suggests that “naming and shaming” techniques may not be effective in motivating households to buy.
- The most common reason households stated for not buying a latrine (78%) was not financial constraints, but rather that they currently have access to a shared latrine.

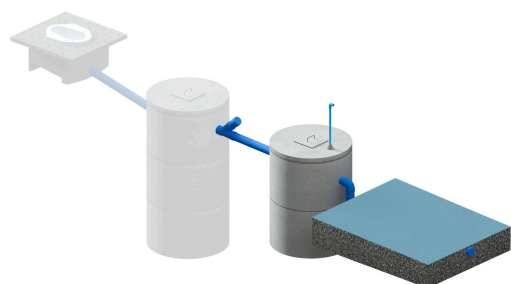
SANITATION PRODUCTS

Rural households living in SCE throughout Siem Reap province face different thresholds of vulnerability to climate change and barriers to effective FSM. However, most communities face the risk of short-term flooding during the monsoon season. In certain geographies, including high groundwater and low infiltration (i.e. dense and saturated soil) environments, pour-flush pit latrine owners tend to experience higher pit filling rates, especially during periods of heavy rainfall and floods, leading some to unsafely discharge pit contents into the open environment.

In designing products and services to meet these challenges, iDE employs a human-centered design (HCD) methodology that focuses on understanding the specific needs and preferences of local communities. Before designing products, iDE conducts interviews and on-the-ground research to identify household needs and contextual opportunities and barriers. Prototyping of products is conducted with actual customers and feedback is elicited based on their use and emergent needs. Products are continuously iterated upon after commercialization, as customer feedback and quality assurance surveying guides iDE to

make design and installation modifications. All of the products iDE designs are manufactured with locally available, inexpensive materials yet strive to maintain an aspirational, durable level of quality and aesthetic.

A key feature of CR-WASH-SUP was designing and facilitating installations of the **Sky Latrine**, a climate-resilient elevated latrine developed specifically for seasonally flooded communities along the Tonle Sap Lake. This innovative sanitation technology, enables sanitation access year-round and prevents contamination of nearby water sources, such as the Tonle Sap Lake upon which the seasonally flooded communities rely for their livelihoods. With a toilet pan fixed inside stilted homes, above the high water mark and waste safely contained in the ground, households can maintain access to sanitation year-round with dignity and mitigate the climate risk of seasonal floods. The Sky Latrine, which prevents the need for individuals to leave and re-enter their highly-stilted homes via step ladder to defecate, provides an accessible option for those with mobility impairments to relieve themselves, an impact in quality of life that has been highlighted by numerous iDE customers.



Between 2019 and 2020, iDE and Engineers without Borders Australia (EWB-A) developed the **All Seasons Upgrade (ASU)** product to increase toilet functionality in high ground water or dense clay areas where floods and heavy rainfall are likely to make basic sanitation systems fail. In CR-WASH-SUP, promotion and availability of the ASU was scaled to all of Siem Reap. Through a filtration and leaching component, the ASU allows for safer, greater wastewater discharge at closer levels to the surface of the ground, above high water tables. In 2019, EWB-A and iDE conducted a one-year field test pilot of the ASU product to: (1) test the treatment effectiveness of the system

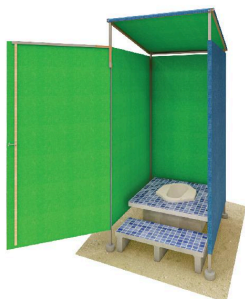
to meet standard levels of safe disposal into the environment and (2) understand the functionality and contextual appropriateness of the product. Data was collected from 14 households every two months for a one-year pilot period. Households selected for this pilot study were ones who lived in high groundwater and/or clay environments (i.e. low soil infiltration), experienced higher pit filling rates, and have practiced unsafe FSM practices such as pit piercing (the practice of creating holes in latrine pits above ground to release wastewater when the pits become full and toilets are not flushing properly). Overall, as designed, the ASU diverted the existing pit content into a high infiltration leach field, minimizing households' exposure to untreated fecal sludge (FS) and improving latrine functionality. Data demonstrated that the ASU system can improve effluent quality when compared to discharging raw wastewater from pit piercing or pit overflow.

The **Easy Latrine**, originally designed by iDE in 2009 and the first sanitation product taken to scale in Cambodia has proven to be a resilience enhancing latrine. The Easy Latrine was designed to be durable enough to withstand floods and heavy rain without substructure damage. The Easy Latrine's durability has been proven to meet the needs of rural communities, highlighted by how only 0.1% of latrine owners reported abandoning their latrine, thus signalling households' ability to maintain and use their latrines in the long term.



In 2018, iDE scaled up promotion and installation of the **Alternating Dual Pit (ADP)** which continued into CR-WASH-SUP. The ADP provides households with latrine pit treatment via hydrated lime and the means to safely alternate between latrine pits while the full pit is left to stabilize, dry, and eventually empty when the other pit fills. By supporting households to manage their FSM and reducing the pathogen content within household systems, the ADP mitigates the risk of sanitation-related health impacts in the instance that floods and heavy rain leads to sanitation system failure and breach of containment structures. iDE has also developed a business model, trained a service provider, and trialed delivery of on-site FSM services, in which waste from latrine pits is treated with hydrated lime and buried on the household premises. This new service innovation and the trial process is described in detail later in this section.

The **Interlock Shelter** is equipped with handwashing facilities, and is designed to be easily customizable with ramps or grab rails for those with mobility constraints including people living with disabilities, the elderly, and pregnant mothers. Utilizing interlocking bricks also reduces construction time and costs, thus making this shelter a more affordable option for low-income households compared to other latrine shelters of comparable quality on the market.



The **Soft Shelter** presents low-income households with an inexpensive, lightweight, portable and immediate, temporary solution for families requiring privacy when using their toilets.

RAINWATER STORAGE TANKS

In Siem Reap, a province where most rural Cambodians depend on agriculture for their livelihoods, enhancing infrastructure for water access and storage is critical, particularly as climate change increasingly leads to unpredictable and prolonged drought periods. Rainwater harvesting is a viable alternative to traditional water sources like groundwater and surface water.

iDE's CR-WASH-SUP team collaborated with iDE's [Climate Smart Commercial Horticulture](#) program to develop rainwater harvesting systems for rural farmers in Siem Reap. The water storage tank system was designed to have a 10,000 litre capacity which equates to an additional water supply of at least 16-20 days of drip irrigation usage of small vegetable plots during the dry season. Beyond irrigation, farmers are able to use water from the tanks for other important household activities, including washing clothes, cooking, bathing, and drinking during droughts. After designing and testing these systems, iDE's WASH engineers trained local entrepreneurs to manufacture and install the tanks. As a result, 13 farmers received these rainwater storage systems during CR-WASH-SUP by November 2024.



Ms. Pet Socheat, a farmer and mother of two, proudly poses with her family in front of their new Water Storage Tank.

PRODUCT DELIVERIES

The rural WASH market is continuously evolving, and iDE's goal is to support market maturation with new products and services that fit emerging customer needs. The total number of products sold, their average price, and the total net revenue earned by latrine business owners (LBOs) through their sales is represented below. Sales commissions per product, which go to sales agents and assisting local authority at the time of sale (in the form of the order deposit), are deducted from the total price that the customer pays the LBO at the time of product installation (Table 3).

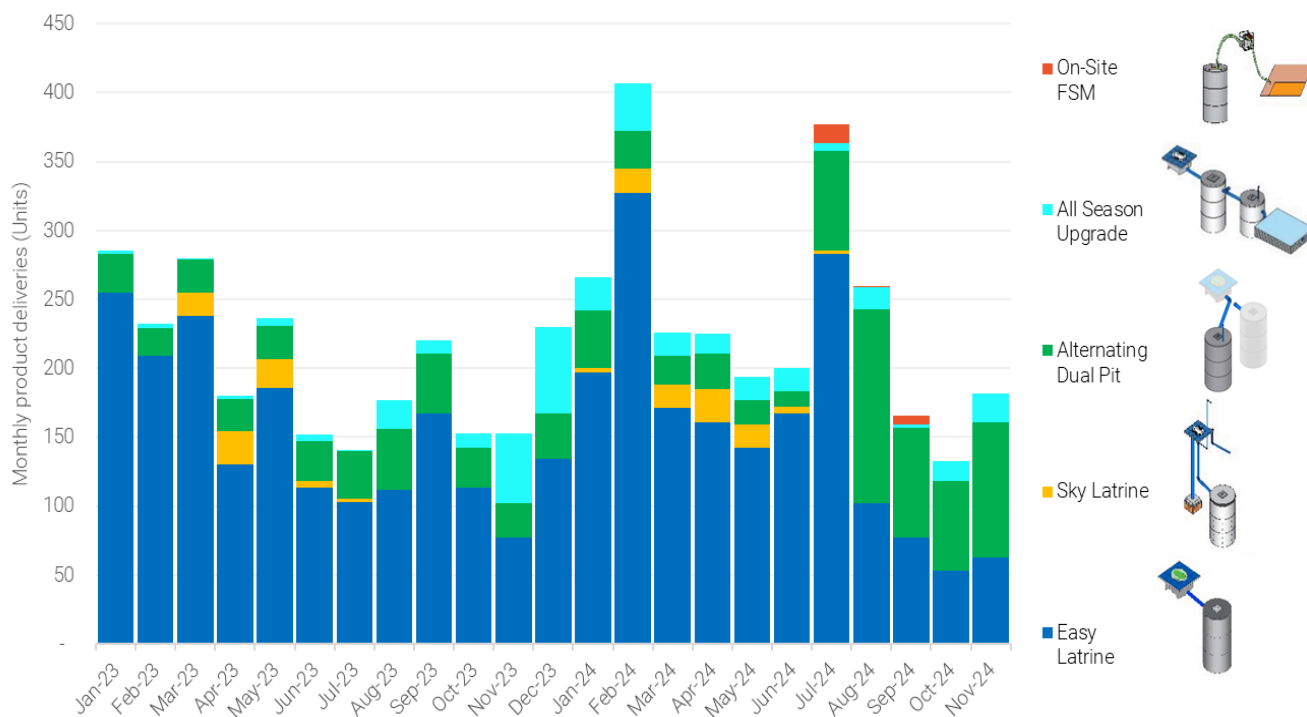
TABLE 3: PRODUCTS DELIVERED, LBO TOTAL NET REVENUE, AVERAGE PRICE PER UNIT AND SALES COMMISSIONS RATIOS IN CR-WASH-SUP, BY PRODUCT

	Quantity	LBO Total Net Revenue	Average Price per Unit	Sales Commissions (Sales Agent: Local Authority)
Easy Latrine	3,580	\$243,686	\$68	\$3:\$2
Alternating Dual Pit	961	\$53,867	\$56	\$2:\$1
All Seasons Upgrade	357	\$32,371	\$89	\$4:\$2
Interlock Shelter	159	\$62,074	\$389	\$18:\$9
Sky Latrine	155	\$25,575	\$165	\$6:\$2
Rainwater Harvesting Tanks	13	\$14,092	\$1,084	0
On-site FSM	22	\$728	\$38	\$2:\$1
Soft Shelter	1	\$40	\$40	\$1.5:\$1
Total	5,248	\$432,074	–	

(Source: Number of WASH Products Delivered and Analysis)

Throughout CR-WASH-SUP, Easy Latrines were the most popular sanitation product, a trend similarly observed in SMSU, with highest peaks observed in February and July 2024. The highest number of ASU deliveries were observed in November and December 2023, potentially as a result of prolonged rainy season and households' latrine pits filling up at faster rates. Between June and July 2024, there was a sharp increase in the number of ADPs delivered. This was due to the application of the targeted subsidy mechanism, which included ADPs, from July 2024 onwards in CR-WASH-SUP (Figure 4).

FIGURE 4: MONTHLY DELIVERIES OF SANITATION PRODUCTS AND SERVICES IN CR-WASH-SUP

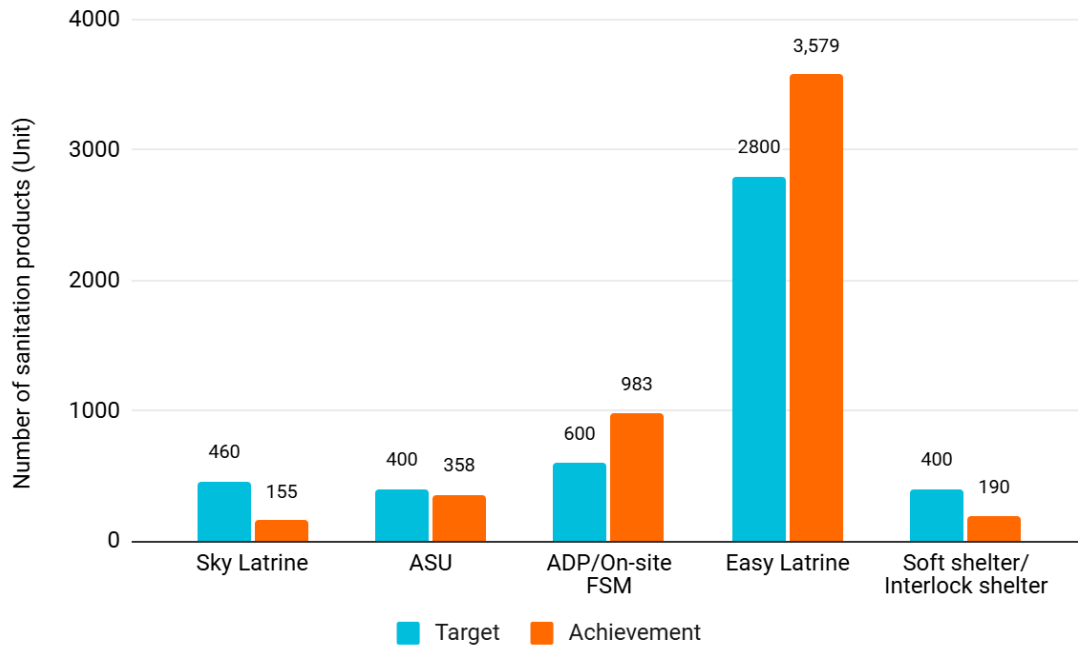


(Source: [Number of WASH Products Delivered and Analysis](#))

The number of Sky Latrines which were sold and delivered during CR-WASH-SUP were less than internal sales targets. To ensure product safety in Q1 2023 iDE conducted design work to adapt the Sky Latrine to Siem Reap (drawing from iDE's experience deploying similar latrines in Kampong Chhnang). Due to the short window of time available to deliver latrines during the dry season in seasonally flooded areas (December to July), this measured roll-out resulted in a short timeframe to deliver Sky Latrines to households during CR-WASH-SUP. Additionally, the early and prolonged rainy season in 2024 resulted in operational challenges and installation delays, thus resulting in cancelled orders (Figure 5).

During CR-WASH-SUP, iDE scaled down the number of temporary "Soft Shelters" offered, compared to SMSU. This was primarily due to lack of customer demand when these products were not coupled with a partial subsidy. Additionally, CR-WASH-SUP focused efforts on selling Interlock Shelters (permanent latrine shelters) as they are customizable for PWDs. In CR-WASH-SUP, iDE sold one soft shelter and 159 Interlock Shelters with hand washing devices inside. 15 of these Interlock Shelters were installed with accessibility features including ramps and sitting-style toilets for households with PWDs. Shelter sales remain comparatively low, largely in part due to the high cost of the Interlock Shelter in comparison with other products (Figure 5).

FIGURE 5: TARGETS VS ACHIEVEMENTS BY SANITATION PRODUCT IN CR-WASH-SUP



(Source: Number of WASH Products Delivered and Analysis)

In iDE's experience, sales performance is seasonal and fluctuates with the rainy and dry seasons. Figures 6, 7, and 8 below illustrate the different seasonal demand curves, which were also influenced to a degree by programmatic decisions and priorities.

FIGURE 6: QUARTERLY PROGRAM CONNECTED EASY LATRINE DELIVERIES

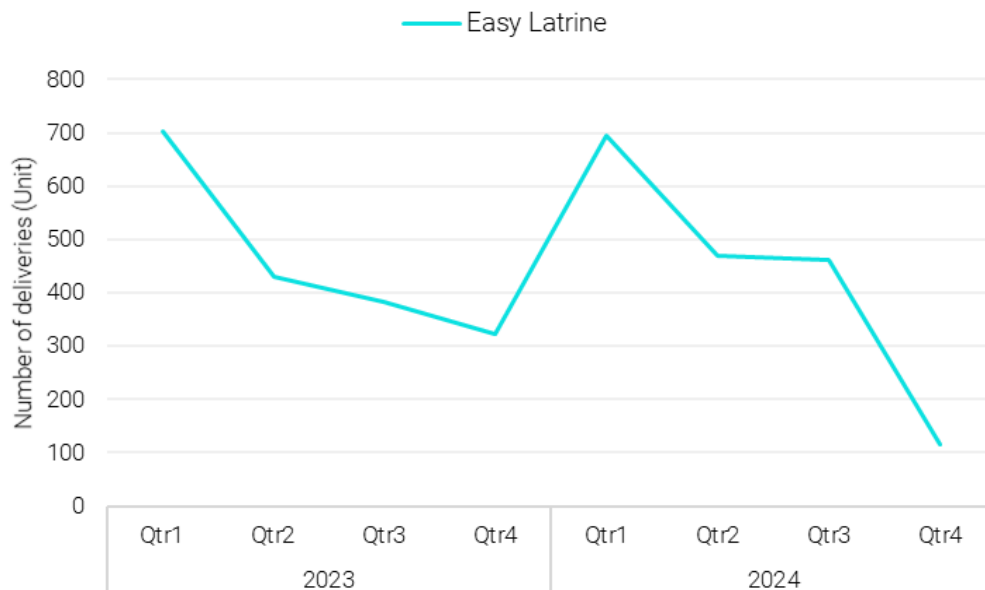


FIGURE 7: QUARTERLY PROGRAM CONNECTED SKY LATRINE DELIVERIES

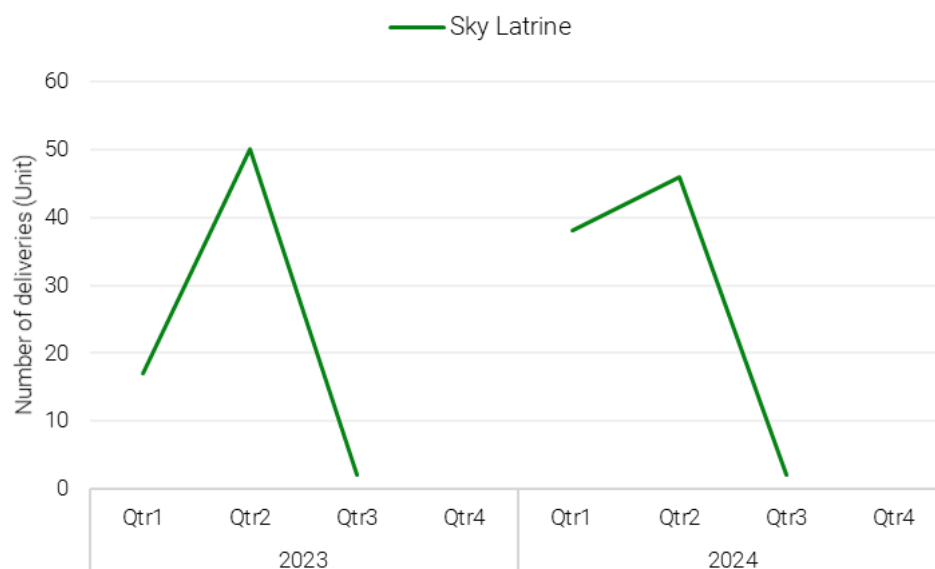
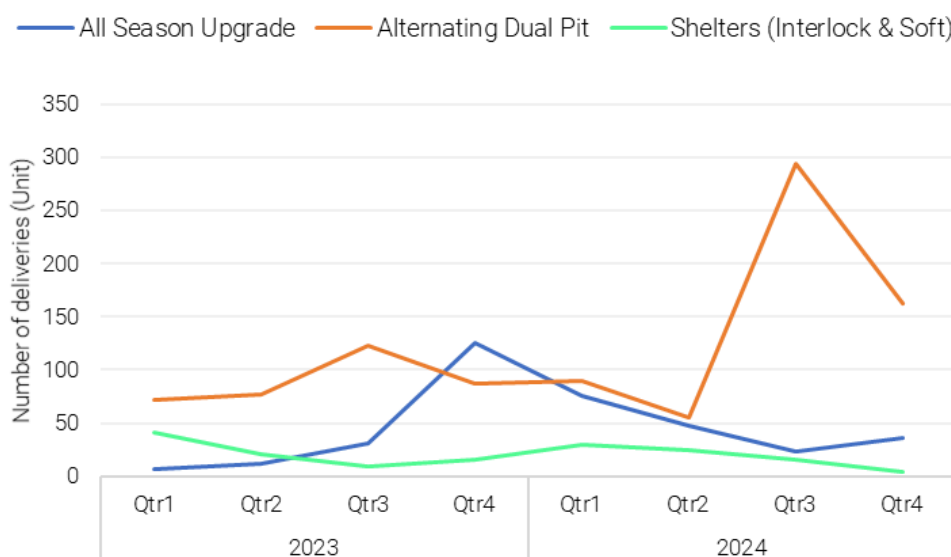


FIGURE 8: QUARTERLY PROGRAM CONNECTED ASU, ADP AND SHELTER DELIVERIES



Easy Latrine deliveries mirrored a typical seasonal demand curve during CR-WASH-SUP, with sales peaking in the dry season (December-April) after harvest season and gradually declining until the following harvest. Latrine shelters generally mirror this seasonality with demand increasing in periods during which households have more expendable income after harvest season. In Q4 2024, Easy Latrine deliveries dropped lower than the same quarter of 2023, namely due to a) the decision to prioritize sales efforts for the Sky Latrine during the limited dry season window for installation and b) in order to prioritize promotion

of SMS products (through the ADP and on-site pit emptying service). The gap in deliveries for the Sky Latrine indicates the flood season (July-November), which in flood-prone areas prevents installation of infrastructure like toilets due to the inability to dig and the challenge of bringing heavy construction materials into villages by boat. The Sky Latrine curve also illustrates the program's measured roll-out phase in Q1 2023, during which the iDE team conducted formative research, design work, and testing of the Sky Latrine (which was adapted from iDE's simultaneous programming in Kampong Chhnang) to apply in Siem Reap.

Inversely to the typical demand curve of basic sanitation, which peaks in the dry season, demand for products like the ADP and ASU reliably peak during the rainy season, as is shown in the charts above. Both the ASU and ADP are upgrade products that help to extend the life of current latrines and are usually in demand when customers experience issues with their systems. In the Cambodia monsoon season, heavy rainfall can lead to latrine pits reaching their peak fill level, especially if they are already nearly full or are located in places that don't easily allow water to infiltrate into the soil, like dense clay areas.

These charts illustrate the complex sales planning that is required for selling multiple products that address both basic sanitation and SMS. iDE and LBOs use this knowledge to plan for stocking relevant products in their peak seasons, then intensify sales accordingly. These varied demand curves also illustrate the value of product diversification, which allows LBOs to move from peak season to peak season without prolonged periods of business slowdown. The conspicuous peak in ADP sales in Q3 and Q4 2024 can be explained by the decision to introduce targeted, partial subsidies for IDPoor households to invest in the ADP from Q3 2024 onward. As noted above, this uptick also explains the relative downtick in Easy Latrine sales during the same time period.

CR-WASH-SUP SALES APPROACH

iDE Cambodia employs a door-to-door sales approach through our team of sales agents who are trained to conduct presentations to rural households to generate demand and promote social behaviour change. iDE's sales agents utilize physical "sight sellers" – laminated flip charts with visuals to aid the four-part sequence of the sales presentation: 1. Emotions/personal connection with the problem; 2. Monetary cost of the problem; 3. Emotions/visualizing the solution; and 4. Cost of the solution). If potential customers express interest but are not able to immediately afford the product/service, the sales agent notes these interactions and schedules either in person or telephone follow-ups. During CR-WASH-SUP, 36,105 sales presentations were conducted, delivered by 12 iDE sales agents (six Female, six Male).

Sales Agents Tailoring Behavior Change Messaging to Systemically Marginalized and Climate-Vulnerable Households

Ms. Reay Sean, a 25 year old mother and sales agent for iDE is passionate about sharing vital sanitation and health messages with rural households. She believes direct conversations about sanitation, handwashing, and menstrual health are essential for positive sanitation behavior changes. "Each day my mission is to sell sanitation solutions to poor rural households. I am very motivated because through my work I talk and explain to them the sanitation problems and solutions that bring about real change and ensure health benefits for rural people, especially small children, women, and older people who are the most vulnerable groups," Sean shared.

In the flood-prone areas along Tonle Sap Lake, families struggle with limited access to climate-resilient and durable toilets, impacting children's safety and health, especially for girls managing their menstruation.

Sean strategically frames her conversations around the real problems each family is facing. "Before introducing any specific sanitation solution to each family, I start a conversation by letting the families share any problems they are facing, and which one is their main concern. Once I learn about their key issue, I then explain to them all the possible solutions." By compassionately speaking to households about their own individual challenges, she not only is able to help address their challenges, but she also contributes to supporting the health of the wider community through improved sanitation coverage.

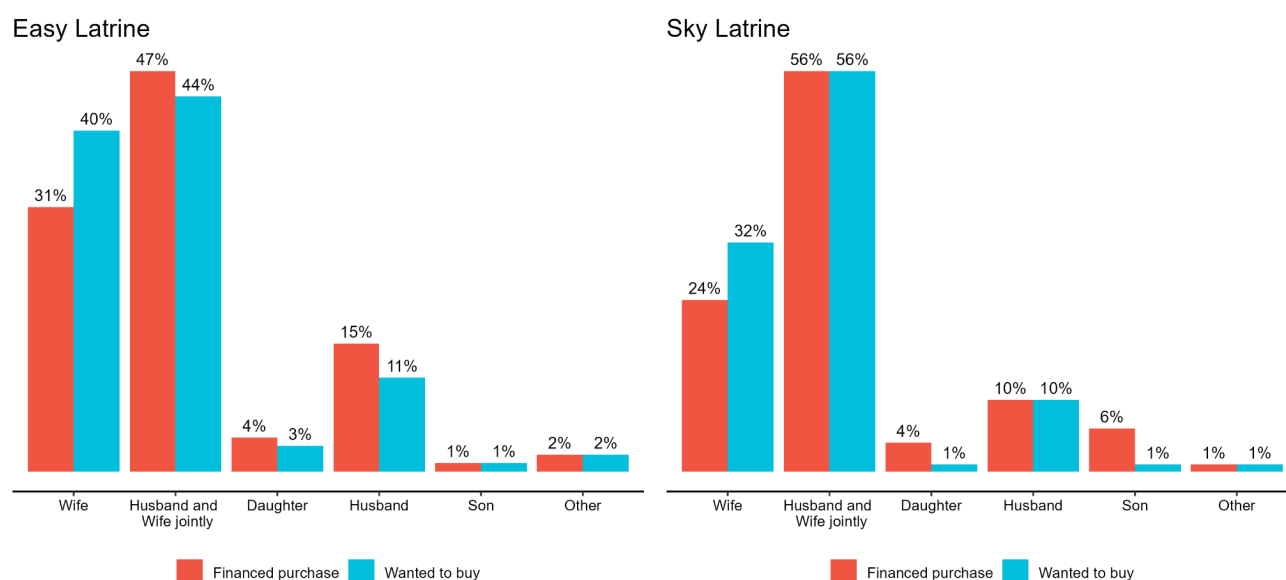


Ms. Reay Sean, sales agent in Siem Reap province, discusses the importance of menstrual health with families.

MOTIVATION FOR PURCHASE

Investigating reasons behind purchasing enables iDE to better understand household decision making dynamics. Figure 9 and 10 show who was the most invested in wanting to buy a product and who was responsible for financing. For most latrine types, the most common situation was that husbands and wives jointly were equally invested in wanting to purchase. 32% of Sky Latrine customers and 40% of Easy Latrine customers said it was solely the wife being the most invested compared to only 11% and 10% of husbands, respectively. Overall, a majority of households had a woman involved in the decision to purchase a sanitation product (84% for the Easy Latrine, 88% for the Sky Latrine) and a majority had a woman involved in the financing (78% for the Easy Latrine, 80% for the Sky Latrine). This indicates a somewhat higher relative expressed preference by women than men for sanitation, reinforcing the notion that responsibility around sanitation often falls to women (Figure 9).

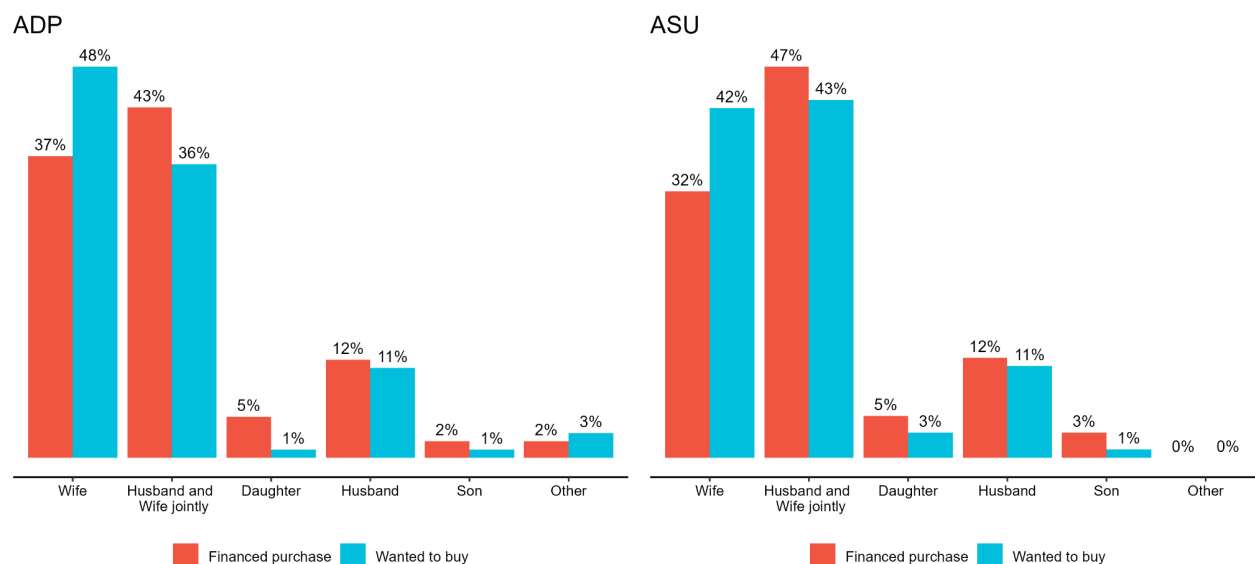
FIGURE 9: EASY LATRINE AND SKY LATRINE PURCHASE AND FINANCING DECISIONS



(Source: Customer Survey 2024)

Wives were more vocal in wanting to purchase the ADP (48%) while husband and wives jointly were more vocal in wanting to purchase an ASU (43%). For both the ADP and ASU, husbands and wives were most likely to jointly finance the purchase, signalling joint decision making (Figure 10).

FIGURE 10: ADP AND ASU PURCHASE AND FINANCING DECISIONS



(Source: Customer Survey 2024)

Table 4 below shows the reasons a household wanted to buy a latrine or latrine upgrade product. They could select more than one option so percentages total up to over 100%. Latrine customers mostly listed convenience, privacy and health reasons as reasons for their purchase, while the majority of latrine upgrade customers mostly cited their old pit filling up or clogging as their primary reason for purchasing a latrine upgrade product. Only a small portion of customers (12% for the Easy Latrine and ASU, 4% for the Sky Latrine, and 8% for the ADP) listed peer or community pressure as a reason for purchasing a product. This suggests that “naming and shaming” techniques may not be effective in motivating a household to buy. This reinforces iDE’s resolve to train sales agents to focus on positive, aspirational SBCC messages to promote proper sanitation.

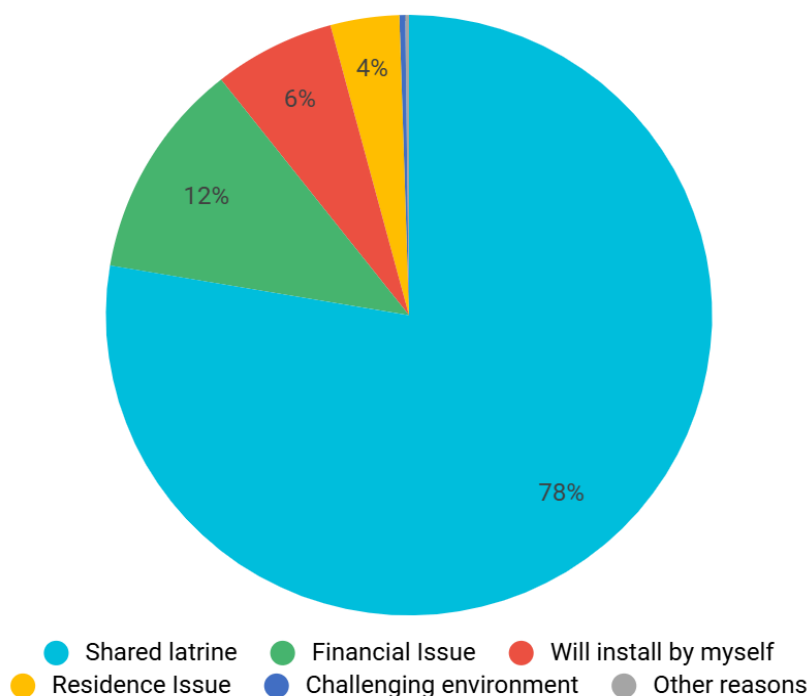
TABLE 4: REASONS TO PURCHASE CR-WASH-SUP PRODUCT

	Easy Latrine	Sky Latrine	ADP	ASU
Convenience	68%	92%	10%	17%
Privacy	44%	39%	4%	2%
Security	31%	36%	5%	11%
Health reasons	15%	48%	2%	3%
Peer/Community Pressure	12%	4%	8%	12%
Social Status	12%	7%	1%	0%
Old pit filled up or clogged	6%	0%	88%	77%
Future savings	2%	2%	1%	3%
Use of waste for agriculture	0%	0%	1%	0%
Other	4%	1%	5%	4%

REMAINING HOUSEHOLDS WITHOUT TOILETS

Siem Reap declared its open defecation free (ODF) status in September 2024.⁹ However, this does not mean that all households in the province own and use individual latrines, as within Cambodia, ODF means that at least 85% of households own basic sanitation while the remaining households are sharing a latrine to get access. CR-WASH-SUP conducts a non-latrine owner census in communes where latrine ownership is at or greater than 85% and are close to being declared ODF. This census provides iDE and local authorities crucial data for targeting sales and subsidy efforts to reach the remaining households without sanitation. Figure 11 highlights non-latrine owners' main reasons for not owning a latrine. Note that respondents could only choose one response, meaning they could only highlight their main reason for not owning a latrine, while there may be interacting factors. It is mostly assumed that non-latrine owners' primary barrier to owning a latrine is lack of financial resources. However, in high coverage areas close to achieving ODF, non-latrine owners may be less prone to invest in a toilet because they have the option of sharing with family members or neighbors. We found that 78% of non-latrine owners stated the main reason they have not invested in a toilet is that they currently have access to a shared latrine. iDE has observed that most households who are sharing latrines are sharing with their parents, siblings or close relatives who reside on the same plot of land.

FIGURE 11: NON-LATRINE OWNERS' MAIN REASONS FOR NOT OWNING A LATRINE

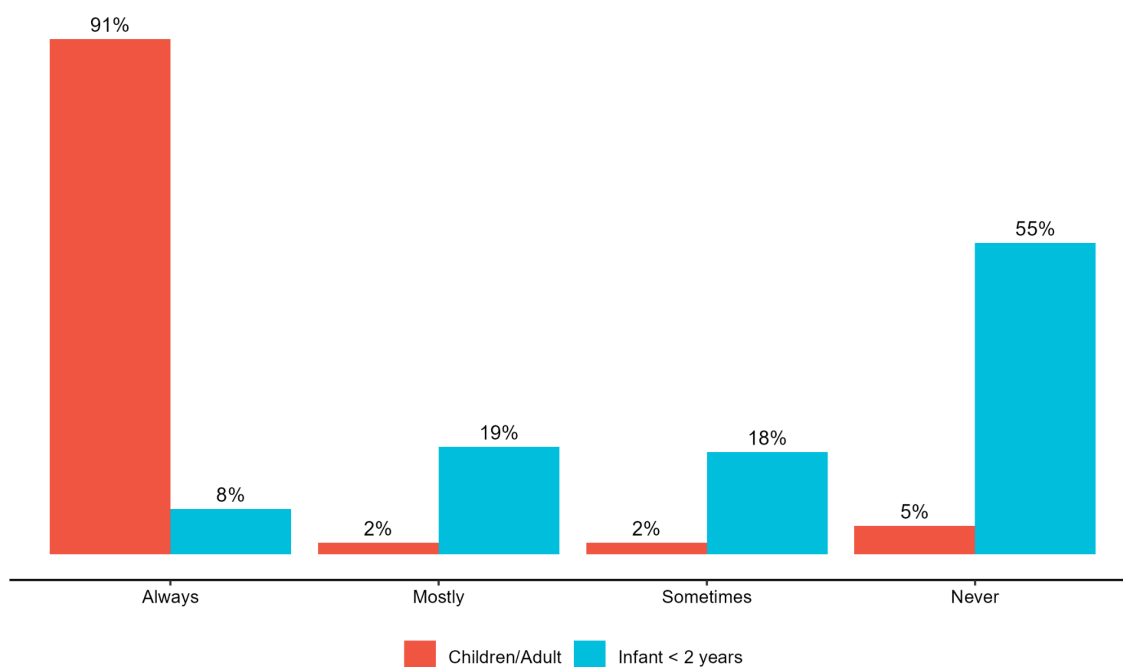


⁹ A Milestone in Sanitation: Siem Reap achieved ODF Status!

INTRAHOUSEHOLD LATRINE USAGE

Understanding intra household latrine usage amongst different household members allows for an in-depth understanding of the equity of impacts of sanitation interventions and signals if the specific needs of household members of certain age groups, genders or abilities are being appropriately met. Data is collected through the iDE Customer Survey, which collects demographic information on individual family members and asks members to estimate their individual frequency of usage of the latrine. Figure 12 below shows that the large majority (91%) of children and adults report always using a latrine. More than half (55%) of parents/caregivers indicated that infants never use a latrine.

FIGURE 12: LATRINE USAGE RESULTS AMONGST CR-WASH-SUP CUSTOMERS



(Source: Customer Survey 2024)

Table 5 below shows notable increase in reported latrine usage across most adult demographic groups over the years. While we lack evidence to fully explain this increase in exclusive latrine usage between 2019 and 2021, it can be speculated that as new latrine owners (a demographic that includes most Cambodians), Cambodians are naturally increasing toilet use as this social norm solidifies. Likewise, as this data is self-reported, the observed increase in social pressure to use sanitation may result in some social desirability bias in the data that could over-represent actual toilet use. While the data points increase, then decrease in PWDs exclusive latrine use between 2019 and 2024, it should be noted that the sample of PWDs measured for 2024 (n=80 individuals), is relatively small and this result may be influenced by the statistical margin of error in the sample. Regardless, this decline highlights potential concerns around PWDs maintaining consistent latrine usage, and signals there may be challenges with accessibility which have not been appropriately addressed within CR-WASH-SUP. iDE is further interrogating the data and intends to investigate qualitatively to learn more. While the use of latrines amongst girls and boys aged 14 and under has increased from 2019 to 2024, it remains lower than adults overall, suggesting there are still barriers towards the full adoption of latrines amongst younger age groups and a need for sanitation

interventions to meet their needs. Improving sanitation access for PWDs and children is the focus of future investigation and research by iDE.

TABLE 5: HOUSEHOLD MEMBERS ALWAYS USING THE LATRINE (BY MEMBER GROUP)

	2019	2021	2024
Elders (> 60 yrs)	79%	97%	97%
Married Women	76%	95%	97%
Married Men	74%	93%	96%
Unmarried Women (15-60)	67%	93%	97%
Unmarried Men (15-60)	67%	92%	97%
Girls (<15)	62%	74%	80%
Boys (<15)	57%	73%	78%
People with disabilities	79%	86%	76%
Infants (Under 2 years)	6%	5%	8%

(Source: Customer Survey 2019, 2021, 2024)

Further analysis of latrine usage amongst 1,693 children aged 14 and under highlights sizable differences between children aged between two to five years compared to children aged six to 14. Caregivers of nearly two thirds of children aged two to five years report them always using the latrine. In comparison, caregivers of approximately 95% of children aged six to 14 years report them 'always' using a latrine. This large drop-off in latrine use for children five years and under indicates a significant gap in current sanitation products and behaviors for this age group (Table 6).

TABLE 6: LATRINE USAGE RESULTS OF CHILDREN

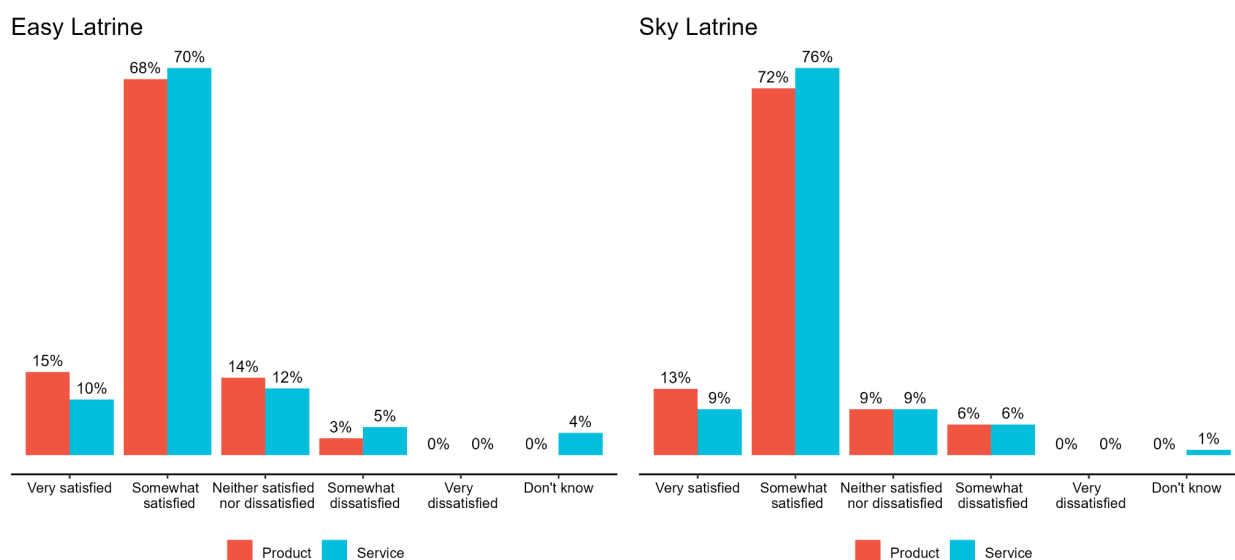
	Always	Mostly	Sometimes	Never
Girl (0-1)	16%	5%	18%	61%
Boy (0-1)	13%	12%	18%	57%
Girl (2-5)	63%	8%	15%	14%
Boy (2-5)	62%	5%	16%	17%
Girl (6-14)	96%	1%	1%	2%
Boy (6-14)	94%	2%	1%	3%

(Source: Customer Survey 2024)

CUSTOMER SATISFACTION WITH PRODUCTS AND SERVICE PROVIDED BY LATRINE BUSINESS

Through the 2024 Customer Survey, customers reported their satisfaction with CR-WASH-SUP products and the service provided by latrine businesses. We see in Figure 13 that 83% of Easy Latrine customers are very or somewhat satisfied, and that 85% of Sky Latrine customers are very or somewhat satisfied with their product.

FIGURE 13: CR-WASH-SUP SATISFACTION RATES WITH LATRINE PRODUCTS AND LBOs SERVICE



We see in Figure 14 that 87% of ADP customers are very or somewhat satisfied, and that 83% of ASU customers are very or somewhat satisfied with their product. Similar to Figure 13, households majorly had equivalent levels of satisfaction with both the latrine and the service provided.

FIGURE 14: CR-WASH-SUP SATISFACTION RATES WITH ADP AND ASU PRODUCTS AND LBOs SERVICE

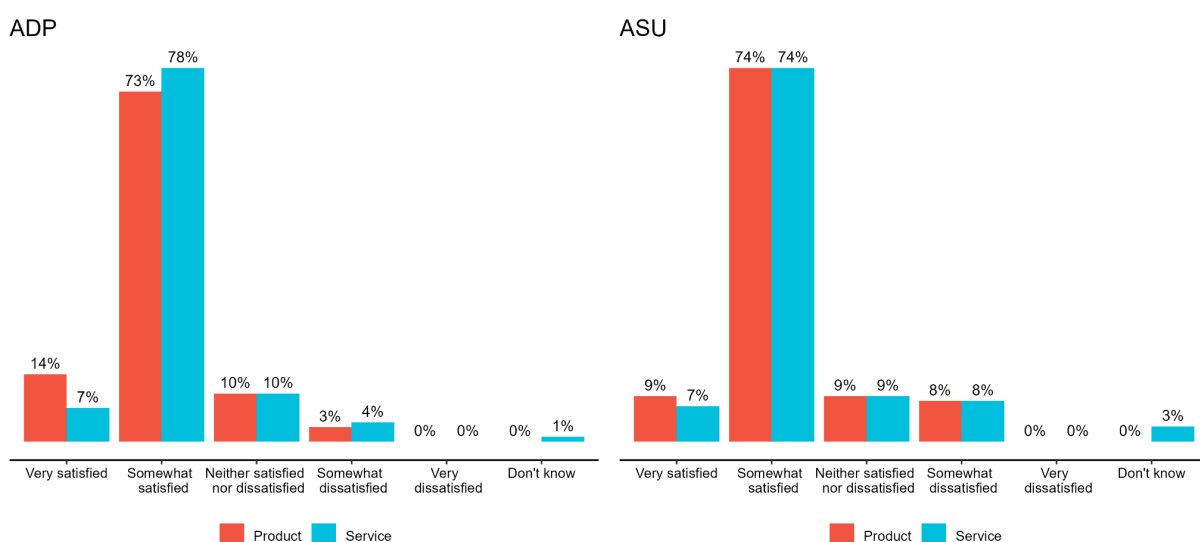


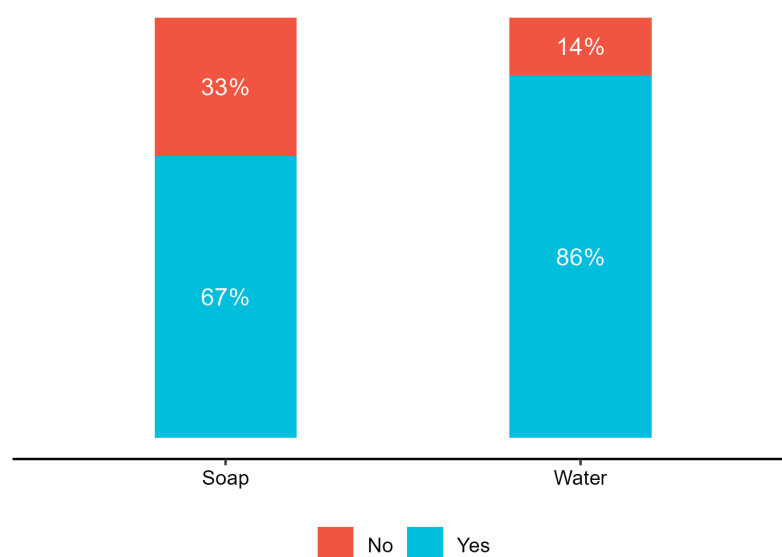
Table 7 presents the intentions of existing Easy Latrine customers to upgrade or change their latrine. 84% said they would build a new shelter or upgrade their existing shelter, which is identical to results from SMSU3. At the end of SMSU3, 23% of respondents mentioned intentions to install a second pit, compared to only 11% in the most recent survey. This may indicate a decreased general preference for continuously installing new pits as a solution for FSM. Taken one step further, this may hint at increased awareness of, availability, or demand for latrine pit emptying services or self-organized pit emptying as an alternative to expanding latrine pit capacity.

TABLE 7: INTENTIONS FOR LATRINE UPGRADES IN NEXT 3 YEARS

Upgrade	Percent
Build a new shelter or upgrade the existing shelter	84%
Build a water reservoir	46%
Build a space to shower	45%
Install a second pit	11%
Other	8%
Install a basin to wash hands	8%
Connect to piped water	3%
Build a space to wash clothes	0%

During CR-WASH-SUP, the Interlock Shelter continued to include handwashing facilities. Among customers who have handwashing facilities, 86% reported using water when washing their hands. However, a third of customers who have handwashing facilities still reported not using soap when hand washing (Figure 15), which is consistent with findings across other WASH organizations.¹⁰ This signals the need to emphasize targeted messages around safe and hygienic hand washing amongst CR-WASH-SUP target households.

FIGURE 15: USE OF SOAP AND WATER AMONGST CUSTOMERS WITH HANDWASHING FACILITIES



¹⁰ Proportion of population using a hand-washing facility with soap and water

QUALITY ASSURANCE

To better understand what could be leading to dissatisfaction, customers were asked about the primary issues they had with their products. 89% of Easy Latrine customers did not experience any challenges with the product, compared to only 52% of Sky Latrine customers. We see in Table 8 that the most commonly reported issues are related to latrines not properly flushing. These can be a product of poor latrine pan quality, improper installation, a full latrine pit, or environmental challenges including high groundwater or flooding.

TABLE 8: CR-WASH-SUP PRODUCT CHALLENGES EXPERIENCED BY CUSTOMERS

Challenge	Easy Latrine	Sky Latrine	ADP	ASU
No problems	89%	52%	85%	80%
Issues flushing	6%	36%	4%	8%
Flooding	2%	18%	4%	2%
Clay environment	2%	2%	0%	1%
Pit full/overflowing	2%	3%	9%	10%
Smells	1%	14%	4%	9%
Pit difficult/expensive to empty	0%	0%	1%	0%
Lack of water for flushing	0%	0%	0%	1%
High groundwater	0%	1%	3%	1%
Other	0%	5%	1%	2%

(Source: [Customer Survey 2024](#))

ENSURING FUNCTIONALITY IN SANITATION CHALLENGING ENVIRONMENTS

iDE conducts the Sky Latrine flooding survey to identify design issues or other challenges that may be affecting the year-round functionality of the Sky Latrine. The survey is conducted by calling all Sky Latrine customers and in person follow ups to learn about the latrine's functionality across all target areas throughout the rainy season.

After the flood water recedes, signalling an end of the rainy season, the flooding survey is deployed by research & learning associates (RLAs) and data is stored in Kobo, a digital data collection tool. After the survey and analysis are completed, iDE's team conducts follow-up observations and interviews to assess the structure of the latrine system and identify causes for any issues revealed in consultation with the owners of the products. Please refer to the Annex for further details on the data collected during the flooding survey by iDE.

The 2024 flooding survey found that the average family size of Sky Latrine households was 6.4 members, compared to Easy Latrine households' family size of 4.7, affirming the observation that multiple families often live within one elevated household structure in seasonally flooded communities. 61% of Sky Latrine households had more than six members using the latrine. 59% of households experienced flooding levels of 2-4 metres. In 2023, 63% of Sky Latrine customers reported some challenges flushing their latrine during the rainy season. In response, the team conducted retrofitting for existing installations and made design modifications to increase ventilation. These modifications appear to have improved functionality, as in

2024, the number of households reporting some degree of flushing challenge decreased to 34%. Further follow-up is needed to identify ways by which issues can be further mitigated. Of the indicators measured, larger family size had a negative impact on latrine functionality, whereas flooding level, households being located in clay soil, and overall latrine structure showed no significant effect on latrine flushing issues. This data helps iDE to discern where and how issues are likely in future implementation, and gives indications for how to improve current system performance (e.g. expanding capacity of systems for larger families).

REINFORCED INTEGRATING OF BEHAVIOR CHANGE INTO SAFELY MANAGED SANITATION

Impactful, sustainable, safely managed WASH solutions require not only infrastructure but also effective household level, aspirational behavior change. Pit piercing as noted above, is an entrenched behaviour in rural Cambodia, and refers to the practice of creating holes in latrine pits above ground to release wastewater when the pits become full and toilets are not flushing properly. “Flooding out” is a behavior observed in seasonally flood-prone communities, in which households open up their latrine pits to allow flood water to effectively empty their latrine pits. These methods are often adopted by households facing challenges with latrine pit emptying, where access to FSM services are limited. Research iDE conducted and published in 2024 indicates that toilet dysfunction occurs more frequently in flood prone regions during the rainy season and unsafe FSM practices were found to be more common among climate-vulnerable households.¹¹ Additionally, when investigating the behavioral adherence to proper maintenance practice of the ADP technology, research showed that very few ADP owners follow recommended practices (only 14% of households) such as emptying the treated sludge safely after two years of storage treatment which enables the safe disposal of FS on-site.¹²

Based on these findings, iDE has placed a more rigorous focus on accompanying sanitation market development interventions with household and community-level behavior change. During CR-WASH-SUP, iDE trained local authorities in flood prone areas to promote the adoption of improved sanitation practices with the aim to increase climate change awareness and increase the accountability of local authorities to mitigate the impacts of climate events to their sanitation systems. Specifically, the aim of these trainings was to ultimately educate households to avoid unsafe latrine pit discharge, including safe pit emptying and not piercing their latrine pits or letting their systems “flood out” in seasonally flooded areas.

iDE staff and connected businesses have also been trained on how to have conversations with customers and local authorities about safe use and maintenance of products, which has included handing out easily-readable leaflets to customers at the time of sale and delivery. It was difficult to assess the immediate impact of these behavior change interventions, as no baseline survey was conducted to assess pre-intervention awareness levels. Future iterations of iDE’s programming will place greater emphasis on monitoring SMS behavior change. iDE’s climate and SMS focused interventions will continue to iterate upon and integrate behavior change approaches into product promotion and market development activities.

¹¹ Abdel Sattar et al, 2024. Effects of Climate Vulnerability on Household Sanitation Access, Functionality and Practices in Rural Cambodia

¹² Harper et al, 2023. Household Perceptions, Practices, and Experiences with Real-world Alternating Dual-Pit Latrines Treated with Storage and Lime in Rural Cambodia (Pre-Print)

CLOSING THE MARKET GAP FOR RURAL SAFELY MANAGED SANITATION: TRIALLING A MODEL FOR ON-SITE TREATMENT AND EMPTYING

A nearly universal lack of affordable, safe FSM services in rural areas poses a major risk to health, water resources and ecosystems,¹³ especially in seasonally flooded areas of rural Cambodia.¹⁴ Without FSM services, when latrine pits fill up, households often opt for unsafe practices, including disposing waste in the surrounding environment.¹⁵ In 2019, approximately one-third of rural Cambodian households in iDE operating areas reported preference for FSM practices that endanger public and environmental health. This risk is exacerbated in flood-prone areas.¹⁶

On-site FSM is defined as the storage, collection, treatment and safe end use or disposal of FS within the household's immediate surroundings/environment.¹⁷ For an average household in Cambodia, a single pit latrine will take between two to five years to fill – once filled, the solution in urban areas is to vacuum out the FS. However, this option is not always feasible for rural households due to high costs and lack of accessibility.¹⁸ After a gradual increase of sanitation coverage in rural Cambodia, in 2017, iDE introduced the ADP upgrade product to the local market to improve access to SMS. Over 23,000 ADP on-site FSM systems have been adopted by rural communities and sold by iDE since 2017. While the ADP is a valuable solution for many households, it is not the ideal product for everyone in the rural Cambodian market. Safe, reliable and affordable pit emptying services are needed to close that market gap. According to the 2020 Ministry of Rural Development (MRD) National FSM Guidelines for Rural Households, on-site FSM is the preferred solution to achieve SMS in rural Cambodia.¹⁹

SERVICE MODEL

In 2023 and early 2024, iDE conducted formative HCD research and desk review to develop a commercial model for on-site latrine pit treatment and emptying on the premises of rural latrine owners' households. The process is as follows:

1. Apply appropriate personal protective equipment.
2. Identify a burial site, ensuring safe distances from water bodies and drinking water sources, and high ground water.
3. At the appropriate site on the household premises, dig a square hole near the existing latrine pit 1m deep, 1.6m long, and 1.6m wide. Layer pit with saturating medium (rice husk) to aid wastewater containment and saturation.
4. Treat the full latrine pit with hydrated lime and mix thoroughly using a mechanical auger blade tool.
5. Using a motorized pump machine, transfer waste between the full latrine pit and the newly dug hole.
6. Gradually backfill soil, allowing for wastewater saturation to prevent wastewater pooling at the surface.
7. Set up a perimeter fence around the burial site and advise households to avoid walking over the burial site for 30 days.
8. Appropriately sanitize and store tools, wash hands, and ensure any soiled clothing is isolated and stored for cleaning.

¹³ [National Fecal Sludge Management Guidelines for Rural Households](#)

¹⁴ Based on iDE's experience operating in seasonally flooded areas along the Tonle Sap Lake.

¹⁵ iDE, 2020. [Mid-term Report: Cambodia Sanitation Marketing Scale-Up 3](#)

¹⁶ Abdel Sattar et al, 2024.

¹⁷ [Faecal Sludge Management | Global WASH Cluster](#).

¹⁸ Harper et al. 2023.

¹⁹ [National Fecal Sludge Management Guidelines for Rural Households](#)

FIGURE 16: LEAFLET DISTRIBUTED TO SERVICE PROVIDERS AND HOUSEHOLDS DETAILING THE PIT EMPTYING SERVICE PROCESS



SERVICE DELIVERY TRIAL

Between July and October 2024, iDE conducted a sales trial, leading to purchases from 22 households for the on-site latrine pit emptying service. The trial was separated into three components, with sales and installations taking place for seven households, then eight households, and another seven, with pauses in between for monitoring, reflection, and iterations on the service model.

To assess safety and mitigate potential public health risks to households and LBOs, iDE collected 225 soil samples to be analyzed by an external lab to identify concentrations of E. coli and fecal coliforms in surface soils. Soil samples were analyzed by Ph.D. researchers James Harper at the University of Colorado Boulder and Drew Capone at the University of North Carolina.

RESULTS

Key findings from the commercialization trial, conducted in Preah Dak Commune in Siem Reap include:

- 15 latrine pit emptying services were sold at a retail price \$31 and delivered during Week 1 and Week 2 with a 53% sales closing rate.
- The remaining seven latrine pit emptying services in Week 3 were sold at \$37.5 with a 41% sales closing rate.

- 82% of customers (18 out of 22) reported being satisfied with their service (rated 4-5 out of 5). The majority of HHs had never purchased any pit emptying services before ours, and specifically noted the following positives: 1. Fast turnaround time of the pit emptying service from the latrine business; 2. LBOs properly cleaned and sealed not just the pit but surrounding areas as well.
- Customers anecdotally reported to iDE that neighboring households also inquired about the emptying services for themselves, indicating a good level of interest and demand amongst the community.
- iDE recognized that households with high groundwater were not well suited for the pit emptying service due to risk of groundwater contamination and soil saturation that prevented infiltration of wastewater into the ground (necessary to allow for safe burial).
- The pit burial site depth was changed from 0.5 to 1 metre during Week 3 to account for large amounts of FS, while the length stayed the same during all 3 weeks (1.6m x 1.6m)
- iDE observed that effective sales messages and unique selling points for the service included emphasizing to households that the entire process would be clean, hygienic and with no bad smells when opening up the latrine pit and during the duration of the pit emptying process, due to lime treatment to kill harmful pathogens.
- Latrine business workers often encountered solid sludge and other waste such as sanitary pads when emptying the latrine pit, which made it difficult to effectively pump sludge out during the entire trial duration, despite the addition of a more powerful motor pump in the third round of service deliveries. This signals the need for further behaviour change communication to households to remind them to not throw waste directly into latrine pits or flush them down their toilets.
- Initial preliminary lab results indicate that E.Coli concentrations are highest at the surface of the soil before the pit emptying service in comparison with immediately after the service has been completed. After a month, E.coli levels at the surface decreased further. Evidence indicates that the on-site pit emptying service does not increase exposure to E.coli and does not present additional health risks.



Latrine business workers backfilling the burial pit to prevent treated FS from contaminating the household surface.

NEXT STEPS

iDE will refine the leaflet distributed to latrine customers informing them of the need to safely manage their latrine, including preparing for emptying and not disposing of solid waste (including menstrual products) in the latrine. Starting with one service provider and gradually adding service providers quarterly, iDE will scale-up the emptying service in rural Siem Reap province in 2025. iDE will conduct regular monitoring in close coordination with field activities to ensure safety and effectiveness of the on-site emptying service. In early 2025 iDE and James Harper Ph.d will draft findings of the trial to submit for peer review and publishing with an academic journal.

PRIVATE SECTOR AND HOUSEHOLD FINANCING

Key Learnings and Findings

- iDE's market-based approach and regular support, coaching, mentoring provided to latrine businesses continues to prove long-term benefits to local sanitation entrepreneurs as they are able to gain technical product diversification skills, business management and grow their customer base strategically.
- Male and female sanitation entrepreneurs who were interviewed as a part of iDE's Gender Equity Assessment for LBOs cited statistically significant differences in the income and business practices domain at the Endline with a significant reduction in agreement that LBOs would only hire male staff for their businesses.
- Further findings from the Gender Equity Assessment highlight the need for qualitative insight to be gathered alongside quantitative data, due to cultural and context-specific nuances which may be overlooked when gathering GEDSI related impacts and outcomes.
- Through CR-WASH-SUP sales of sanitation products, 20 LBOs have earned a combined total net revenue of over USD \$432,000.

PRIVATE SECTOR & ENTREPRENEUR CAPACITY BUILDING

iDE's vision for the future of sanitation businesses in rural Cambodia is a diversified market where businesses stock a wide range of products – not just limited to sanitation – and can sustainably provide new products, maintenance, and upgrades to the public. iDE has been building a network of high-performing, increasingly diversified sanitation enterprises in Siem Reap for over 12 years. iDE is partnering with 17 LBOs in Siem Reap and have engaged 20 throughout the course of CR-WASH-SUP. Currently 11 of these LBOs are classified as “active,” meaning iDE is sending them orders. The remaining six are classified as “passive” and are still receiving coaching support from iDE for their business, without active referrals.

At the core of iDE's market-based programming is empowering local entrepreneurs to create change within their communities. Within the context of sanitation in rural Cambodia, this takes the form of coaching, mentoring and training local LBOs. iDE's engagement with LBOs consists of technical training, enabling sanitation entrepreneurs to manufacture and install climate resilient sanitation products, and business management capacity building, strengthening financial and administrative acumen to support business sustainability. iDE sanitation business advisors (SBAs) engage directly with LBOs on a weekly basis to continue strengthening and improving these skills through business coaching and business support. SBAs invite LBOs to attend quarterly LBO meetings for networking and to give updates, voice concerns, and share advice and information with one another.

An LBO that is offering a range of products, through a variety of sales and promotion channels, is in a stronger position to be successful in the future than an LBO that is offering only a single product to customers through iDE sales agents – especially as Siem Reap has reached 88% latrine coverage. iDE also considers product diversity to include additional products beyond the WASH products and services that iDE has developed. In order to stay profitable and mitigate seasonal fluctuations in demand, many LBOs produce and sell other concrete products, compressed bricks, and housing materials. Table 9 shows a snapshot of the highest, mid, and lowest tier performers of LBOs.

TABLE 9: SNAPSHOT OF CR-WASH-SUP LBOs

	Monthly volume of sanitation product sales (average)	Monthly revenue (average)	Monthly operating profit (average)
Highest tier performers (Quintile 5)	38.0	\$2,677.6	\$515.4
Mid tier performers (Quintile 3)	8.1	\$631.4	\$117.8
Lowest tier performers (Quintile 1)	Less than 1 (0.1)	\$7.5	\$1.4
Average	13.0	\$912.7	\$177.4

(Source: [LBO Business Analysis](#))

Through CR-WASH-SUP sales, 20 LBOs have earned a combined total net revenue of USD \$432,074 (Table 3). During CR-WASH-SUP, iDE has introduced and trained LBOs to produce additional climate resilient WASH products, such as the Sky Latrine and ASU. Ensuring that a referral process is in place between local authorities and LBOs, in which referees receive a small sales commission, perpetuates sustained demand generation within the WASH market system.

Entrepreneurs Integrating Climate Resilience into Sanitation Businesses

Residents of Kampong Khleang, a seasonally flooded community in Siem Reap, rely on fishing for food and income, but declining fish populations threaten their livelihoods. Local sanitation entrepreneur, Mr. Khut Khon, describes the sanitation related challenges: “Kampong Kleang’s environment is not clean. I think the soil and water are contaminated. This is because not every household has a toilet to use, and most of the toilets installed are not functional during the rainy season.”

Determined to help Kampong Khleang households, Mr. Khon has partnered with iDE to construct, sell and install Sky Latrines. However, working in seasonally flooded areas is a challenge. They have road access issues, and have short windows for when you can install latrines during the dry season. Despite this, Mr. Khon is happy with his business, as he can promote safe sanitation by offering a climate-resilient toilet to marginalized groups in his community. “Diversifying products and services and extending the areas of coverage means I can provide jobs to my staff who have worked for me for quite a long time. Equally important, I can help those flood-prone villages to have better access to the Sky Latrine, which would be functional in their areas.”



Mr. Khut Khon is helping to protect the environment of the Tonle Sap Lake by providing households with affordable, aspirational, and climate-resilient latrines.

iDE'S PRIVATE SECTOR IMPACT

CR-WASH-SUP interviewed all 17 LBOs currently partnering with iDE in Siem Reap in October 2024 to understand how they felt about iDE's support and impact to their business' earnings, technical skills, business skills and overall impact to their community's access to WASH products and services.

The vast majority of LBOs (97%) reported that they felt that iDE had improved their business skills, which highlights iDE's strong emphasis on skill-building initiatives with LBOs is positively received. Nearly all (94%) of all LBOs expressed agreement when asked if iDE supported their businesses to earn more, with 74% expressing that they "strongly agreed," signalling iDE's positive financial contribution to local sanitation entrepreneurs' livelihoods. Similarly, a large majority (85%) agreed that iDE has a positive impact on enhancing their technical skills, which suggests that most LBOs found training and coaching offered by iDE SBAs relevant and beneficial. However, 15% of LBOs were neutral or expressed disagreement, which may be explained by the fact that six LBOs are currently considered "passive" and are not receiving direct sales support from iDE. These LBOs, which are still receiving coaching, are not actively seeking to reach new customers with sanitation and have in most cases diversified and prioritized providing a range of other home improvement goods to households.

All LBOs (100%) indicated that iDE had positively helped them to support their community's access to WASH, with the majority (73%) expressing "strong agreement." This suggests that LBOs were appreciative of iDE's presence to their business and community, and supported their vision of providing their communities with enhanced climate-resilient sanitation products and services.

LBO GENDER EQUITY ASSESSMENT

CR-WASH-SUP conducted a baseline and endline gender equity assessment amongst all LBOs with the purpose of boosting gender parity in the WASH business sector. The baseline was conducted in August 2023, and the endline was conducted in October 2024, which had 33 respondents including 17 female sanitation entrepreneurs and 16 male sanitation entrepreneurs who joined optional GEDSI transformative workshops spearheaded by iDE Cambodia's GEDSI Manager across the duration of CR-WASH-SUP. The workshops included both male and female sanitation entrepreneurs and through a participatory approach, aimed to create a safe environment where participants could improve their understanding of GEDSI related issues in business such as gender roles within family-owned businesses and sharing business responsibilities equitably. Please note that results marked with an asterisk highlight statistical significance found during analysis.²⁰

Each respondent was asked to rank themselves at the baseline and endline on their level of involvement with their business:

Level 5: Business Owner	I am the ultimate owner/leader of the latrine business.
Level 4: Business Partner	I share responsibility and decision making with my partner.

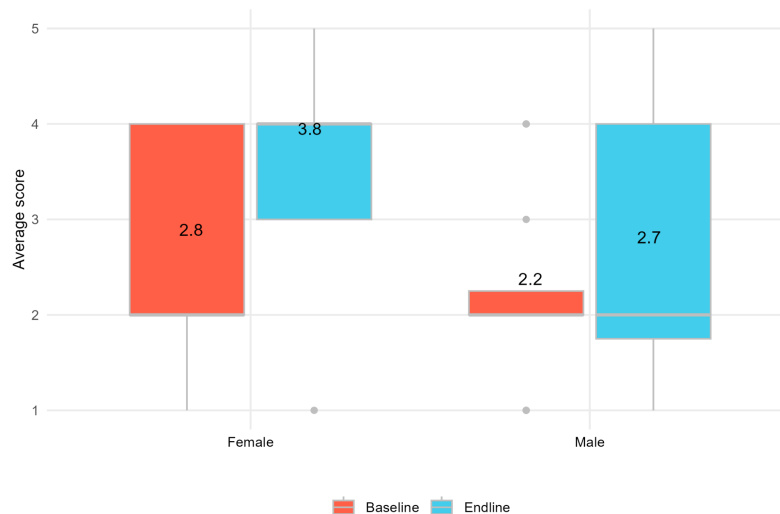
²⁰ The sample size for the LBO equity assessment was small (n=33), which is why statistical significance was difficult to detect at the baseline and endline during analysis.

Level 3: Business Manager	I am permanently delegated specific areas/tasks. My decision making authority is limited to this area.
Level 2: Employee	I am delegated with basic activities and tasks involving little or no responsibility and decision-making.
Level 1: Assistant	I provide ad-hoc assistance. I have no permanent responsibility and no decision making role.

Survey participants were then given statements which fell into the categories of income and business practices, decision making power and self confidence and critical consciousness and asked to rank their level of agreement with the statements according to five levels: strongly agree, agree, neutral, disagree, and strongly disagree. Findings from the assessment indicate the importance of qualitative insights to complement quantitative data, as iDE observed numerous context-specific observations amongst respondents, which add nuance to why shifts in gender equity may have or may not have been observed. For example, a surveyed husband and wife ran latrine business reported that at the baseline, the wife was a Level 5 LBO, while the husband had limited oversight of the business. At the endline, both partners indicated that they were inspired by the GEDSI transformative workshops to become joint Level 4 business partners. While at first glance, a woman sanitation entrepreneur moving from Level 5 to Level 4 may indicate a reduction in agency, iDE acknowledges that family owned latrine businesses stand to benefit from equitable task sharing and decision making.

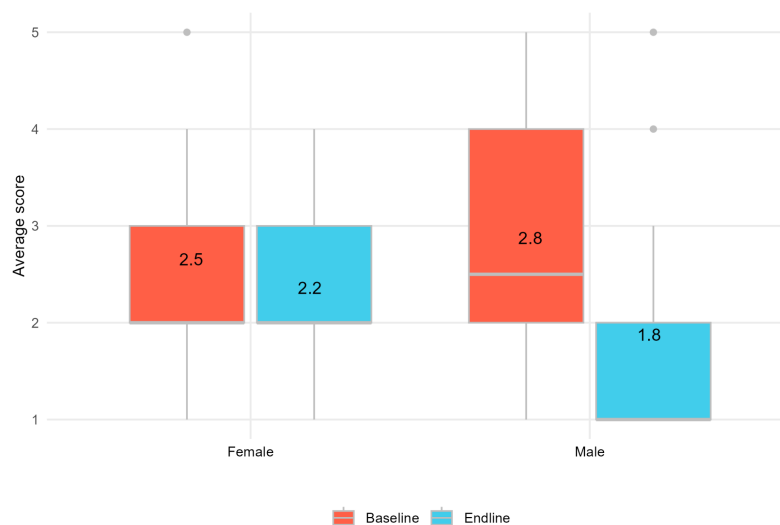
Gender inclusive hiring practices. Male and female LBOs cited statistically significant differences in the income and business practices domain at the endline with a significant reduction in agreement that LBOs would only hire male staff for their businesses. In general, this shift reflects a move towards more gender-inclusive recruitment practices among LBOs, with more female sanitation entrepreneurs expressing more interest in hiring women for their business. Please note that the rankings for Figure 17 were as follows: 1) Strongly Agree; 2) Agree; 3) Neutral; 4) Disagree; 5) Strongly Disagree

FIGURE 17: AVERAGE SCORE OF FEMALE AND MALE LBOs RESPONSE TO "I ONLY RECRUIT MALE STAFF FOR THE BUSINESS" *



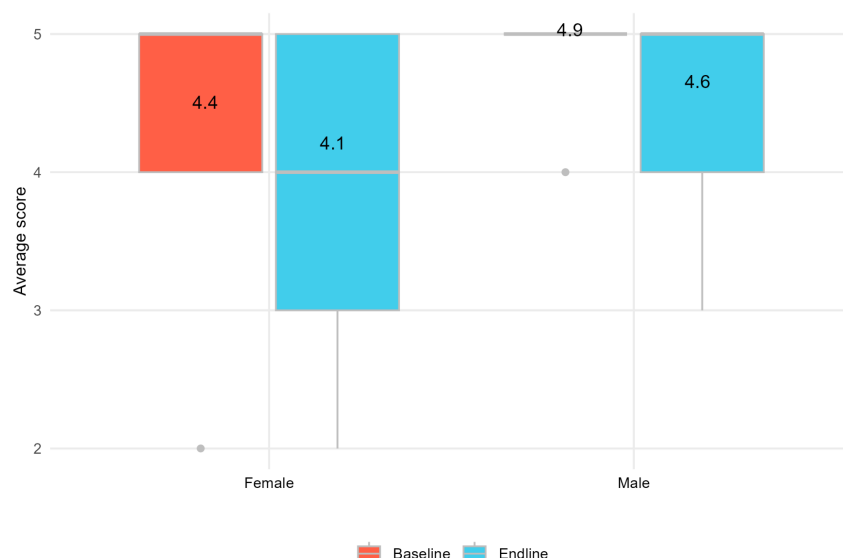
Financial autonomy decision making. LBOs indicated shifts in financial decision-making from neutral to agreeing that they must ask permission from their spouse before spending money earned from the business at the endline. While this might be interpreted as reduced financial decision making amongst both men and women, iDE's observations reflect that this could be a positive sign in adopting joint financial decision making when it comes to business earning related decisions, highlighting increased collaboration amongst husbands and wives. Please note that the rankings for each five levels for Figure 18 were as follows: 1) Strongly Agree; 2) Agree; 3) Neutral; 4) Disagree; 5) Strongly Disagree

FIGURE 18: AVERAGE SCORE OF FEMALE AND MALE LBOs RESPONSE TO "I MUST ASK PERMISSION FROM MY HUSBAND/WIFE BEFORE SPENDING MONEY I EARN FROM OUR BUSINESS" *



Regarding making financial business decisions on purchases over \$5000, while no statistical significance was detected, both female and male entrepreneurs showed high levels of agreement at the endline. Please note that the rankings for each five levels for Figure 19 were as follows: 1) Strongly disagree; 2) Disagree; 3) Neutral; 4) Agree; 5) Strongly agree

FIGURE 19: AVERAGE SCORE OF FEMALE AND MALE LBOs RESPONSE TO "I PARTICIPATE IN BUSINESS DECISIONS THAT ARE MORE THAN \$5000"



Evolving critical consciousness on gender norms. While no statistical significance in responses was detected to the questions "Girls are more limited than boys in what they can do," and "A woman's role is to serve her husband," iDE observed that men and men generally agreed against rigid gender norms both at the baseline and endline, signalling critical consciousness amongst survey participants regarding gender roles.

iDE positively supports latrine businesses to be more inclusive. When questioned at the endline, the majority of LBOs (94%) reported positive agreement towards iDE's efforts to enhance GEDSI practices, through GEDSI transformational workshops, reflecting confidence in iDE's approach to promote inclusivity in sanitation businesses.

HOUSEHOLD AND SECTOR INVESTMENT

Donor funding is often perceived to be the predominant source of overall WASH funding in low-and lower-middle-income countries, and household contributions are likely under-reported in national WASH accounts and global estimates.²¹ By working through markets, iDE is able to leverage households' investments in WASH. Throughout CR-WASH-SUP, households have cumulatively invested USD 411,327 in WASH infrastructure, proving there is a strong demand for these products.²²

²¹ WHO & UN-Water, 2021. [Reflecting on TrackFin 2012-2020: key results, lessons learned and the way forward](#)

²² Calculated by subtracting the value of subsidies provided to IDPoor households from LBOs' total net revenue.

To support low income households to purchase toilets, CR-WASH-SUP has invested USD \$20,747 in targeted subsidies for the most systemically marginalized, climate-vulnerable households, to offset the required user investment. These targeted subsidies have helped to support 628 IDPoor households to purchase latrines and latrine upgrade products. Additionally, iDE has leveraged its relationships with communities, active NGOs, and the sanitation private sector to channel an additional USD \$31,000 of funding from other local and NGOs towards facilitating sanitation access to the most vulnerable households still without access to sanitation in Siem Reap.

PUBLIC SECTOR CAPACITY BUILDING

Key Learnings and Findings

- Between January 2023 and December 2024, in total iDE supported 67 villages in Siem Reap to claim ODF status, overachieving the target of 60. Since 2019, iDE has supported 45% of all villages in rural Siem Reap to successfully claim ODF status.
- Utilizing a training of trainers approach with local authorities to disseminate messages to wider community members has fostered open discussion amongst a diverse range of family members, as iDE observed how men in villages were engaged in dissemination events related to improved sanitation practices, MH and climate resilience.
- Aligning programming with the Cambodian government's national ODF goals has been critical to establishing a foothold for knowledge sharing and advocacy for more inclusive, climate-resilient, and market-friendly approaches for sanitation delivery.

NATIONAL PUBLIC SECTOR ENGAGEMENT AND CAPACITY BUILDING

To support market sustainability, iDE builds the capacity of local authorities to strengthen local WASH systems at sub-national and national levels, ensuring alignment with national sanitation goals and priorities. During CR-WASH-SUP, iDE has provided expert feedback and contributed research and operational data to inform the development of national guidelines and policies such as the MRD's "Post-ODF National Strategy," "Standard Operating Procedure on Fecal Sludge Management," and "Guiding Principles on Hardware Subsidies for Rural Household Sanitation," and was an active, key participant in national-level sector groups which were led by the MRD and the Council of Agriculture and Rural Development (CARD). Through its contributions to the MRD's guidelines, iDE has ensured that climate considerations are central to national sanitation related strategies. Overall, this has strengthened the alignment of national policies in Cambodia with climate-resilient sanitation objectives, thereby facilitating local climate finance and action. For example, iDE presented on its WfW I&I Grant-funded climate subsidy research to inform the MRD update of the "Guiding Principles on Hardware Subsidies for Rural Household Sanitation." iDE's feedback on purchasing/subsidy thresholds for households and climate vulnerability targeting was incorporated into the final guidelines.

SUB-NATIONAL CAPACITY BUILDING AND GENDER TARGETED CAPACITY TRAININGS FOR LOCAL AUTHORITIES

CR-WASH-SUP has targeted female local authorities such as commune committees for women and children (CCWCs) and district committees for women and children (DCWC) for inclusive capacity building training of trainer sessions on the topics of post ODF and SBCC. CCWCs and DCWCs are given the mandate to manage WASH in their communities, but often lack the technical skills or knowledge needed to efficiently manage WASH services. Reasons for this include a lack of financial resources allocated to WASH initiatives at the local government level, which limits the ability of these committees to invest in necessary infrastructure and training for effective service delivery. Women, who often play a critical role in community health and sanitation solutions, may also face social barriers to participation in local government committees, leading to underrepresentation of their perspectives and needs in WASH initiatives. Therefore, training of trainer programs that specifically target women in leadership roles within these committees can support addressing gender disparities and ensure that women's voices are embedded within WASH.

Table 10 highlights female local authority representation in iDE led capacity building trainings at the subnational level.

TABLE 10: LOCAL AUTHORITIES TRAINED BY IDE, DISAGGREGATED BY GENDER

	Directly Trained by iDE	Secondary Participants (trained by iDE-trained local authorities)
Sanitation Champions	115	0
Male:Female	44:71	0:0
Post-ODF Trained Local Authorities	51	166
Male:Female	24:27	N/A
SBCC Trained Local Authorities	3	96
Male:Female	1:2	59:37

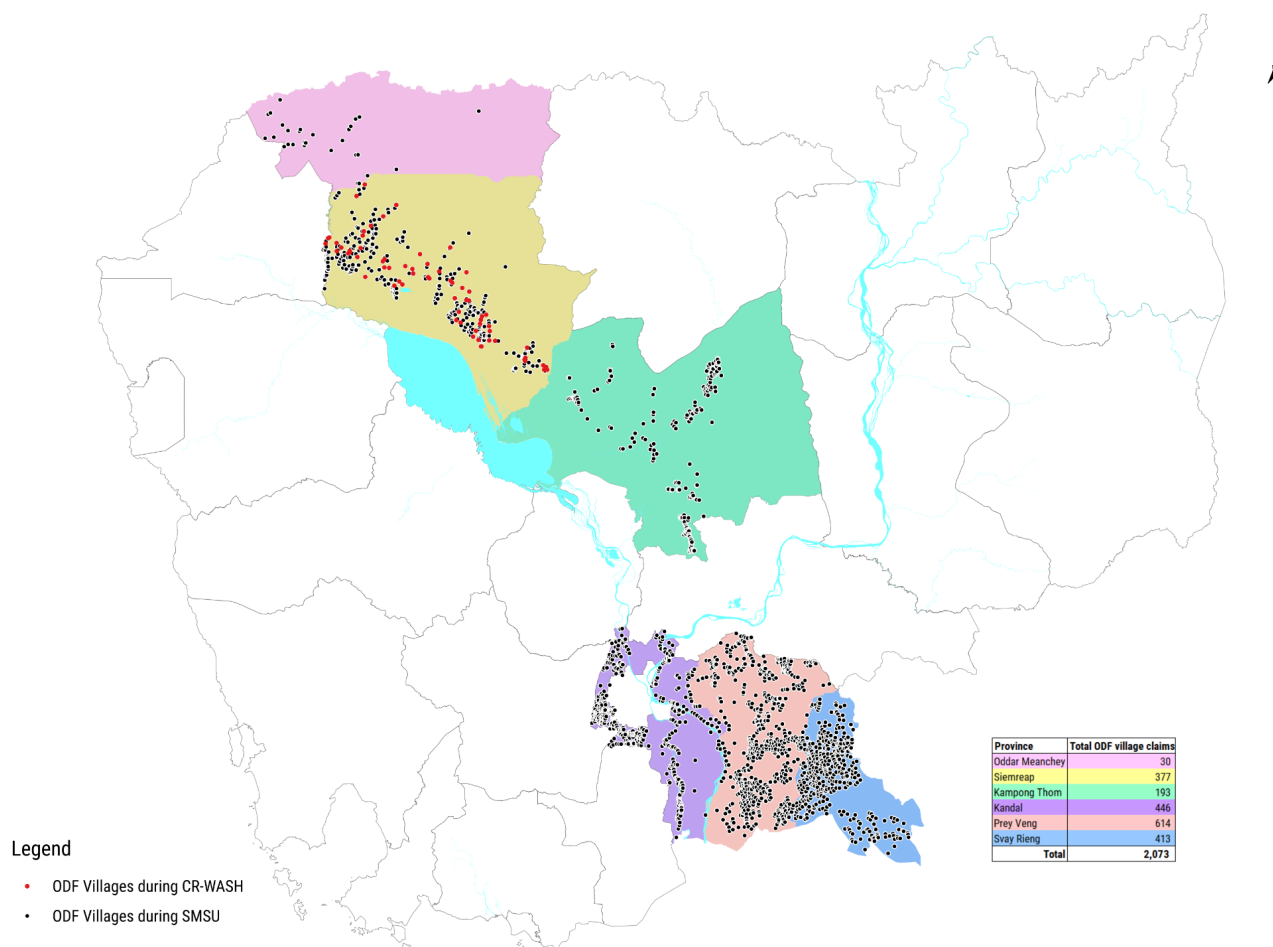
At the subnational level, iDE's close work with local authorities has been the most influential entry point and general approach for improving the function of WASH governance systems. By facilitating connection and collaboration between LBOs, civil society, and government, iDE's Public Private Partnership (PPP) team supports further development of sustainable sanitation systems, to and beyond ODF status. The PPP team operates in communes with sanitation coverage over 85%, mobilizing resources to identify and address the issues preventing laggard households from owning a latrine. After identifying barriers, the team coaches local "Sanitation Champions" to find context-specific solutions, facilitates networks between local latrine suppliers and the village, and supports local authorities to gather evidence and confidently file ODF claims. This process is completed over five key steps:

1. Commune Activation
2. Village activation and data gathering
3. Training, coaching and problem solving
4. Claiming ODF
5. Post ODF training towards safely managed climate resilient WASH.

Once a commune is "activated," Sanitation Champions – after receiving in-depth training on safe sanitation practices and mapping sanitation climate risk areas (e.g. flood zones) – assist in conducting censuses to identify non-latrine users and gather household data on sanitation behaviors. This data collection is essential for tailoring disaster risk reduction plans and equips local authorities with necessary technical skill and knowledge to mitigate sanitation-related risks from climate events in their communities.

Between January 2023 and November 2024, in total iDE supported 67 villages in Siem Reap to claim ODF status, overachieving the target of 60. In total, since beginning its ODF development work in Siem Reap in 2019, iDE has teamed up with local authorities in 377 out of 835 villages (45%) in rural Siem Reap to help them to successfully claim ODF status.

FIGURE 20: MAP OF ODF VILLAGE CLAIM LOCATIONS



(Source: iDE Operational Data: ODF Village Claims in CR-WASH)

After a village successfully claims ODF, iDE delivers a training curriculum to address ODF sustainability. Through the post ODF training of trainers approach, three training sessions are held: Sustainable ODF, ODF Plus and Climate Change, and Handwashing, Child Feces, and Menstrual Hygiene Management (MHM). After the targeted local authorities receive their iDE training, they then promote and disseminate these messages to the broader community using a visual tool through three separate sessions.

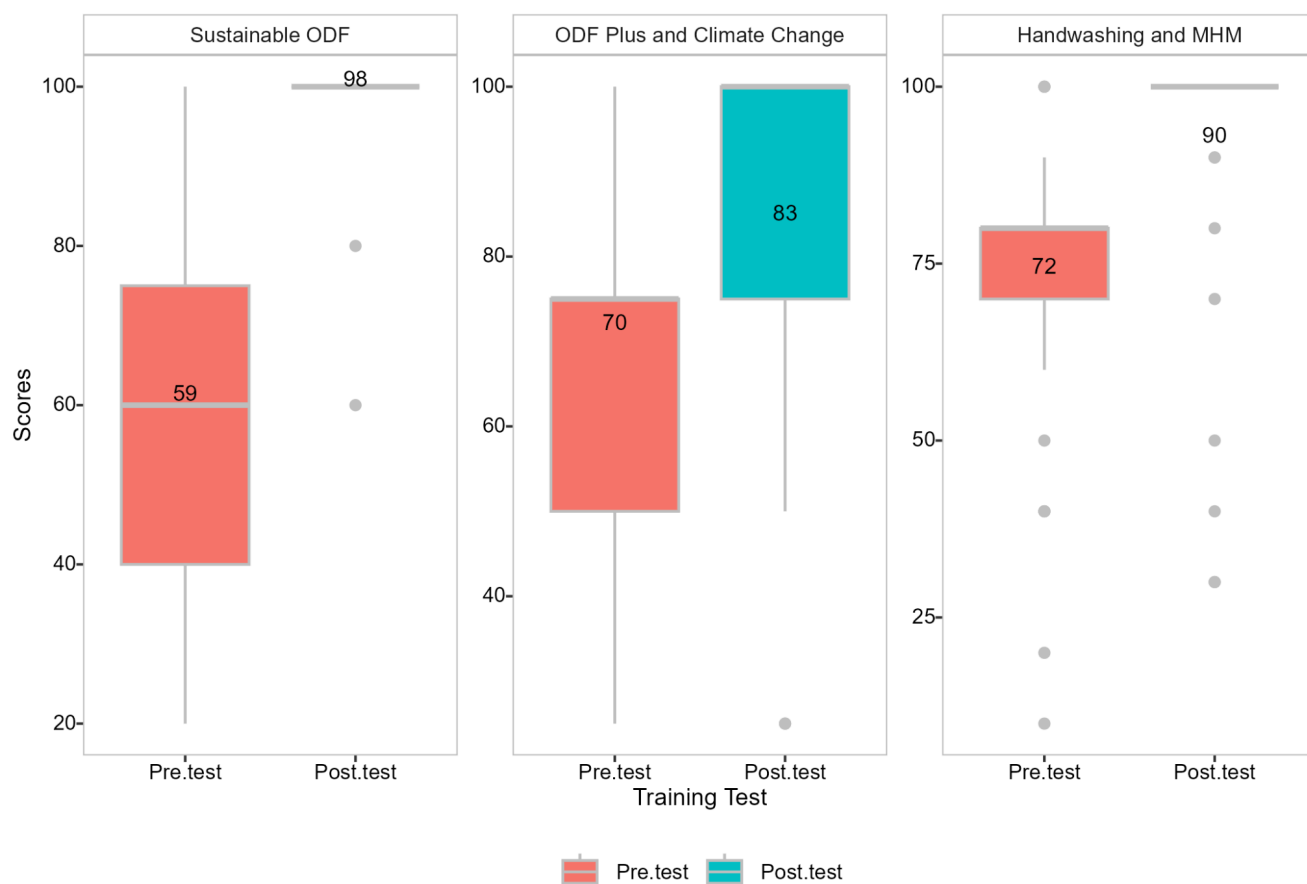
Local authorities received pre-and post-tests evaluating their knowledge retention of the training sessions. All training topics show a significant improvement in knowledge among participants, as evidenced by p-values being well below 0.05, indicating the effectiveness of the training sessions for all three topics:

- Sustainable ODF (40 participants): The mean post-test score (98) is significantly higher than the mean pretest score (59). The low p-value (<0.001) confirms the improvement is statistically significant.
- ODF Plus and Climate Change (32 participants): The mean post-test score (83) is higher than the mean pretest score (70), with the p-value (<0.001) confirming this improvement is also statistically

significant.

- Handwashing, Child Feces, and MHM (35 participants): The mean post-test score (90) is significantly higher than the mean pretest score (72). The low p-value (< 0.05) confirms the improvement is significant.

FIGURE 21: TRAINING PARTICIPANT SCORES ON PRE AND POST TRAINING KNOWLEDGE TESTS



(Source: Pre-post test training results)

GENDER EQUITY, DISABILITY AND SOCIAL INCLUSION AND LEAVING NO ONE BEHIND: THE REMAINING POPULATION WITHOUT TOILETS

Key Learnings and Findings:

- Mainstreaming GEDSI focused training has supported shifting harmful stigma and stereotypes about women and girls, marginalised groups and PWDs amongst iDE powered latrine businesses and local authorities to reduce discrimination and encourage discussions around MH, infant feces management and FSM.
- Deploying a deposit restitution policy that aims to minimize financial burdens and the risk of conflict, especially for lower-income, systemically marginalized households ensures alignment with do no harm principles.
- Including male sanitation entrepreneurs in GEDSI transformative workshops allows for spouses to mutually learn and benefit from topics such as women's leadership, decision making and agency within the context of business operations and management.

While sanitation coverage has dramatically increased in rural Cambodia, there is a risk that the most climate vulnerable will be left behind. CR-WASH-SUP has a core focus of reaching the most likely to be left behind, including those living in SCE, PWDs, low-income households, women and girls.

CR-WASH-SUP approaches GEDSI within its program in a variety of ways:

1. We look at latrine sales to better understand our customer profile and to determine if any societal groups are systemically marginalized or overlooked in our sales. This primarily means looking at the proportion of sales to IDPoor households, the breakdown of customers' gender, and the proportion of customers who have a household member with a disability. This is discussed in the Leaving No One Behind section and the Human Centred Design sections above.
2. We offer targeted subsidies for the most socioeconomically and climate-vulnerable households to increase affordability for these populations and narrow the coverage gap with the less-vulnerable segment of the population.
3. We have integrated menstrual health components (MH) in our Interlock Shelters. By adding in a trash bin and wall hook at no extra cost to the household from March 2024, households with women and girls are able to dispose of their menstrual products with dignity, safety, and privacy.
4. We conduct regular gender-focused capacity training to our partners in the private sector, public sector, and our own staff. These trainings have supported female entrepreneurs and powered female local authorities to advocate for WASH in their communities, and supported iDE to mainstream gender equality into program activities.
5. We look at the intra-household use behaviors after a household has purchased and installed its latrine to see how often women, girls and PWDs are using their toilets and if they are as likely as men and boys to use their latrines.
6. We test and scale effective models for advancing do no harm principles. In this area, we have focused on deploying a deposit restitution policy that aims to minimize financial burdens and the risk of conflict, especially for lower-income, systemically marginalized households.

DO NO HARM

When households purchase any product from an iDE sales agent, they are obligated to pay a cash deposit to secure their order and deter order cancellations. In the past, when households canceled their orders, they forfeited their deposits. However, iDE suspects that the forfeiture of this deposit could put an undue burden on poorer households' financial situations, as well as increase the likelihood of domestic violence if a financial decision has been made without the whole family's consent. As such, CR-WASH-SUP has continued a policy from SMSU for returning deposits in the instance of order cancellation. IDPoor and other systemically marginalized households receive their deposit back in full if they cancel for any reason. Non-poor households can cancel their order for any reason within 72 hours. We believe this is a critical use of program resources as we strive to improve the program's pro-poor and 'Do No Harm' aspects. To date, 434 households have received their deposits back after canceling orders, 240 of which are registered as IDPoor. iDE's procedure for deposit restitution has the following rules:

1. IDPoor1, IDPoor 2, "At Risk," (all of which have government-issued identification cards), and single caretaker households, as well as those with a member of the family with a disability, are eligible to get their deposit back after iDE confirms the order has been cancelled.
2. Non-poor households who do not fit the criteria listed above are eligible to have their deposit returned when canceling within three days after ordering.
3. Households who encounter technical problems that prevent product installation.

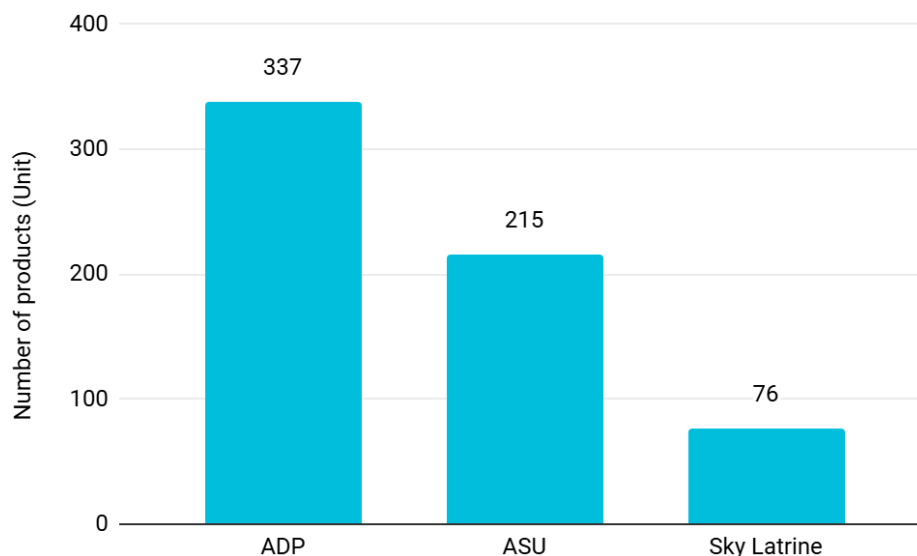
TARGETED SUBSIDIES FOR SOCIOECONOMICALLY AND CLIMATE VULNERABLE HOUSEHOLDS

iDE's climate-targeted partial subsidies mechanism plays a vital role in addressing sanitation disparities by increasing affordability for the most socioeconomically and climate-vulnerable populations while avoiding distortion of the local sanitation market. In 2021, with support from a [WfW Innovation & Impact grant](#), iDE conducted a randomized controlled trial to develop and test a targeted subsidy mechanism to deliver partial sanitation subsidies to climate and socioeconomically vulnerable households living along the Tonle Sap Lake.²³ Findings indicated that offering targeted sanitation subsidies increased the likelihood of successful sales conversions for climate-resilient latrine products among vulnerable households by 32%, indicating that subsidies can be effective at increasing market-based sanitation uptake among climate-vulnerable communities. Under iDE's previous targeted subsidies mechanism, eligibility for a subsidy was predicated on a household's IDPoor status alone. The novel eligibility assessment developed through this research added additional dimensions of household and community-level socioeconomic and climate vulnerability. iDE's targeted subsidies mechanism criteria now includes household-level measures related to climate (for example, living in flood prone, high groundwater areas and requiring SMS solutions). iDE provides a 40% discount price for households who purchase the Sky Latrine, ASU and ADP in Siem Reap.

Out of a total of 5,097 households who purchased WASH products, 628 (12%) are IDPoor households who received subsidies for their products including Sky Latrines, ASUs and ADPs (Figure 22).

FIGURE 22: IDPOOR HOUSEHOLDS WHO RECEIVED A CLIMATE-TARGETED SUBSIDY

²³ Kozole et al. 2023. Impact of Targeted Subsidies on Access to Safe Sanitation for Vulnerable Households in Cambodia.



(Source: [CR-WASH Data from Jan 2023 to Nov 2024](#))

PAYMENT INSTALLMENT PLANS

There are many households who are not registered as IDPoor, and are therefore ineligible for targeted subsidies, but still face significant financial barriers to purchasing latrines. One means for reducing the burden of payments for such households has been through payment installment plans. iDE has trained LBOs to offer simple payment installment plans (with no interest paid by cash-constrained customers), so that low-income households can still purchase WASH products. 375 households have now purchased latrines using this mechanism with a 95.7% full repayment rate. In addition, businesses have expressed that the skill set of dealing with households who have cash flow challenges has improved their ability to confidently work with customers for all products, helping them to operate a more profitable enterprise.

INTERLOCK SHELTER WITH MENSTRUAL HEALTH (MH) COMPONENTS

iDE is increasingly working to address MH within our programming, given its importance to health, gender equity, and women's public participation. In order to be female friendly, a toilet should have the following core functionalities:

- Private, with sturdy walls and doors, and a lock
- Have private washing (and potentially, drying) facilities to clean leaks, clothes or reusable products
- Have a lighting system
- Have a viable and desirable disposal mechanism for menstrual products

Through WfW funding, iDE co-developed and deployed the [Water, Sanitation and Hygiene - Gender Equality Measure \(WASH-GEM\)](#), a multi-dimensional quantitative tool to understand the gender equality context in our working areas during SMSU3.

The WASH-GEM found that most women had access to menstrual products and facilities; however, they reported barriers to participation and stress due to menstruation. In 2023, in order to understand more about these barriers, with the support of WfW and iDE's internal PPIF, iDE employed a HCD process,

focusing on empathy-led discovery, design priorities, ideation, prototyping and field testing to better understand the barriers and enablers to MH in rural Cambodia. This resulted in the development of key personas of menstruators to design a low-resolution prototype for MH storage and disposal that would be integrated to iDE's latrine shelters, and to develop effective messaging that iDE sales agents and LBOs can use to improve MH for women and girls.²⁴

Leveraging these findings, starting from March 2024, all Interlock Shelters sold by iDE include a sanitary bin with an easy to follow MH sticker and wall hook to ensure convenience, privacy and dignity for girls and women when menstruating in their households, at no extra cost.

Integrating Dignified Menstruation into Interlock Shelters

During November 2024, to assess the impact of the MH components, iDE conducted ten key informant interviews with households with women and girls of menstruating age, who had the new Interlock Shelters installed for over six months. The purpose of this assessment was to gain an in-depth understanding of the use and accessibility of the addition of MH components in Interlock Shelters, as well as customer satisfaction.

Five out of ten households reported using the sanitary bin for menstrual product waste, and recalled most of the key messages from the MH sticker, especially messages around proper disposal and handwashing. The majority of the households using the sanitary bin reported that they found it either "comfortable" or "very comfortable" to use. However, households that were not using the bin for sanitary waste either reported either not having their menstruation since installation (two households), or feeling shy to use the bin as they shared the space in their latrine shelter with male relatives.

One household specifically reported finding great value in the MH sticker, and reported learning about proper menstrual product disposal and that managing her menstruation was more convenient and comfortable. Mrs. Teb Mey, a mother and aunt specifically stated that she was inspired by the lessons from the MH sticker to pre-emptively teach her daughters, nieces and other young girls in her family about their menstruation, without fear or shyness.



Mrs. Teb Mey explains the importance of proper MHM and disposal to her niece, Rath Monika with the assistance of iDE's MH sticker.

²⁴ This approach was presented during World Water Week 2024, at the Tools for Trust – Pathways Towards Peace for Equitable Water session hosted by WfW as an onsite workshop.

RESEARCH AND EXPANDING SECTOR KNOWLEDGE

KNOWLEDGE AND LEARNING

Throughout CR-WASH-SUP, iDE has actively participated in national and global WASH and climate sector forums to ensure wide knowledge sharing and learning dissemination. iDE has presented 15 oral and poster presentations, based on program research, technical and operational learnings at numerous conferences such as the Water & WASH Futures Conference, University of Colorado Boulder WASH Symposium, World Water Week, University of North Carolina Water Institute's Water & Health Conference, Loughborough University Water Engineering and Development Centre's International Conference, World Water Forum and gLOCAL Evaluation Week.

On behalf of the Climate Resilient Sanitation Coalition, iDE has published a blog entitled "[Bridging Borders: The Role of Climate-Resilient Sanitation in Global Peace and Sustainability](#)" on the Sustainable Sanitation Alliance Network platform. iDE has also published articles in [The Conversation](#) and [See Change Magazine](#). In 2023, iDE hosted a webinar on the "Discovery and Prototyping for Storage and Disposal of Menstrual Health and Hygiene Products in Cambodia," and co-authored a learning brief with WfW entitled "[Menstrual Health: A Critical Cornerstone of Community and Climate Resilience](#)," in 2024.

To commemorate World Toilet Day 2024, iDE produced a [short documentary on the Sky Latrine](#), and the transformational impact the climate-resilient sanitation product has had on the lives of rural Cambodians in Siem Reap province.

iDE has also authored or co-authored four academic articles which have been used to inform best practices amongst WASH sector partners and actors (Table 11).

TABLE 11: ACADEMIC ARTICLES PUBLISHED DURING CR-WASH-SUP

Title	Description
Impact of targeted subsidies on access to resilient sanitation for climate-vulnerable households in rural Cambodia	The study evaluates the impact of targeted sanitation subsidies on latrine purchases among climate-vulnerable households in Cambodia's Tonle Sap Lake region. Findings indicate that offering a subsidy increased the likelihood of latrine purchase by 31% for eligible households, with a significant closing rate of 38% in treatment areas compared to 6% in control areas. The research demonstrates that the subsidy mechanism effectively enhances access to sanitation without causing substantial market distortions, highlighting its potential for scalability in similar contexts.
Microbial hazards in real-world alternating dual-pit latrines treated with storage and lime in rural Cambodia	The study investigates the effectiveness of the iDE's ADP product in reducing microbial hazards in rural Cambodia. After two years of storage treatment with lime, fecal indicator bacteria (E. coli and fecal coliforms) were found at unsafe levels in 31% and 42% of sampled pits, respectively, indicating a significant health risk for households emptying these pits. The findings highlight operational challenges and suggest that many ADPs are not being used as intended, raising concerns about the adequacy of the two-year treatment period for ensuring safety.

Effects of climate vulnerability on household sanitation access, functionality, and practices in rural Cambodia	The article examines the influence of climate vulnerability on household sanitation access, functionality, and practices in rural Cambodia, focusing on how climate-related events like floods and droughts affect sanitation infrastructure. It highlights a significant correlation between increased climate risks and the dysfunction or abandonment of sanitation facilities, emphasizing the need for resilient sanitation solutions in vulnerable communities.
Investigating impacts of gender-transformative interventions in water, sanitation, and hygiene: Structural validity, internal reliability and measurement invariance of the water, sanitation, and hygiene–Gender equality measure (WASH-GEM)	The article investigates the development and validation of the Water, Sanitation, and Hygiene–Gender Equality Measure (WASH-GEM), a tool designed to assess gender equality changes within WASH programs across five domains: resources, agency, critical consciousness, structures, and wellbeing. The study demonstrates the measure's strong structural validity and internal reliability through data collected from concurrent validation studies in Cambodia and Nepal, providing a valuable resource for evaluating gender-transformative impacts of WASH interventions.

ASSESSING THE DIRECT HEALTH IMPACT OF iDE'S INTERVENTION

Investigating the relationship between improved sanitation coverage and health outcomes, specifically childhood nutrition is vital to understand how disease transmission as a result of poor sanitation can be reduced, and how better sanitation translates to improved nutritional absorption and reduced childhood stunting.

During SMSU, iDE conducted a latrine count census every two years across the six previously operational provinces, which provides a comprehensive database to investigate if and how iDE's programming led to increases in latrine coverage, improvements in health and what the relationship between latrine coverage and health is.

The primary sampling unit used was the village. Villages were chosen using a two-stage stratified sampling strategy focused only on rural areas. Within each village, a census of all households was completed and village-aggregate results were reported. Other sources of data that were used was the Cambodia Socio-Economic Survey, conducted by the Cambodian National Institute of Statistics. In the second stage of analysis, each village was divided into enumeration areas and a single enumeration area was randomly chosen from each village. Finally, a fixed number of households were randomly selected from the chosen enumeration area. Each primary sampling unit contained province, district, commune, and village identifiers. The final data source used was the demographic health survey from 2010, 2014 and 2021. The enumeration areas were selected using a two-stage stratified sampling approach. In the first stage, Cambodia was stratified by rural-urban areas across 14 individual provinces and 5 pairs of provinces. Enumeration areas were randomly chosen within each stratum, and a fixed number of households were randomly chosen from within each enumeration area.

A difference-in-difference analysis was utilized to assess iDE's impact and compare the changes in outcomes over time between a population enrolled in a program (the treatment group) and a population that is not (the comparison group). Mixed-effect general regression models were used to assess the impact of latrine coverage and other vectors of diarrheal disease on health outcomes.

The difference-in-difference analysis revealed a positive correlation between iDE interventions and increased latrine coverage in the Cambodia Socio-Economic Survey data; however, it found no statistically significant correlation between these interventions and health outcomes in children under five. In contrast, analysis of the demographic health survey data demonstrated significant correlations between latrine coverage and improved nutritional health outcomes for children in the same age group. The analysis of demographic health survey data revealed that latrine coverage emerged as statistically significant, indicating that as latrine coverage increased, the rates of various health issues decreased. Specifically, higher latrine coverage was associated with reductions in stunting rates measured both across districts and by the continuous variable of average standard deviation of height for age. Similarly, latrine coverage correlated with decreased rates of wasting, as measured by the continuous variable of average standard deviation of weight for height, as well as reductions in malnutrition rates across districts and by the continuous variable of average standard deviation of weight for age. This analysis indicates that iDE's intervention did have an impact over time on pushing up latrine coverage in areas where we worked. However, mirroring other research on the topic, these findings suggest that while sanitation gains are positively correlated with improved health outcomes, sanitation interventions alone are likely insufficient to bring upon these health outcomes.

LOOKING FORWARD

iDE conceives of all of its work as iterative. Building on the learnings of the CR-WASH-SUP program, much of which has been articulated in this report, we expect to continue to use evidence to guide the Cambodia WASH program's evolution. Into the future, iDE Cambodia WASH intends to pursue two core priorities: 1) facilitate access to sanitation for the remaining areas without access to basic latrines, focusing on the most climate vulnerable populations and 2) scale up affordable SMS products and services to rural Cambodian households. Through incorporating a cross-cutting lens of climate resilience and GEDSI into each aspect of our work, we aim to facilitate the maturation of an inclusive, sustainable market for sanitation in rural Cambodia. Working in partnership with local entrepreneurs, the national and subnational public sector, and the broader national and international WASH and academic sectors, we intend to collectively learn to solve today's sanitation challenges, then tomorrow's. As always, we intend to keep our customers at the center of the conversation, amplifying their voices and using their stories to direct our priorities for a climate resilient, water secure Cambodia.

We deeply appreciate the support of our partners and funders, who make all of this possible.

We thank and are deeply humbled by the dedication, grit, creativity, and passion that each member of the iDE team brings to work every day, pouring rain or scorching sunshine.

ANNEX: METHODS

While some data collection methods are continuous throughout program operations, other data collection efforts, such as the pre-test and post-tests for local authorities, are static collection efforts. Date ranges for those data are noted in the report. Customer survey data collection ended in November 2024. WASH sales and deliveries data is inclusive of all sales from January 2023 to November 2024.

The key indicators of success for this program are grouped around the following outcomes: (1) Sustainable Climate Resilient WASH Market Systems, (2) Universal, Resilient and Equitable Access to WASH Products and Service, (3) GEDSI and (4) Evidence, Innovation and Practice. Key indicators for those outcomes include:

- Sales through program-connected enterprises
- Sales to IDPoor households through program-connected enterprises
- Changes in latrine coverage
- Intrahousehold use by household member type, including people with disabilities and women and girls
- Household adoption and use of SMS
- Progress to ODF status in program areas

In order to measure these results, we have used the following methods:

Continuous data collection:

- Sales data from program-connected enterprises (measures direct sales)
- Ongoing verification of latrine business sales (including a household questionnaire to identify the percentage of IDPoor customers, consistent use by household member types, and installation rate)
- Ongoing survey for all sales pitches that do not result in an order to help determine barriers to purchase
- ODF village-level census to identify remaining households that lack basic sanitation
- A quarterly business profile update, collecting key business data from each active latrine business

Static data collection:

- A customer survey (customers who have purchased within the last 12 to 18 months) to better understand our customers and the challenges they face
- A flooding survey for Sky Latrine households to better understand their challenges with year-round functionality
- Pre and post tests for local authorities who received training of trainers sessions

SALES TRACKING

iDE's team of research assistants collects sales data from each program-connected latrine business every month. Latrine businesses maintain a record book designed by iDE to track customer data (name, phone number, and village/commune/district/province) and details of the sale (units purchased, components, sales agent responsible, etc.). Research assistants record summary data on deliveries based on the record book and also take a digital photo which they send to headquarters for verification purposes. Verification of monthly delivery records ensures that deliveries are accurately and properly recorded in the LBOs' books.

CUSTOMER SURVEY

Follow-up surveys are given to customers to learn about their poverty status, expenses for WASH products, use, and satisfaction. Customer surveys also serve as a tool for verifying delivery data. The most recent customer survey was completed in 2024 and was the first survey that included customers with Sky Latrine products. Sampling procedures for the customer survey are as follows:

1. The sampling frame is restricted to customers whose latrine was delivered 12 to 18 months prior. LBOs with the highest delivery counts are selected proportional to the research assistants covering that province.
2. Twenty customers are randomly selected per LBO, with additional customers selected for replacement as needed during field work.
3. Research assistants are provided with a list of selected customers and their contact information via the mobile app, TaroWorks. Interviews are alternated between male head of household and female head of household (or spouse).
4. Completed surveys are synced to Salesforce database. The Monitoring and Evaluation Coordinator regularly checks data to ensure results are complete and accurate.

LATRINE COVERAGE PROJECTION

In CR-WASH-SUP, we did not conduct the Latrine Count which was previously conducted during SMSU every two years. To project Siem Reap's latrine coverage as a result of iDE's program, we utilized existing data to estimate the latrine coverage in the target province (Siem Reap) for 2024. The existing data used was historical data on latrine coverage rate from Latrine Count, population (households) and latrine deliveries (Easy Latrine and Sky Latrine) in Siem Reap from February 2012 to November 2024 as shown in the table below.

Year	Coverage Rate	Population (HH)	Latrine Deliveries
2012	17%	142,152	2,609
2014	35%	148,837	16,728
2016	48%	156,189	18,318
2018	59%	159,920	15,034
2020	71%	174,578	14,930
2022	80%	208,845	10,941
2024	X	231,714	3,965

With these existing data points, we used a multiple linear regression model to predict the latrine coverage rate in 2024 for Siem Reap. The model has 'Coverage Rate' as a dependent variable and 'Population', 'Year' and 'Latrine Deliveries' are independent variables. Therefore, the formula used was :

```
model <- lm(Latrine_Coverage ~ Year + Population + Deliveries, data = data).
```

The model showed that the latrine coverage rate is around 88% in 2024 with the confidence intervals of 87% and 89%.

FLOODING SURVEY QUESTIONNAIRE

Data collected by research learning assistants and verified by the MERL coordinator in the flooding survey includes:

- Customer Information (Including ID, Name, Contact Number)
- Installation Date
- Latrine Structure
- Number of Family Members Using the Latrine
- Clay Soil (Yes/No)
- The Highest Level of Flooding (In Meters)
- The Month of Highest Level Of Flooding in the Area
- Toilet Pan Submerged during the Highest Flood (Yes/No)
- Latrine Completely Stopped Flushing This Year (Yes/No/No But Use A Lot Of Water To Flush)
- Why the Latrine Stopped Working (Technical Issue, It Was Submerged, Technical Issue And Submerged, Don't Know)
- Was the Issue Fixed (Yes/No)
- Pierced Pit (Yes/No)
- Opened the Pit Lid in the Rainy Season (Yes/No)
- Emptied Pit (Yes/No)
- Modifications (Yes/No)