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FINAL EVALUATION REPORT ON INTEGRATING SANITATION PROGRAMMING IN THE PANTAWID PAMILYA PROGRAM (PHILIPPINES)

IMPACT EVALUATION REPORT

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Executive Summary

1. Lack of sanitation is a global problem, with 2.5 billion[1] people without access to improved sanitation facilities worldwide. In low- and middle-income countries, an estimated 432,000 diarrheal deaths and 25.8 million DALYs were caused by inadequate sanitation in 2016, equivalent to 32 percent of diarrheal deaths in these countries that would have been preventable through improving sanitation services (Prüss-Ustün et al. 2019). Furthermore, poor sanitation and the resulting diarrheal diseases are the second and third leading risk factors for stunting in developing countries worldwide, with a combined 13 million cases in 137 countries (Danaei et al. 2016).

2. In the Philippines, 25% of the total population[2] is without access to improved sanitation facilities. Improving access to safely managed sanitation services is a Sustainable Development Goal (6.2). Poor and marginalized households are often the most affected by the lack of sanitation facilities, and resort to open defecation which causes disease and limits human capital accumulation. To build evidence on the best approaches for targeting poor households and encouraging adoption of improved sanitation facilities, the World Bank's Water Global Practice (Water GP) in partnership with the Philippines Department of Social Welfare and Development (DSWD) conducted a sanitation program impact evaluation. The study was conducted in the context of the sanitation program convergence initiative between the Philippines Department of Health and the three core programs of the DSWD, mainly the Pantawid Pamilyang Pilipino Program (4Ps), which supports 4.4 million poor households with conditional cash grants.

3. This impact evaluation (IE) was designed to evaluate the integration of sanitation into the 4Ps Program, with an overall aim to test the effectiveness of a combination of hardware and financial subsidies to encourage adoption of improved sanitation facilities among the poorest households in rural areas of the Philippines. While the original research endeavored to measure health and nutrition outcomes, the final evaluation primarily focused on the upgrade and construction of latrines with the goal of achieving improved sanitation at the household level.

4. The study uses a randomized controlled trial design where participating barangays (villages) received behavior change communication for adoption of sanitation and were randomly assigned to receive either hardware or financial subsidies to help them overcome barriers to adoption of improved latrines. All study participants were 4Ps beneficiaries, who are required to attend Family Development Sessions (FDS) that included a module on sanitation promotion. In addition, all study barangays received a community-led total sanitation (CLTS) intervention. Study participants in two treatment arms were offered partial financial subsidies through a micro-finance institution (MFI) for construction of a new latrine or upgrade of an existing latrine: one study arm was offered a 25% subsidy and the other study arm was offered a 50% subsidy. A

[1] The World Health Organization reported that 2.5 billion people were without basic sanitation in 2012, with 1 billion practicing open defecation.
[2] Data from JMP's 2017 annual report and website.

separate set of barangays received encouragement at the municipality and barangay level to avail hardware subsidies for improved sanitation facilities through DSWD programs such as Kapit-Bisig Laban sa Kahirapan-Comprehensive and Integrated Delivery of Social Services (Kalahi CIDSS) and Sustainable Livelihood Program (SLP), and through local government resources.

5. The results of the study show that households who were offered a 50% financial subsidy for toilet construction were 5 percentage points more likely to have an improved toilet after the intervention, compared with households who received behavior change communication alone. A smaller financial subsidy of 25% was no more effective than behavior change communication alone for adoption of improved sanitation. Neither the 25% nor 50% subsidy intervention was more effective than the comparison intervention for reducing reported open defecation.

6. Both the 50% and 25% financial subsidy encouraged more households to upgrade or construct toilets (38% for big subsidy and 21% for small subsidy), but a large share of these improvements were made in households who already had improved toilets at baseline. In other words, some households who already had an 'improved' latrine, decided to use the subsidized loan to make further improvements to their toilet. While higher uptake may be attractive from the perspective of a private lender, it points to the need for better targeting of subsidies if these are publicly financed.

7. Due to spillovers of the hardware subsidy, it was not possible to evaluate the effectiveness of these for encouraging adoption of improved sanitation compared with the financial subsidy or behavior change communication alone. However, when we isolate households who received a hardware subsidy across the study population we see that hardware subsidies are both inefficiently targeted and that the quality of toilets constructed with the hardware subsidy is lower than that of the toilets built with the financial subsidy. Among households who received a hardware subsidy during the intervention period, 52% of them already had improved sanitation at baseline. Both findings have important implications for the scale-up of hardware subsidies through DSWD programs.

8. The study observed large increases in sanitation over time across all study arms. These increases could be due in part to the behavior change communication through 4Ps, the hardware subsidies that were provided in all study arms, overall time trends, or a combination of these. The study design does not enable us to draw conclusions on the effectiveness of the behavior change communication for increasing adoption of improved toilets, however the use of the 4Ps platform to deliver behavior change communication improves the likelihood that these messages reached the right target audience.

9. The findings of this study lead to several recommendations for the integration of sanitation in the 4Ps program. Furthermore, while the study did not evaluate DSWD's Convergence for WASH Initiative more broadly, the recommendations help to inform this approach going forward. Overall, the study demonstrates that the right mix of subsidies, targeted to the population most in need, could help achieve government targets of zero open defecation as well as more ambitious targets of safely managed sanitation under SDG 6.2. Utilization of the existing 4Ps platform

enabled efforts to mainstream sanitation promotion across DSWD programs. However, there is a need to improve the targeting efficiency of both partial financial subsidies and hardware subsidies to households that lack access to improved sanitation, if these are financed through public resources. This could be done through better identification and classification of toilets in the National Household Targeting System (NHTS), which would provide the necessary data to inform targeting approaches for sanitation subsidies.

10. The offer of a complete, high-quality toilet package that included installation through financial subsidy by a socially-oriented MFI led to higher sanitation service levels, higher toilet quality and greater satisfaction. Where hardware subsidies are utilized, DSWD should consider offering a complete toilet package to households rather than materials or components to improve quality and satisfaction. Scaling up sanitation subsidies nationwide to 4Ps beneficiaries would require substantial resources. A harmonized approach of efficiently targeted partial financial subsidies to higher income 4Ps beneficiaries combined with *full* financial subsidies for lower income beneficiaries could ensure that households receive a toilet of higher quality, that they are satisfied with, and one that provides safely managed sanitation.

11. Importantly, there is a need to understand the medium- and long-term effects of utilizing subsidized loans, offered through socially-oriented MFIs, to improve sanitation outcomes in 4Ps households. Households that take out a loan may reduce spending in other areas to pay back the principal, which could lead to negative consequences if spending in the areas of food, education and health is reduced. On the other hand, improvements in sanitation and hygiene are associated with a range of health and wellbeing benefits including reductions in diarrheal disease, soil-transmitted helminth infections, and environmental enteric dysfunction (Hutton & Chase, 2016).Therefore, it is necessary to understand the net benefit to households taking these potential health benefits into account. While the study was not designed to assess health effects of improvements in sanitation, systematic reviews show sanitation reduces diarrhea in children by 25% on average with effects even larger when higher levels of community coverage are reached (Wolf et al. 2018).

Contents

Table of Tables

Table of figures

1. Introduction

1. Household latrines can provide substantial health and other welfare benefits to users (Dangour, 2013) (Curtis V, 2003) (Cairncross, Bartram, Cumming, & Brocklehurst, 2010) as well as positive development outcomes to others in the community (Hammer & Spears, 2013) (Andrés et al., 2017) (Günther & Fink, 2010) For example, synthetic review and meta-analysis of health impact assessments of sanitation interventions show that sanitation reduces diarrhea in children by 25% on average with effects even larger when higher levels of community coverage are reached (Wolf et al. 2018). Furthermore, sanitation interventions which reduce community levels of open defecation have been shown to have significant effects on increasing child height-for-age and reducing under-5 stunting (Pickering et al. 2015). There is further evidence that better sanitary conditions in early childhood helps to prevent anemia (Stewart et al. 2019), which is caused in part by poor absorption of essential nutrients and is directly related to human capital formation.

2. In the Philippines an estimated 14,828 WASH-attributable deaths and 858,742 DALYs occurred from diarrheal disease in 2016, equivalent to 3 percent of total DALYs in the country (Prüss-Ustün et al. 2019). Meanwhile, an estimated 33 percent of children under 5 are stunted in the Philippines – a marker that is associated with cognitive development, human capital, productivity, earnings and intergenerational transmission of poverty (Victora et al. 2008). Despite evidence of positive effects on human capital development, ownership of sanitary household latrines remains uncommon among the poor in developing countries.

3. Since the 1990s, community-led total sanitation (CLTS) and similar approaches have been used to encourage adoption of sanitation among the poor (Mukherjee, 2008). However, despite some success with CLTS, it has not proven to be a comprehensive strategy in all contexts (Ahmed, Alam, Rahman, Hoque, & Sarkar, 2008) (Mukherjee, 2008) (Trémolet, 2011). For example, while sanitation promotion through CLTS was introduced to the Philippines in 2008 by the World Bank's Water and Sanitation Program, success rates were initially low with just 17% of communities receiving CLTS achieving open defecation free status. By 2012 only 36 communities had been certified open defecation free (UNICEF, 2017).

4. One limitation of CLTS is that it focuses on demand, but not supply. While it is important to create awareness and a desire for toilets it is equally crucial that mechanisms are in place to meet demand (World Bank, 2016). Thus, rural sanitation programs globally and in the Philippines have increasingly adopted social marketing as a tool to reach the poor and underserved. These approaches combine sanitation promotion, such as through CLTS, with private sector marketing tools and sanitation product development to increase availability, affordability and desirability of latrines. However, the effectiveness of these programs in achieving take-up of household latrines has been uneven, particularly among the poor.

5. A randomized intervention in Indonesia found households that were exposed to CLTS built latrines at a higher rate than those in comparison households, however there was no significant increase in access to improved sanitation, suggesting that either households that already had access to improved sanitation made further improvements, or the latrines constructed did not meet the

quality standards to be considered improved. Moreover, the effects on latrine construction were driven by households in the upper wealth quintiles (Cameron, 2010). Conversely, a similar program in Tanzania that combined CLTS with marketing of a low-cost sanitary slab for installation over dry pit latrines achieved substantial increases in latrine construction, which did translate into a 15.7% increase in access to improved sanitation; although these increases did not lead to health impacts (Briceno, Coville, & Martinez, 2015).

6. Low-income and poor households continue to face constraints to upgrading their toilet facilities and changing their sanitation and hygiene behavior.[3] It is becoming increasingly evident that the poorest and most marginalized people will not necessarily be able to access sustained improved sanitation and climb the sanitation ladder without some form of external support, such as financial or hardware subsidies (Hanchett, Krieger, Kahn, Kullmann, & Ahmed, 2011) (Kunthy & Catalla, 2009) (WSP, 2011). Moreover, the exclusive use of CLTS and a non-subsidy approach may not be replicable in the rural Philippines, due to crowded environments in some barangays, land tenure problems, and requirement for more costly solutions than in urban areas and other developing countries.

7. Indeed, high cost of sanitation infrastructure is consistently cited by poor respondents as the main barrier to improved latrines, yet household surveys show ownership of other durable goods of a similar price range. As poor households face liquidity constraints that make it difficult to purchase durable goods requiring large lump sums of cash (Banerjee, 2003); (O'Donoghue, 1999), easing these constraints, by smoothing consumption over time, may make them more willing to adopt beneficial durable goods such as household latrines (Dupas, 2011).

8. Consumer credit has been applied successfully to increase take-up of household piped water connections (Devoto, Duflo, Dupas, Parienté, & Pons, 2011), clean cookstoves (Levine, 2012) and insecticide-treated bed nets (Alessandro Tarozzi, 2014), but there is limited experimental evidence of consumer lending for sanitation, particularly among poorer households. One study in Cambodia showed that financing significantly increased latrine uptake when a loan was offered compared with upfront cash payment (Yishay et al. 2017). In Vietnam, revolving funds administered by the Vietnam Bank for Social Policy have been used to finance septic tanks and sewerage connections for low-income households (Trémolet, 2011), while direct latrine micro-loans have been provided through micro-finance institutions (MFIs) in India and Tanzania (Sophie Trémolet, 2015). Recent experience demonstrates that socially-oriented MFIs can help to increase access to sanitation among the poor by offering small loan sizes and ensuring that application processes are poor inclusive (WSP, 2014)

9. Micro-finance institutions are uniquely positioned to efficiently meet the demand for household water and sanitation finance. While water and sanitation loans are unlikely to be major profit drivers for most financial institutions, they help MFIs fulfill a commitment to address their clients'

[3] The poorest and most vulnerable households often revert to open defecation, perhaps because their limited resources and capacity tend to result in less well-built, less durable, and less well-located toilets. They are also sometimes less convinced about the Zero Open Defecation movement and can be pressured into toilet construction that lacks conviction and investment made by others. (Robinson & Gnilo, Promoting choice: Smart finance for rural sanitation development, 2016)

pressing needs for improved health and wellbeing thus meeting social objectives of the organization (World Bank, 2015). Importantly, water and sanitation loans have not posed any more risk than other microloans. Socially oriented lending may also provide strategic business value to MFIs by attracting and retaining customers and cross-selling them on other products (World Bank, 2015).

10. The current consensus in the sanitation sector is that encouraging households to adopt sanitation through promotion and education alone will not have a sizeable impact on the uptake and use of sanitation products and services among financially constrained households. Rather, simultaneously addressing the financial constraints of these households is necessary to allow them to act (i.e. make a purchase) in response to demand created through promotion (Trémolet, 2011); (Baskovitch, 2011). While financing and savings products can enable households that cannot afford a lump sum payment to smooth this cost over time, some households will never have enough cash to afford a latrine. For these households, subsidies may be the only means of acquiring adequate sanitation facilities.

11. In the Philippines, there are ongoing efforts to partner with MFIs to help people pay for water and sanitation services. Water.org, for instance, provides grants to 22 MFIs for capacity building and technical assistance while offering loans for water connection and toilet construction through its Water Credit program. By 2019, this program estimates to have reached 2.8 million people, with 117 million USD provided in loans and 650,000 loans disbursed (water.org, 2019). MFIs such as ASA Philippines, Negros Women Foundation for Tomorrow, TSKI, KMBI, etc. are testing approaches to water and sanitation lending and learning about the types of loan products that can be scaled up effectively. However, to date there is no evidence on the effectiveness of these programs for increasing access to household sanitation among the poorest.

12. Thus, a key knowledge gap is how best to address the constraints poor households face in acquiring sanitation products and services. This impact evaluation (IE) aims to answer this question using a randomized controlled trial design to evaluate the effectiveness of a combination of hardware and financial subsidies for encouraging adoption of improved sanitation facilities among the poorest households in rural areas of the Philippines. Study participants are beneficiaries of a large conditional cash transfer program, the Pantawid Pamilyang Pilipino Program (4P). The use of the 4Ps platform allows us to identify and target households who are most likely to need financial and hardware support for construction of sanitation facilities.

13. The remainder of this report proceeds as follows. Section 2 provides a background on sanitation and related programming in the Philippines and describes the Convergence for Sanitation Initiative, along with the hardware and financial subsidy interventions that were evaluated. Section 3 introduces the evaluation design with various treatment assignments. Section 4 presents descriptive statistics on key attributes of the study population and intermediate study outcomes. These findings should not be interpreted as causal statements. Section 5 presents the causal estimates of the impact of the financial subsidies on adoption of sanitation, toilet quality and household satisfaction. Sections 6 and 7 discuss the findings and limitations of the study and conclude. Sections 8 and 9 discuss the findings of the study and conclusions. The final section presents policy recommendations and lessons learned.

2. Background and Description of the Program

2.1. Sanitation in the Philippines

14. In the Philippines, 25% of the total population[4] is without access to improved sanitation[5] facilities. A study[6] conducted under the Economics of Sanitation Initiative of the World Bank's Water GP in 2005 estimated that the country lost 1.5 percent of its GDP due to the costs of poor sanitation (Hutton et al., 2008). While data from the UNICEF-WHO Joint Monitoring Programme indicated that the country made good progress in improving sanitation coverage to 74%, the country fell short of the Millennium Development Goal target for sanitation of 78% in 2015. Compared to its East Asian neighbors, rural sanitation coverage of the country is above the regional average. This has been attributed to the country's strong economic growth over the last two decades, and higher household incomes. However, these improvements in sanitation have not been entirely inclusive. Households in rural areas continue to have lower access to improved sanitation compared to those living in urban areas. In rural areas alone, access to improved sanitation remains at 72%, with 2 million people still defecating in the open and 4.5 million using unimproved latrines[7] (Figure 1). In addition, improper hygiene behaviors and low levels of basic on-site access altogether lead to contamination of water resources, a high incidence of fecal and water-borne diseases and negative impacts on the environment.

[4] Data from JMP's 2017 annual report and website.

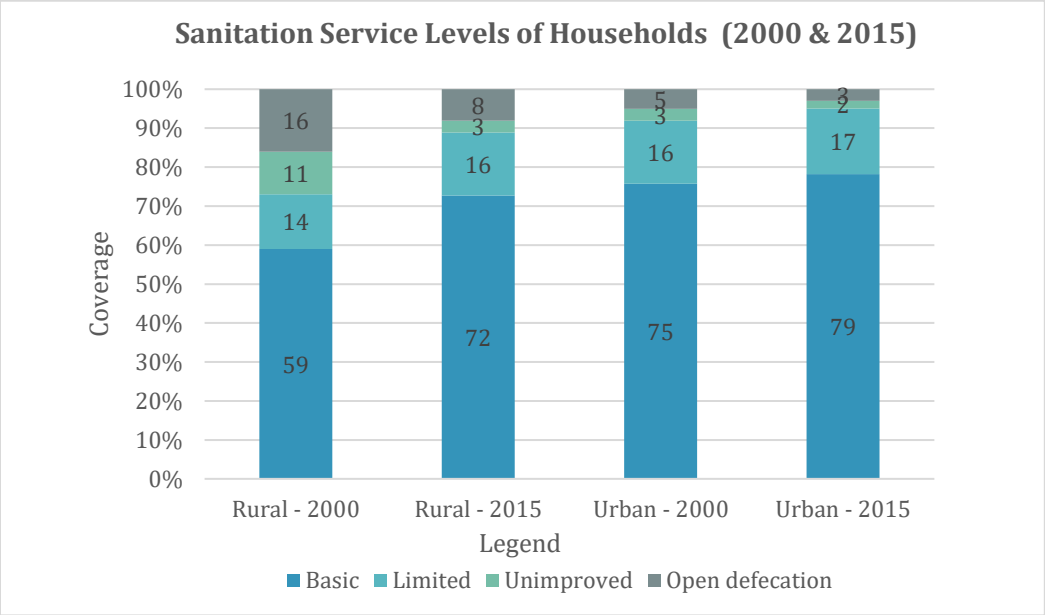
[5] Improved sanitation is a term used by the Joint Monitoring Program for Supply and Sanitation of UNICEF and WHO. The aim is to determine if the household has access to a hygienic sanitation facility. If the household has access to the following sanitation services, it can be classified as having *improved sanitation*:

- Flush toilet
- Connection to a piped sewer system
- Connection to a septic system
- Flush / pour-flush to a pit latrine
- Pit latrine with slab
- Ventilated improved pit latrine
- Composting toilet

[6] Economic Impacts of Sanitation in the Philippines, WSP-EAP, World Bank, 2008

[7] Data from JMP's 2017 annual report and website.

FIGURE 1: SANITATION COVERAGE IN THE PHILIPPINES



15. While differences have narrowed over time, there continues to be a disparity in regional access to improved sanitation. Households in the Autonomous Region of Muslim Mindanao (ARMM), the three Visayas Regions (Region 6, Region 7, Region 8) and Bicol Region (Region 5) have significantly lower access to sanitation compared to those living in other parts of the country.[8] Moreover, there is evidence that those who do not have any access (practicing open defecation) are largely concentrated among the poorest households in rural areas (World Bank, 2015).

16. The government of the Philippines has recognized the issue and taken great strides towards improving sanitation for the population, including accelerating investments in the sanitation sector. However, these investments have mainly focused on major civil infrastructure rather than on improvements for individual households (World Bank, 2018). The result of this has been a heavy reliance on households themselves to invest in sanitation, which could be a substantial barrier for poor households for whom affordability is a major constraint. There is also a lack of easily accessible 'off-the-shelf' sanitation solutions that can be purchased at low-cost. In addition, households perceive toilets to be very costly with these perceptions difficult to change even when affordable, low cost alternatives are made available. As a result, access remains lowest for rural and poor populations in the Philippines. At the same time, these households incur disproportionally greater economic and human capital losses associated with living in unsanitary and unhygienic environments.

[8] These regions have the highest percentage of households defecating in the open and using unimproved facilities: The Autonomous Region of Muslim Mindanao (ARMN) at 37%; Region 6, Region 7 and Region 8 at 11%, 18% and 19% respectively; Region 5 at 14%. "Republic of the Philippines Support to Rural Sanitation Scale Up under the Philippine National Sustainable Sanitation Plan" (World Bank, 2015)

17. Getting to universal access to sanitation in the Philippines is a complex and challenging endeavor. The evolution of government's sector institutions [9] have created overlapping roles and responsibilities for service provision, policy development, regulation, planning, funding, and implementation at various levels of governance. There has been confusion between oversight and coordination roles across central agencies over urban and rural programs and projects, which further complicates implementation by local government units. The capacity of local governments to plan and manage sanitation interventions is generally low, while political support and resource mobilization have not enabled implementation and sustainability of WASH programs (World Bank, 2015). Moreover, underserved and marginalized groups can be difficult to reach; they can easily fall through the cracks between the competing priorities of multiple institutions responsible for sanitation. Government's targeted support for the poor, financing for sanitation communication campaigns, and operational expenses, therefore, require timely coordination, testing and scale-up to achieve the ambitious goal of universal access to sanitation in the country under the new Sustainable Development Goals (SDGs) target 6.2.

18. The Department of Social Welfare and Development (DSWD), with the support of the World Bank's Water GP, has worked to put an end to the practice of open defecation through awareness raising and generating buy-in as well as planning and resource mobilization to achieve Zero Open Defecation Status in key municipalities where the access and use of improved sanitation toilets remains limited. The WASH Convergence Initiative of DSWD focuses on integration of sanitation into three core programs[10]:

    - The **Pantawid Pamilyang Pilipino Program** (4Ps), a conditional cash transfer program, integrates sanitation promotion in Family Development Sessions (FDS), which 4Ps' beneficiaries are required to attend as part of the program. A sanitation module delivers behavior change communication and orientation on the importance of hygiene and sanitation issues within the community.
    - **Sustainable Livelihood Program** (SLP), a community-based capacity building program, seeks to improve the program participants' socio-economic status. SLP provides its participants with community consultations on WASH, skills training for labor force needed in the construction of sanitary facilities, and Cash for Building Livelihood Assets (CBLA) such as improved toilets.
    - **Kapit-Bisig Laban sa Kahirapan-Comprehensive and Integrated Delivery of Social Services** (Kalahi CIDSS), following the community driven development approach, provides technical assistance to community groups in the preparation of proposals for the construction of facilities, offers project financing and supports implementation through Bottom-up Budgeting (BUB) process.

[9] Department of Health (DOH), Department of the Interior and Local Government (DILG), Department of Public Works and Highways (DPWH) and Local Water Utilities Administration (LWUA)

[10] "Guidance Note on the Integration of Water, Sanitation and Hygiene (WASH) in the three core programs of the DSWD", DSWD (n.d)

2.2. Description of DSWD Convergence Initiative and Evaluation Components

2.2.1 Sanitation promotion and behavior change communication

19. Sanitation promotion activities or Behavior Change Communication (BCC) consisted of Community-led Total Sanitation (CLTS) at the barangay level, Interpersonal Communications (IPC) and an enhanced sanitation module in Family Development Sessions (FDS). The aim of these activities was to provide information on the benefits of sanitation and generate demand for improved latrines in 4Ps households. Water GP facilitated CLTS and BCC training for Municipal Links (DSWD frontline workers) and Local Government Links, who were facilitating the FDSs. The sanitation BCC concept is titled "*UNLI Asenso pag may Inidoro*"[11] (Unlimited progress one has a hygienic toilet).

FIGURE 2 : BCC MESSAGE

20. The rollout of CLTS was overseen by the Department of Health (DOH) via the Zero Open Defecation (ZOD) campaign, part of the National Sustainable Sanitation Plan rollout, in partnership with DSWD's 4Ps and the Integrated Provincial Health Office (IPHO). ZOD used the Phased Approach to Total Sanitation to certify barangays into four categories, ranging from Open Defecation to Total Sanitation. Trained Municipal Links officers conducted community outreach events in CLTS barangays, which included the following activities:

FIGURE 3 : CLTS ACTIVITY

- *Calculation of Feces Accumulation*: The community calculated how much feces left lying around had accumulated within the span of a year based on the number of people who practiced open defecation.
- *Defecation Mapping*: Participants identified the houses without latrines in a mock map of the barangay. The activity was meant to shame the residents of those houses as it clearly recognized them as people who practice open defecation.
- *Transect Walk*: The respondents were taken on a tour of areas where open defecation was practiced. They encountered feces lying around; the feces were identified, and responsibility and ownership of the feces was discussed.
- *Food/Feces Demonstration*: Food was placed beside feces to show how flies and insects would land on the feces and then transfer to the food, directly demonstrating how having feces lying around contaminates even the food they eat.

[11] The BCC component created calendars, posters, stickers and flipcharts, with support from WSP. They were used during the BCC activities and provided to participants. Examples of posters and flipcharts are included in the Annex.

21. The World Bank supported DSWD in modifying FDS Module 3: Preservation of the Environment to incorporate CLTS and sanitation BCC elements. The objective of the enhanced module was to communicate with FDS participants the benefits of sanitation and incorporate evidence-based behavior change messages. The enhanced participants' module sought to incorporate a stronger focus on themes related to clean water supply, proper waste disposal techniques, disease prevention and CLTS. The enhanced module also placed a focus on making sanitation and hygiene-related themes easier to understand for 4Ps participants. This included a clear learning objective for each section, practical guidance for facilitators, increased number of hands-on activities for participants and the integration of flipcharts as a tool for increasing visual prompts. Due to the expansion in the number of topics covered, the enhanced module was delivered over two sessions, held on consecutive months, for a total of four hours. Participation in FDS was a conditional requirement for beneficiaries to receive cash grants[12].

2.2.2 Latrine hardware subsidies

22. Several of DSWD's core programs already provided subsidies for construction of sanitation facilities, such as Kalahi-CIDSS (with BUB), SLP (with CBLA[13]), however prior to the WASH convergence initiative of DSWD programs there was no coordinated effort to mobilize these hardware subsidies, especially at municipal level. As part of the study, Water GP worked with municipalities to mobilize sanitation grants in selected barangays that would provide materials or financial support to beneficiaries.

23. Line agencies administered national level funding[14] such as BUB and barangays prepared proposals for sanitation subsides through the process of local poverty reduction action planning. These proposals are consolidated at the municipal level and endorsed to the relevant agency for funding. Following approval of funding, relevant agencies provided a lump sum to barangays and barangays then distributed the amount to households prior to latrine construction in the form of vouchers, cash, or hardware.

24. The study adopted an encouragement design for hardware subsidies since it was not possible to directly control which municipalities and barangays mobilized the subsidies to improve sanitation. Barangays that were randomly assigned to the hardware subsidy arm received assistance from Water GP in preparing necessary proposals to their respective municipal governments to procure funding for sanitation subsidies.

[12] Attendance to the monthly FDS is one of the conditions for a beneficiary to claim the health cash grant amounting to 500 pesos (USD $11) per month.

[13] Cash for Building Livelihood Assets

[14] The Bottom Up Budgeting or BUB has mandated the Department of Health, Department of Social Welfare and Development and the Department of the Interior and Local Government to allocate at least 10% of their respective agency budget to fund barangay-level WASH projects through local poverty reduction action planning.

FIGURE 4: EXAMPLE OF HARDWARE SUBSIDY

25. Implementation monitoring reports show that different municipalities and barangays exhibited different participation rates: some were more active in consolidating proposals, distributing funds and hardware to households. In addition, various programs/donors targeted various beneficiary households: municipal-coordinated subsidy specifically prioritized poor households without improved latrines. Moreover, the hardware subsidy also varied in scope, modality (such as cash or physical asset transfers) and following the targeting system that each municipality adopted.[15] Hardware subsidies ranged from concrete blocks, to cement to ceramic latrine bowls. (Figure 4) Monitoring reports indicate that many municipal grants and subsidies were only established as part of this study.

2.2.3 Partial financial subsidies

26. The WASH Convergence initiative of the DSWD, despite the influential role it has for promoting the adoption of sanitation through BCC and for providing subsidies for toilet construction, leaves considerable gap. For example, while Kalahi-CIDSS gave a subsidy comprised of individual toilet structures and SLP provided cash for toilet construction work, these required funds from local government with households still needing to purchase other construction materials for a complete toilet facility. To address this barrier Water GP partnered with ASA Philippines, a micro-finance institution, to develop a subsidized financial package for households to ease the financial constraints that poor households have for making sanitation improvements.

27. The financial packages were originally designed as matched 'savings' grants, providing a 25% or 50% grant once the remainder had been saved. This was done to examine whether households were liquidity constrained in their decision to build an improved latrine, and what magnitude of subsidy was required to incentivize households to save money to do so. For example, if the latrine package had a total cost of 10,000 Pesos and the household saved up 7,500 Pesos over 6 months, then ASA would add the remaining 2,000 Pesos and procure the materials and services of a certified mason to construct the latrine. However, during the midline review, the team learned that the uptake of ASA savings accounts and construction of latrines was lower than expected, thus the modality was switched to providing a subsidized loan to the households. ASA would pay for the construction of the latrine upfront and the beneficiary household would pay the remaining balance in weekly installments ranging from 80-300 Pesos. ASA offered two types of latrines via the subsidized savings accounts (Figure 5):

[15] According to monitoring reports, some municipalities relied on the 4Ps targeting system and engaged with beneficiary households via the FDSs. Other municipalities required every house to have an improved toilet and therefore used their own targeting methods to identify hardware subsidy beneficiaries. Monitoring reports showed that 5 municipalities (Asturias, Daan Bantayan, Bien Unido, Tabango and Calubian) had lower coordination of the hardware subsidy compared to the other 12 municipalities in this study.

FIGURE 5 : EXAMPLE OF LATRINES BUILT

OPTION 1	OPTION 2
	
STANDARD LATRINE DESIGN 1 1. Septic Tank a. Circular septic tank (3.5ft dia.x 4ft depth, buhos type) b. Cube septic tank (4ftx4ftx4ft, buhos type) 2. Amakan walling with nipa roofing 3. Ceramic bowl 4. Bio-sand filter 2ft.x2ft.x2ft. **CIRCULAR SEPTIC TANK** ABOVE: Php. OFFSET: Php. **CUBE SEPTIC TANK** ABOVE: Php. OFFSET: Php.	**STANDARD LATRINE DESIGN 2** 1. Septic Tank a. Circular septic tank (3.5ft dia.x 4ft depth, buhos type) b. Cube septic tank (4ftx4ftx4ft, buhos type) 2. Marine plywood walling with CGI roofing 3. Ceramic bowl 4. Bio-sand filter 2ft.x2ft.x2ft. **CIRCULAR SEPTIC TANK** ABOVE: Php. OFFSET: Php. **CUBE SEPTIC TANK** ABOVE: Php. OFFSET: Php.

Option 1 used Nipa roofing, '*amakan*" walling, concrete ring septic tank and total cost of the latrine ranges between 9,000-10,000 Pesos (USD 180 to USD 200) including labor and hardware. Option 2 used Corrugated galvanized iron roofing, marine plywood walling, concrete ring septic tank and costs between 10,000-11,000 Pesos (USD 200 to USD 220) including labor and hardware.

28. As shown above the latrine constructed using ASA subsidies included a door and four walls, which are an upgrade from temporary tarpaulin used by many households. This can greatly improve the privacy of latrine users and helps shield the user from the weather. The newly constructed latrine would also include a septic tank that captures all wastewater. This septic tank would eventually have to be emptied, usually after three to five years of use. This helps to prevent the spread of disease in the community, because most existing latrine would discharge wastewater into the storm drains or into a non-covered dry pit. The newly provided ceramic bowl would provide a water seal to reduce odors and flies from congregating around the latrine.

29. In addition, the baseline survey indicated that more than half of study households already owned an improved latrine. The ASA subsidy was reworked to allow households with existing latrines to apply for loans to finance upgrades to existing latrines. Households had two options for upgrading an existing latrine. One option cost the same amount as constructing a new latrine (9,000-11,000 Pesos) and the second option cost around 5,000 Pesos but did not always utilize approved masons for construction. Constructing new latrines or upgrading existing latrines allowed eligible households to claim 25% or 50% subsidy toward the total cost.

30. An example of an upgrade could be an addition of a septic tank, so if a household already had latrine at baseline that discharged wastewater into the communal storm drain, then now all wastewater would be captured in the septic tank. Another upgrade could be replacing the ceramic

bowl and replacing the walls and roof of the latrine, if the household already had a functional septic tank, but the existing walls and bowl were inadequate.

31. The ASA procedure included multiple steps. First all 4Ps beneficiary households in the MFI-treatment groups, which were interviewed during the baseline survey would be invited to attend an orientation session by ASA[16], where the subsidized loans package and the process of procuring a certified mason to construct a new latrine or upgrade an existing one is explained. These orientation sessions were coordinated with Municipal Links (MLs), which increased the likelihood 4Ps beneficiaries would attend the orientations to learn about the financial package offerings. During the orientation households were shown the different latrine options as well as repayment options. When households expressed interest in signing up for the loans, the ASA verification team would visit the household to confirm eligibility.

32. Repayment could be done over either 23 or 46 weeks and the interest on the loans was 0%. There was no collateral required for the ASA loan and there were no fees collected if households paid their weekly installments on time.[17] ASA was also instructed not to accept 4Ps debit cards to secure the loan. Depending on the amount of the loan and duration of repayment schedule each weekly payment varied between 80 to 330 pesos (Figure 6).

FIGURE 6 : EXAMPLE PAYMENT PLAN

Cost of toilet construction:		**PhP**	**9,000**
Amount of subsidy (25%):		PhP	2,250
Amount of loan (75%):		PhP	6,750
Amount of weekly payment:		PhP	300
Duration:			**23 weeks**
Week	Amount of payment		Balance
1	300		6450
2	300		6150
3	300		5850
4	300		5550
5	300		5250
6	300		4950
7	300		4650
8	300		4350
9	300		4050
10	300		3750
11	300		3450
12	300		3150
13	300		2850
14	300		2550
15	300		2250
16	300		1950

[16] If the household was interviewed at baseline but was no longer a 4Ps beneficiary when ASA conducted the orientation, it was still offered the subsidized loans.

[17] Endline data show that 2% of households (12 out of 515 households) who took out a loan reported missing a payment, but these households were not charged any fees for missing the payment.

17	300	1650
18	300	1350
19	300	1050
20	300	750
21	300	450
22	300	150
23	150	-
Total	**6750**	

33. When the loan agreement was signed, ASA provided the recipient 50% of the loan principal upfront, which was directly provided to the certified mason to begin construction. When latrine construction was completed the ASA team visited the household again to confirm the quality of the constructed latrine and then recommend releasing the remaining 50% to the mason. This verification process before releasing final payment was done to ensure high quality of constructed latrines. The household was then left to pay the remaining balance of the loan in weekly installments.

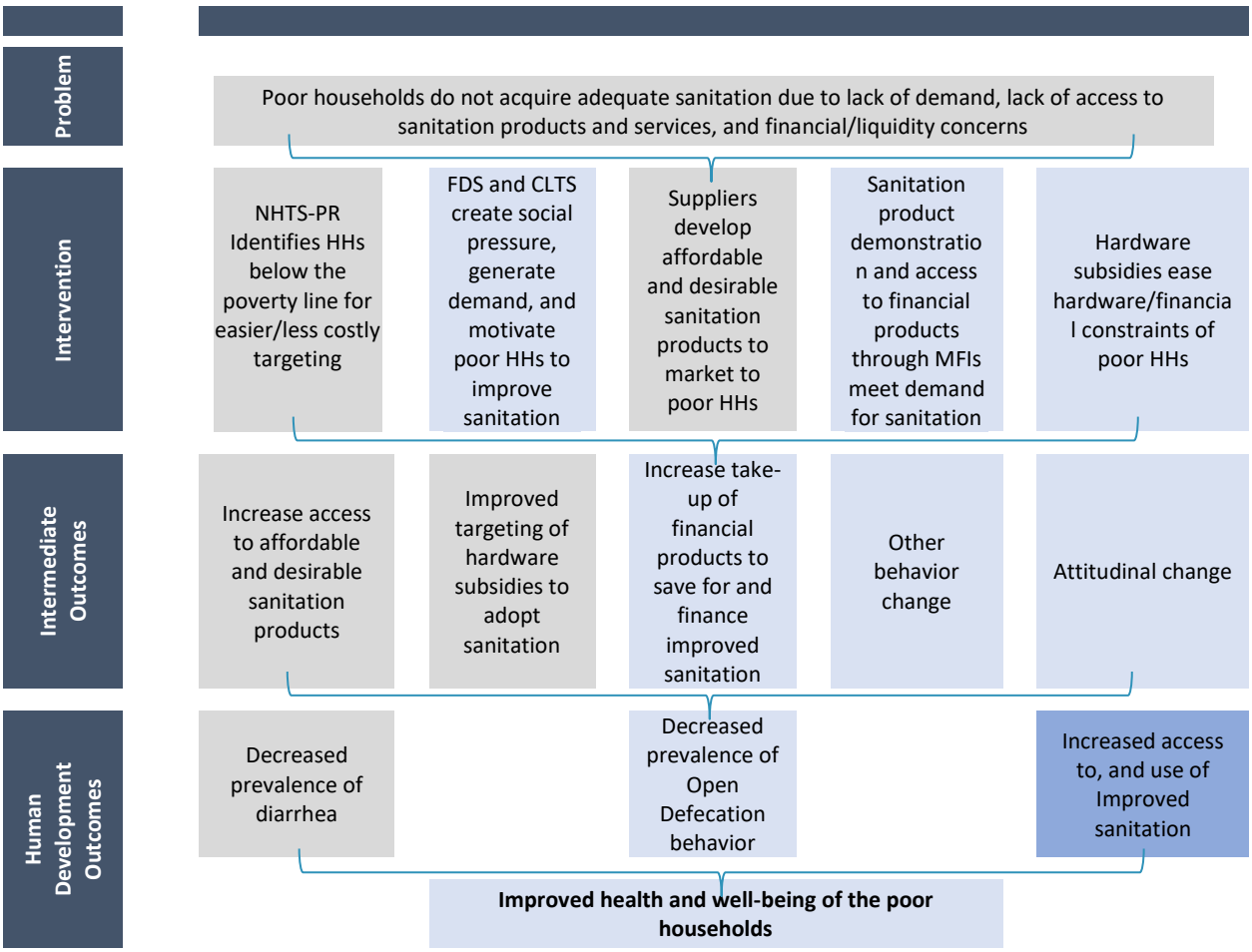
34. The amount borrowed is a significant share of the household's total income. At baseline the average monthly per capital income of the household was 3583 PhP and the cost of an 11,000 PhP latrine represents 3 months of income for one household member. In absence of loans it is difficult for households to make such large investments.

3. Evaluation Design

3.1 Theory of change

35. Barangay-level CLTS and Family Development Sessions' enhanced module was hypothesized to generate demand for sanitation by increasing knowledge and community motivation to improve sanitation. The supply-side package was anticipated to help remove supply constraints by increasing the availability, affordability and desirability of latrines on the market and providing access to financial products and hardware subsidies to facilitate latrine purchases by households. Finally, adoption of improved sanitation facilities was hypothesized to result in the reductions of open defecation, better hygiene practices, and therefore reductions in diarrhea in young children, better health and well-being of the poor (not evaluated). The evaluation's theory of change is illustrated in Figure 7.

FIGURE 7 : PROGRAM THEORY OF CHANGE



3.2 Identification strategy and treatment assignment

36. The identification strategy uses a cluster randomized controlled trial (cRCT) design to make causal inference statements. The randomized design evaluates the relative impact of interventions that address the constraints that poor households face in improving their sanitation in the presence of sanitation promotion and behavior change communication.

37. Through random assignment of hardware and financial subsidies the study was designed to answer the following research questions:

    a) How do including *hardware subsidies* with sanitation promotion and behavior change communication impact access to sanitation and sanitation behaviors among households and communities?

b) How do incorporating *partial financial subsidies* with sanitation promotion and behavior change communication impact access to sanitation and sanitation behavior among households and communities?

38. Table 1 shows the treatment assignment for sanitation promotion and behavior change communication (BCC – T1), hardware subsidies (T2), 25% (small MFI – T3) and 50% (big MFI – T4) financial subsidy. Random assignment was stratified at the municipality level to account for municipal level characteristics. Thus, barangays within each municipality were randomly assigned to one of the four treatment arms (Table 1).

TABLE 1 : COMPOSITION OF RANDOMIZED TREATMENT ARMS

Treatment Arm	Number of Barangays	Barangay Level Treatment	Pantawid Pamilya	Promotion (BCC)	MFI Subsidy	Hardware Subsidy
T4	47	50% (big) MFI + BCC	✓	✓	✓	
T3	48	25% (small) MFI + BCC	✓	✓	✓	
T2	47	Hardware Subsidy + BCC	✓	✓		✓
T1	48	BCC	✓	✓		

3.3 Spillover of hardware subsidy

39. As described earlier all four study arms received the BCC intervention through community level CLTS and sanitation promotion in FDS. However, because the encouragement to utilize hardware subsidies initially occurred at the municipality level to gain political and implementation support for the approach, it was difficult to control the application of subsidies at the barangay level. Household responses in the endline survey showed that hardware subsidies, which were assigned to T2, had spilled over into all study arms.

40. Table 2 shows that while a larger number of households in the T2 arm reported receiving a hardware subsidy, these subsidies were consistently reported across other study arms as well. Responses show that close to 29% of households in T2 received a hardware subsidy (from all sources) compared to around 19% in other treatment arms. Given that there was higher uptake of the hardware subsidy in T2 due to encouragement efforts made by Water GP team it would not be appropriate to combine the T1 and T2 arms into a single comparison group. Therefore, due to these spillovers the study was not able to assess the effectiveness of the hardware subsidy encouragement, and this arm was dropped from the impact analysis.

TABLE 2 : ENDLINE DISTRIBUTION OF HARDWARE SUBSIDIES AND SOURCE

Treatment Arm	N Obs.	Local Government Support	SLP	Kalahi CIDSS	Any
T4	678	11.1%	2.9%	5.0%	19.0%
T3	657	11.7%	1.7%	5.8%	19.2%
T2	692	17.3%	3.0%	8.4%	28.8%

T1	668	12.9%	1.7%	5.1%	19.6%

41. The final evaluation compares the different levels of financial subsidy (25% and 50%) with the BCC plus hardware subsidy (T1), noting that households in T3 and T4 also reported receiving hardware subsidy, so the only difference between the treatment and comparison arms is the offer of financial subsidy. (Table 3) To confirm that households that seek out hardware support in each treatment arm were similar on important background characteristics, we conducted a baseline balance test on households that ended up getting hardware subsidies in Table 25. We find that households were balanced on most variables, except for value of agricultural land and the number of adults was lower in T1, compared with T3 and T4.

TABLE 3 : COMPOSITION OF RANDOMIZED TREATMENT ARMS – ACTUAL ROLLOUT AND ANALYSIS

Treatment Arm	Barangay Level Treatment	Pantawid Pamilya	Promotion (BCC)	MFI Subsidy	Hardware Subsidy
T4	50% (big) MFI + Hardware Subsidy + BCC	✓	✓	✓	✓
T3	25% (small) MFI + Hardware Subsidy + BCC	✓	✓	✓	✓
T1	Hardware Subsidy + BCC	✓	✓		✓

3.5 Methodology

42. Random assignment ensures with high probability that households are balanced on both observable and unobservable characteristics at baseline. Therefore, the most plausible way to determine the causal impact of the MFI loan subsidy is to use a simple ordinary least squares (OLS) regression at endline. Our OLS model is shown by the following equation:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + d_i + \varepsilon$$

where Y is the outcome variable, α is the intercept, and X_1 is a variable identifying T3 barangays and X_2 is the variable identifying T4 barangays. We include municipality dummy variables ($d_2 \dots d_{17}$) for each municipality, except Alangalang, which will serve as the base group. These dummy variables control for municipality specific characteristics including variance in hardware subsidy distributions. Standard errors are clustered at the barangay level, because random assignment was done at the barangay level.

43. We include a difference in differences model for outcomes, where baseline and endline values were present. This includes a variable for time T and interaction terms between the time variable and variables identifying T3 and T4 barangays.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + T + \beta_3 (X_1 * T) + \beta_4 (X_2 * T) + d_i + \varepsilon$$

The coefficients of interest in the difference in differences outputs will be β_3 and β_4 , which will give unbiased estimate of T3 and T4, assuming parallel trends assumption holds. The standard errors were also clustered at the barangay level and dummy variables added for each municipality.

44. Additionally, we ran a Probit model as a robustness check. We included variables identifying T3 and T4 barangays and household head characteristics as explanatory variables.

45. More details on the design of the study including study population and sample, data collection, power calculations, and baseline balance are shown in the Annex.

4. Descriptive results

46. Below we present descriptive findings from both baseline and endline surveys to help put into context the causal results that follow in the next section. We begin with the baseline sanitation situation in the study population, including baseline household demand for making improvements and the perceived constraints to doing so. We then describe exposure to each of the interventions, followed by reported constraints to improving sanitation at endline, latrine ownership and the quality of toilets at endline. Finally, we describe the characteristics of households who received either hardware or financial subsidies.

4.1 Baseline sanitation situation of study population

47. The baseline survey showed that 42% of households did not have a toilet in their home and practiced open defecation (Table 4). Another 42% of households had a flush or pour flush toilet, but only 67% of these were classified as improved sanitation according to the JMP definition. Finally, 15% of households had a latrine, 65% of which were classified as improved. In total, 38% of households had access to improved sanitation at baseline.

TABLE 4 : AGGREGATED TOILET TYPE (BASELINE)[18]

Toilet Type	N*	Toilet Type Percent	JMP Improved Percent
Flush/Pour Flush	1688	42%	49%
Latrine	606	15%	42%
No Facility	1683	42%	0%

*Households not categorized n=103

48. At baseline households were asked whether they planned to make any improvements to their sanitation, and what type of improvements they desired. For these households without a facility or an informal facility at baseline 41% said they had no desired improvements, while 30% said they wanted to build a superstructure[19]. Households with a flush/pour flush toilet and with a latrine were most likely to want to repair the superstructure at baseline. (Table 5)

[18] At baseline the sample size was 4080 households.

[19] Superstructure refers to the walls, door and roof of the latrine. Inadequate superstructure fails to provide privacy to the user and shield the user from the elements.

TABLE 5 : DESIRED IMPROVEMENTS TO SANITATION (BASELINE)

Sanitation Demand	Pour Flush/Flush N=1688		Latrine N=606		Informal Facility / Open Defecation N=1683	
	Obs.	Mean (sd)	Obs.	Mean (sd)	Obs.	Mean (sd)
Desired Improvements						
Nothing	1688	22% (41%)	606	21% (41%)	1683	41% (49%)
Build Superstructure	1688	27% (44%)	606	23% (42%)	1683	30% (46%)
Repair Superstructure	1688	42% (49%)	606	42% (49%)	1683	8% (27%)
Repair Slab	1688	9% (29%)	606	8% (27%)	1683	1% (11%)
Repair Platform	1688	13% (33%)	606	11% (31%)	1683	4% (20%)
Intend to improve in next 12 months	1294	85% (36%)	456	74% (44%)	855	86% (35%)

49. Households were also asked at baseline where they would obtain the funds to make sanitation improvements. Only between 1 and 2% of households said they would borrow from a MFI, while most said they would generate cash for improvements through casual labor. Households were also most likely to cite high cost as the main constraint to improving their sanitation, while competing priorities was also a major constraint for between a fifth and a third of households depending on the type of sanitation at baseline. (Table 6)

TABLE 6 : RESOURCES FOR AND CONSTRAINTS TO SANITATION IMPROVEMENTS (BASELINE)

Sanitation Demand	Pour Flush/Flush N=1688		Latrine N=606		Informal Facility / Open Defecation N=1683	
	Obs.	Mean (sd)	Obs.	Mean (sd)	Obs.	Mean (sd)
Potential Sources of Money for Improvement						
Cash Casual Labor	1688	46% (50%)	606	44% (50%)	1683	28% (45%)
Borrow MFI	1688	2% (14%)	606	1% (11%)	1683	1% (7%)
Borrow (Friend/Family)	1688	6% (24%)	606	7% (26%)	1683	4% (20%)
Own Savings	1688	12% (32%)	606	10% (30%)	1683	12% (33%)
Biggest Constraints						
Materials Not Available	1688	10% (30%)	606	7% (25%)	1683	6% (24%)
Competing Priorities	1688	33% (47%)	606	30% (46%)	1683	21% (41%)
High Costs	1688	59% (49%)	606	64% (48%)	1683	47% (50%)

4.2 Exposure to intervention

50. Nearly all households attended the Family Development Sessions (FDS), with between 96% and 98% of respondents reporting that someone in their household either 'always or sometimes' attended FDS (Table 7). This was expected, as attending FDS is a condition of receiving 4Ps grants. Very few households across the study arms could identify CLTS as a program, but nearly all respondents were familiar with S4P[20] as the name of the sanitation promotion BCC activity. We observe a similar proportion of households in each treatment arm stating that having a latrine in the household is very important and about half of households across the treatment arms report being very likely to recommend constructing a latrine to another household in their barangay. These findings demonstrate that sanitation promotion activities were conducted across the study arms with similar intensity.

TABLE 7 : EXPOSURE TO INTERVENTION – AT ENDLINE

	Treatment Arm					
	T1		T3		T4	
	Mean	SE	Mean	SE	Mean	SE
Household member attended FDS	92%	1%	91%	1%	92%	1%
Familiar with FDS	7%	1%	11%	1%	7%	1%
Familiar with CLTS	0%	0%	53%	2%	59%	2%
Familiar with ASA	94%	1%	92%	1%	93%	1%
Familiar with S4P	99%	0%	99%	0%	99%	0%
Having toilet is very important	58%	2%	58%	2%	60%	2%
Very likely to recommend toilet to others	92%	1%	91%	1%	92%	1%
N obs.	668		657		678	

51. The hardware subsidy intervention varied in intensity across municipalities and the programs did not operate in all study barangays. For example, Kalahi Cidds was not present in 4 of the study municipalities, while it was intensively implemented in 3 of the municipalities. In Sulat municipality 68% of households surveyed received a hardware subsidy from Kalahi Cidds (Table 29). The provision of hardware subsidies through DSWD programs was highest in Asturias, Mabinay and Tuburan municipalities. Surveyed households in Tabango and Bien Unido experienced the lowest levels of hardware subsidies from any source.

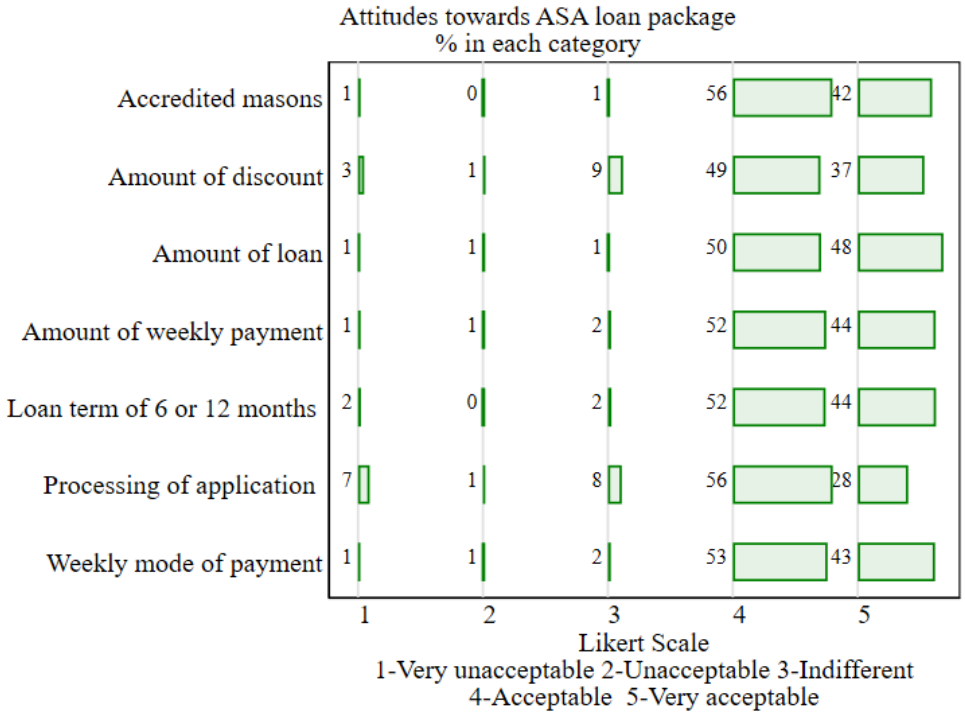
52. Around half of respondents in T3 and a small percentage more in T4 reported being familiar with ASA (Table 7). Responses also confirm that the ASA orientation was confined to just T3 and T4

[20] S4P stands for Sanitation for the Poor, which is the operational name of this Impact Evaluation adopted by Water GP in the Philippines.

study arms. By the end of the program ASA reported that it had disbursed loans to 818 households as part of the study, for a total amount of 4,532,000 PhP ($86,000 USD).

53. Overall, borrowers expressed positive attitudes towards most aspects of ASA's sanitation loan package (Figure 8). The only aspects of ASA's loans package with negative attitudes were the amount of financial subsidy provided to the households and the application process, where 7% of the borrowers rated the application process as "Very Unacceptable".

FIGURE 8 : FEEDBACK FROM MFI BORROWERS



4.3 Constraints to sanitation improvement

54. Table 8 displays the top 3 constraints that households reported at endline for making sanitation improvements. A smaller proportion of households in T3 and T4 cited high financial cost as a top constraint, while 46% of households in the comparison group cited this as a top barrier. Interestingly, competing priorities is less likely to be a barrier to sanitation improvement in T3 and T4 arms in relation to the comparison group. The MFI intervention is associated with both lower materials and lower financial constraints. Other constraints that were not explicitly addressed by the MFI intervention show little to no difference across study arms.

TABLE 8 : TOP 3 REPORTED CONSTRAINTS TO SANITATION IMPROVEMENT AT ENDLINE

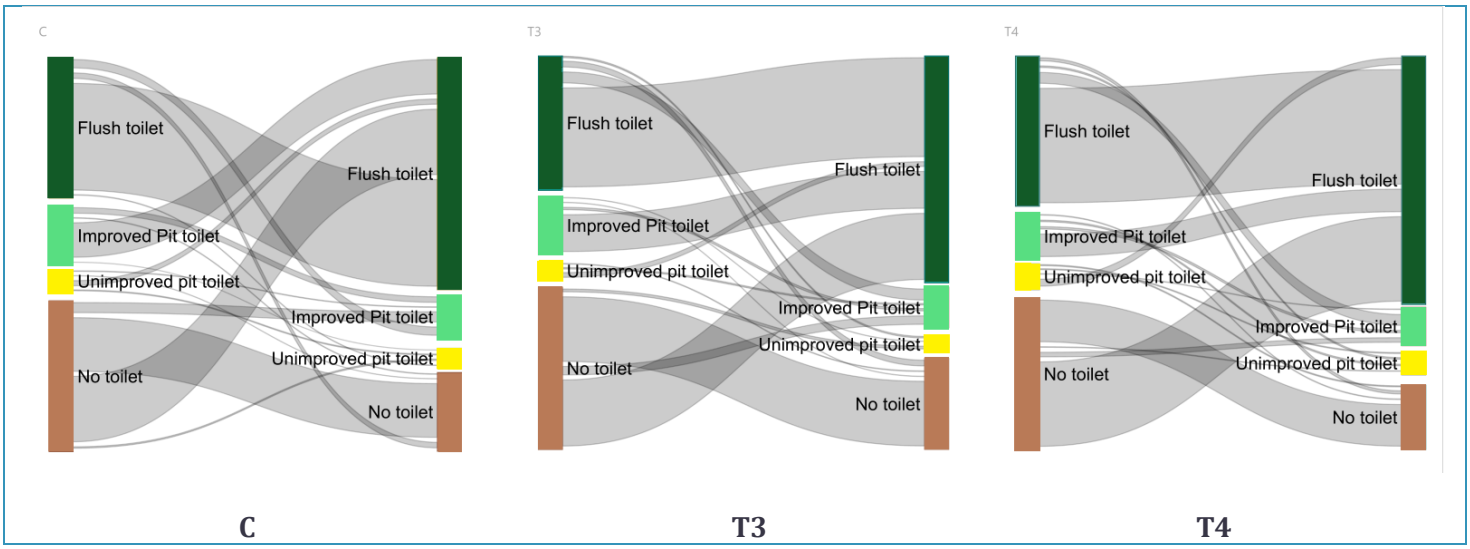
	Treatment Arm					
	T1		T3		T4	
	Mean	SE	Mean	SE	Mean	SE
High financial cost	46%	2%	32%	2%	23%	2%
Competing priorities	50%	2%	34%	2%	22%	2%
Labor constraint	3%	1%	2%	1%	1%	0%
Materials constraint	29%	2%	23%	2%	18%	1%
Geological limitations	5%	1%	5%	1%	3%	1%
Limited space	2%	1%	1%	0%	2%	0%
Tenancy issues	8%	1%	4%	1%	5%	1%
Dislike toilet options	0%	0%	1%	0%	0%	0%
No constraints	7%	1%	6%	1%	6%	1%
N. of obs.	668		657		678	

Household survey respondents selected up to 3 constraints.

4.4 Latrine ownership and quality

55. Figure 9 shows the same household change between baseline and endline in the type of latrine ownership for the C, T3 and T4 study arms. The colored vertical bars represent the share of each type of latrine in each study arm. On the left are the shares at baseline and on the right are the shares at endline. These graphs show that a larger proportion of households in T4 have adopted a flush toilet by endline compared with the other study arms, as represented by the taller dark green vertical bar on the right. We also see that a smaller share of households at endline have no toilet in T4 arm, compared to other arms (brown bar). Notably, the graphs illustrate that household access to sanitation is not always a fixed condition. There are some cases observed of households with improved toilets at baseline reverting to unimproved or open defecation by endline.

FIGURE 9 : CHANGE IN LATRINE OWNERSHIP BETWEEN BASELINE AND ENDLINE



56. Features that enhance the usability, safety and security of toilets, such as presence of a door or curtain, a fully covered roof, fully enclosed wall, floor tiles and toilet seat were also more likely to be observed in T4 versus the comparison arm (Table 21). Toilets in T4 were also more likely to have soap and water present (2.70 T4 vs. 1.80 T1 p<.01). A composite measure of toilet quality taking into account all these features (Toilet Quality Index) is higher in both T3 and T4 in relation to the comparison arm.

4.5 Targeting efficiency of hardware and financial subsidies

57. For both the hardware and financial subsidies, proportionally more households who already had an improved toilet at baseline received a hardware subsidy (52%) or took out a toilet loan for construction or upgrade (58.9%), compared to those who did not possess an improved toilet at baseline. (Table 9)

TABLE 9 : BASELINE TOILET TYPE FOR HARDWARE AND FINANCIAL SUBSIDY RECIPIENTS

	Hardware N= 539			Financial N= 528		
	#	Mean	SE	#	Mean	SE
Improved	279	52%	2%	311	59%	2%
Unimproved	260	48%	2%	217	41%	2%

58. To better understand the characteristics of households who received subsidies, we look at their income level in relation to subsidy take-up. We constructed income quintiles using the baseline

values of household income, since we did not collect a full household income roster at endline. The quintiles range from 1 to 5, with 1 being the poorest households at baseline.

59. While the sample sizes are small making comparison difficult across the income quintiles, the findings show that overall take-up rates of both the 25% and 50% subsidy sanitation loans are higher in the lowest quintiles where households are most likely to be liquidity constrained when it comes to making investments into sanitation assets. (Table 10) Difference in means t-tests show that households in highest income quintiles (4 and 5) were less likely to take out sanitation loans compared to the lowest quintiles (1 and 2). Similarly, difference in means tests show that households in the lowest income quintile were more likely to receive the hardware subsidy than households in the highest income quintile.[21]

TABLE 10 : FINANCIAL SUBSIDY AND HARDWARE TAKE-UP BY INCOME QUINTILE

	Income Quintile									
	1		2		3		4		5	
	N= 387		N= 385		N= 401		N= 371		N= 418	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
25% subsidy loan take up	18%	2%	14%	2%	9%	1%	9%	1%	4%	1%
50% subsidy loan take up	16%	2%	18%	2%	17%	2%	13%	2%	13%	2%
Any hardware subsidy	20%	2%	18%	2%	18%	2%	18%	2%	14%	2%

5. Causal Treatment Effects

5.1 Effect of partial financial subsidies on adoption of improved sanitation

60. We first assess the effectiveness of the partial financial subsidies for encouraging adoption of improved sanitation as the primary study outcome. While the 25% subsidy was not any more effective than the comparison group for increasing access to improved sanitation, the 50% subsidy resulted in 5 percentage points more households adopting improved sanitation due to the intervention. Neither the 25% nor 50% subsidy intervention was more effective than the comparison intervention for reducing reported open defecation (Table 11). Households in both

[21] This result only includes households in C, T3 and T4 that received hardware subsidy, but not in T2 since this arm has been dropped.

the 25% and 50% subsidy arms were more likely to report upgrading or constructing a toilet versus the comparison (21% in T3 and 38% in T4). In all regressions we are estimating intent-to-treat effects, or the effect of being randomly assigned into either treatment arm, regardless of whether the household took up the treatment.

TABLE 11 EFFECT ON IMPROVED SANITATION, BEHAVIORS, AND LOAN TAKE-UP (ENDLINE REGRESSION)

	(1) Improved Sanitation	(2) Share of HH members practicing OD	(3) Community Coverage of Improved Sanitation	(4) HH Has Loan for Latrine Improvements	(5) Upgraded latrine	(6) Built new latrine	(7) Constraint is Credit	(8) Constraint is Hardware
T3	-0.03	0.06	-0.04	0.25***	0.21***	0.06**	-0.14**	-0.06
	(0.05)	(0.17)	(0.05)	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)
T4	0.05	-0.10	0.05	0.37***	0.30***	0.12***	-0.23***	-0.12***
	(0.04)	(0.13)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)
Constant	0.81***	1.57***	0.81***	0.04***	0.18***	0.14***	0.46***	0.30***
	(0.03)	(0.10)	(0.03)	(0.01)	(0.03)	(0.02)	(0.04)	(0.03)
N. of obs.	2003	2003	142	2003	1631	1631	2003	2003
R-squared	0.01	0.00	0.02	0.13	0.07	0.01	0.04	0.01
Baseline means	0.54 (0.01)	-	0.54 (0.01)	0.04 (0.00)	0.19 (0.01)	-	0.55 (0.01)	0.11 (0.01)

Standard errors are clustered at the barangay level. Municipality dummies not included.

Outcome variable definitions:

Improved sanitation: 1-improved 0-unimproved

Share of HH members practicing OD: 1-None 2-Few 3-Some 4-Most 5-All

Community coverage of improved sanitation refers to the ratio of households with improved sanitation over the number of households surveyed per barangay. One value per barangay.

All other outcomes: 1-Yes 0-No

61. Households in the financial subsidy arms were more likely to report easing of both credit and hardware constraints. Households were 13 points less likely to report credit as a top constraint to improving their sanitation in the 25% arm versus the comparison, while in the 50% arm households were 24 points less likely than the comparison arm to mention credit constraints.

62. Since the improved sanitation indicators showed only modest (T4) or no improvement (T3) in improved sanitation, the higher likelihood of toilet construction and upgrades in both these study arms suggest that some households that already had improved sanitation took out the loan, thus there was no positive movement up the sanitation ladder.

TABLE 12 : EFFECT ON IMPROVED SANITATION, BEHAVIORS, AND LOAN TAKE-UP (DIFFERENCE IN DIFFERENCES)

	(1)	(2)	(3)	(4)	(5)
	Improved Sanitation	Community Coverage of Improved Sanitation	HH Has Loan for Latrine Improvements	Constraint is Credit	Constraint is Hardware
T3	-0.04	-0.04	-0.02	-0.09*	0.03
	(0.04)	(0.04)	(0.02)	(0.05)	(0.03)
T4	-0.01	-0.01	-0.00	-0.06	0.04
	(0.04)	(0.04)	(0.02)	(0.05)	(0.04)
Time variable	0.25***	0.25***	-0.00	-0.14**	0.22***
	(0.03)	(0.03)	(0.01)	(0.06)	(0.03)
Interaction T3	0.00	0.00	0.27***	-0.04	-0.09
	(0.04)	(0.04)	(0.05)	(0.09)	(0.06)
Interaction T4	0.06	0.06	0.38***	-0.17**	-0.16***
	(0.04)	(0.04)	(0.04)	(0.08)	(0.05)
Constant	0.74***	0.74***	-0.01	0.64***	0.07**
	(0.04)	(0.04)	(0.03)	(0.05)	(0.03)
N. of obs.	4006	4006	4006	4006	4006
R-squared	0.20	0.56	0.25	0.10	0.06

Dummy for each municipality is added

Robust standard errors are clustered at the barangay level.

Outcome variable definitions:

Improved sanitation: 1-improved 0-unimproved

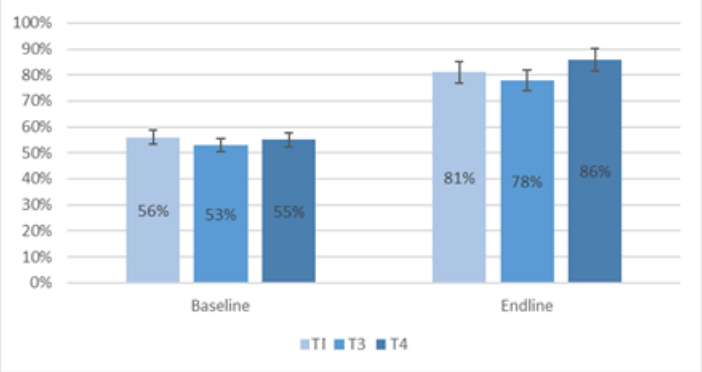
Community coverage of improved sanitation refers to the ratio of households with improved sanitation over the number of households surveyed per barangay. One value per barangay.

All other outcomes: 1-Yes 0-No

63. Figure 10 illustrates that there is no differential improvement in sanitation in the T3 arm compared with the T1 arm. Both before and after the intervention, the T1 study arm has higher coverage of improved sanitation than T3, but this difference is not statistically significantly different from 0. The lower uptake of loans in T3 compared to T4 suggests that poor households need a larger subsidy to make meaningful investments in sanitation facilities.[22] At endline 41% (1.8%) of households in T4 have loans to make sanitation improvements, which is significantly higher than the 29% (1.7%) in T3.

[22] This could also mean that the subsidy was not large enough to attract a sufficiently large number of households to take up the loans and conduct latrine upgrades.

FIGURE 10 : CHANGE IN SHARE OF HOUSEHOLDS WITH IMPROVED SANITATION



64. On the other hand, Figure 10 shows that T4 households were 5 percentage points more likely than T1 to have an improved latrine, driven by the high uptake of subsidized loans for improved toilets in T4. These results are consistent in the difference in difference model, when robust standard errors are not clustered at the barangay level (Table 12). Clustering errors at barangay level results in an insignificant effect (p=0.13). This is likely due to a reduced sample size at endline, which reduces the minimum detectable effect.

65. Since some of our outcome variables are binary, we used a Probit model (Table 22) at endline to check the coefficients and statistical significances of our OLS findings. The coefficients in the Probit model cannot be compared directly to the coefficients in the OLS model, but the signs are consistent for outcomes of interest. The results suggest that the 50% subsidy increased the household's probability of possessing an improved latrine at endline and lowered reported open defecation.

5.2 Effect of the partial financial subsidies on toilet quality and satisfaction

66. Reported satisfaction with the toilet is higher in both T3 and T4 households in relation to the comparison group households (0.17 in T3 and 0.16 in T4). We look at several objective measures of quality to understand whether these could explain the higher rates of satisfaction in the financial subsidy arms.

TABLE 13 : EFFECT ON TOILET SATISFACTION AND QUALITY (ENDLINE REGRESSION)

	(1)	(2)	(3)
	Reported Toilet Satisfaction*	Sanitation Ladder Index	Toilet Quality Index
T3	0.17***	-0.11	0.29
	(0.05)	(0.09)	(0.20)
T4	0.16***	0.17**	0.66***
	(0.05)	(0.08)	(0.19)
Constant	3.24***	2.73***	4.51***
	(0.10)	(0.08)	(0.33)
N. of obs.	1317	2003	2003
R-squared	0.16	0.22	0.15

Dummy for each municipality is added

Standard errors are clustered at the barangay level.

*At the endline toilet satisfaction questions were not asked to respondents without private latrines.

Outcome variable definitions:

Reported Toilet Satisfaction: 1-Very dissatisfied 2-Somewhat dissatisfied 3-Somewhat satisfied 4-Very satisfied

Sanitation Ladder Index: 0-No toilet 1-Pit toilet 2-Improved Pit toilet 3-Flush toilet

Toilet Quality Index ranges from 0 to 10, and was constructed by adding one point for each toilet attribute, such as raised platform, footrest, seat, floor tiles or concrete, walls, roof, door and the bowl having a water seal.

67. First, we construct a Sanitation Ladder Index to simplify the 14 possible categories of household latrine ownership. The index takes a value of 0 if the household does not have access to a private latrine, uses a public toilet or defecates in the open. A value of 1 is given when the household has a basic unimproved pit latrine or a flush toilet that is not improved. If a household possesses an improved pit latrine, a ventilated pit latrine or a composting toilet, it will be given a value of 2. Finally, if the household has an improved flush toilet the index takes the value of 3.

68. We compared the Sanitation Ladder Index for households that received financial subsidy in T3 and T4 with those in the comparison group to test if the financial subsidy offer resulted in a higher Sanitation Ladder Index on average. Table 13 shows that the Sanitation Ladder Index was significantly higher for the 50% subsidy arm, indicating that overall households in T4 had higher sanitation service levels

69. Finally, Table 13 shows that toilet quality[23], as measured by the number of positive attributes or features of the toilet, such as a fully enclosed roof, walls, tiled floors, toilet seat and soap and

[23] Toilet Quality Index reflects how many features the latrine has. See annex for list of features that make up the index.

water is significantly higher in T4, than in the comparison group. Importantly, these are features that enhance the usability, safety and security of toilets, making them more likely to be used, and likely contributing to greater satisfaction.

6. Cost Analysis

6.1 Data and methodology

70. We conducted a simplified cost analysis to calculate the cost per household adopting improved sanitation of each intervention, comparing CLTS, hardware subsidy and the two levels of partial financial subsidy. We omit all operating costs[24] associated with these interventions since data were not available.

71. Data on sanitation loans were provided by ASA and included the subsidy amount in addition to any amount of loan proceeds that were defaulted on and not recovered. This resulted in a US$ 24.9 cost per household for the 25% subsidy and US$ 57.4 cost per household for the 50% subsidy (Table 26). In addition to the actual costs provided by ASA, we simulated costs for each subsidy level assuming that all households selected the 10,000 PhP toilet option.

72. For hardware costs, we relied on monitoring data which showed a range between US$ 40 and US$ 415 per household. Table 27 shows an example of a province, where we deanonymized the names of actual municipalities and barangays that received funding to provide hardware subsidies for latrine construction or improvement. The average cost across the barangays who provided data was US$ 205.9 per household. Notably, this estimated cost is consistent with the cost of toilet options available for purchase with the MFI financial subsidy (US$ 180 – 220).

73. For CLTS intervention DSWD provided a cost of US$ 13 per household, which is consistent with evidence from other countries on the cost of participatory approaches to sanitation improvement (Crocker et al. 2017). We added the cost of CLTS to each intervention since all households receive this treatment. Data were not available on the cost for sanitation promotion in FDS. Since this was provided in all study arms it does not add qualitatively to the results but would need to be considered as an additional cost for program scale-up.

74. We estimate the cost of moving a household from unimproved to improved sanitation using different interventions, by averaging the total cost of each treatment arm and dividing over how many households moved from JMP unimproved sanitation into JMP improved sanitation status. The sample for each intervention is restricted to households that received either the financial subsidy or hardware subsidy, but not households that reported support from both financial and

[24] Here we choose to ignore all costs associated with transportation, staff wages, office rental and communication. We did not have sufficiently detailed cost information from the different service providers.

hardware subsidy. Our comparison group are households in T1 arm that did not receive hardware subsidies.

75. Total cost per intervention is estimated by multiplying the number of households that took up each intervention by the cost per household of that intervention. For each intervention we calculate the percentage and number of households that moved from unimproved to improved sanitation between baseline and endline. This figure is used to calculate the total cost and cost per household adopting improved sanitation.

6.2 Results

76. CLTS is the lowest cost intervention at US$ 13 for household targeted but requires an estimated US$ 66 per household to move from unimproved to improved sanitation. We caution any conclusions around this figure since the study lacked a pure control group and therefore we cannot determine the share of the CLTS intervention households that would have improved their sanitation status in the absence of the intervention.

77. While the hardware subsidy costs US$ 205.9 on average, this cost balloons to approximately US$ 590 per household moving from unimproved to improved sanitation. This is primarily due to the inefficient targeting of the hardware subsidy.

78. Using actual ASA Philippines data from the study, the cost of the 25% subsidy was US$ 97 per household to make the switch from unimproved to improved and the cost of the 50% subsidy was US$ 174. Estimates assuming a PhP10,000 toilet option for all households rise to US$ 156/ household and US$ 270/household for 25% and 50% subsidy respectively (Table 26, rows 7-10).

79. Extrapolating these results to the estimated 2.7 million 4Ps households to achieve improved sanitation status, the financial resources required are: US$ 1.59 billion (approx. PhP82.68B) for hardware subsidies and CLTS; as against US$ 729 million (approx. PhP37.91B) for 50% financial subsidies (assuming PhP10,000 option).

80. Importantly, these figures do not account for the inefficiency in targeting of interventions. If we assume that program implementers had perfect knowledge about which households to target, i.e. those that lack improved sanitation, the investment cost of providing 2.7 million households with improved sanitation would be significantly lower assuming that all households who lack sanitation would take-up the subsidized loan rather than improving their sanitation through regular public hardware subsidies.

7. Study limitations

7.1 Potential adverse effects of sanitation loans

81. We assess whether take-up of the sanitation loan is associated with any negative effects on household consumption by asking households to report any hardship due to loan repayments (Table 14). As described earlier the weekly payments ranged from 80 - 300 Pesos (1.5-5.7 USD). Findings show that 18.6% of households in T3 and 9.7% of households in T4 that took out a loan with the purpose of making sanitation upgrades reported reducing household spending to meet the weekly payments. While this was expected, there is no evidence that households cut spending on food consumption or that households missed meals to make payments. However, 2% of households in T3 and 1% of households in T4 reported using savings that were intended for another purpose to repay the sanitation loan. Finally, we show that households are not using the 4Ps grant income to repay the loan.

TABLE 14 : HARDSHIP DUE TO LOAN PAYMENTS

	T1 N=29	T3 N=194	T4 N=279
Variable	Mean / SE	Mean / SE	Mean / SE
4P grant used for Loan payment	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]
We missed one or several meals	0.000	0.005	0.000
	[0.000]	[0.005]	[0.000]
We reduced household spending	0.000	0.186	0.097
	[0.000]	[0.068]	[0.033]
We used our savings intended for another purpose	0.000	0.021	0.014
	[0.000]	[0.013]	[0.008]

7.2 External validity

82. Our sample consisted of 4Ps conditional cash transfer beneficiaries at baseline. Therefore, our findings on the effectiveness of financial subsidies for poor households cannot be generalized to poor households who do not receive additional financial support for consumption of food, health and education.

83. Similarly, since our study did not include non-4Ps beneficiaries, we cannot make causal statements on general equilibrium impacts at the barangay level or possible negative externalities for households that were just above the provincial poverty threshold and not eligible for 4Ps grants nor offered financial subsidies.

7.3 Internal validity

84. Due to the decision to reduce the sample of barangays by 30% at endline due to budget constraints, we have concerns that the effects of the financial subsidies may be overestimated.

Table 24 shows that the barangays with the lowest uptake of the subsidized loans had worse sanitation indicators at baseline. Thus, inclusion of those barangays could have affected the outcome variables.

85. The power calculations were estimated using baseline data on 270 barangays, but a 30% reduction in barangays at endline increases the minimum detectable effect. This shows in our results, where we can see a significant increase in improved sanitation when using OLS model at endline but show borderline significance when using difference in difference models for the same outcome variables.

8. Discussion/Conclusion

83 The results of this impact evaluation demonstrate that under the right conditions, poor households are willing to pay to adopt better sanitation. Improved toilets are a desirable amenity for low-income households that enhance wellbeing and contribute to the cleanliness of the environment, which is associated with improved child health and nutrition.

84 While zero-subsidy approaches to improving sanitation have been strongly advocated by donors and development agencies over the past several decades, there is mounting evidence that these approaches are not always effective and may in fact lead to negative consequences if poor quality toilets are constructed as a result. The negative health externalities of poor sanitation suggest a role for public sector intervention to ease the financial constraints that households face in making this investment (Andrés et al. 2017).

85 Our findings show that offering 4Ps beneficiaries a partial financial subsidy for toilet construction through an MFI is effective for encouraging household adoption of high-quality improved household latrines. Moreover, the cost of doing so could be substantially lower than the prevailing approach to improving sanitation through hardware subsidies, if more efficient targeting is achieved.

86 We lack a pure control group to estimate effectiveness of behavior change communication and sanitation promotion alone for increasing adoption of improved toilets. While we observed large increases in sanitation in the comparison arm, we observed similar increases in the treatment arms. These improvements could be due in part to the behavior change communication through 4Ps, the hardware subsidies that were provided in all study arms, overall time trends, or a combination of these.

87 The spillover of the hardware subsidy intervention has limited the causal inference statements we can make about these. We are not able to determine whether hardware subsidies are more or less effective than partial financial subsidies for increasing access to improved sanitation and reducing open defecation. However, when we isolate households who received a hardware subsidy across the study population we find several noteworthy findings. First, we see that hardware subsidies are inefficiently targeted. Around 52% of households who already had

improved sanitation at baseline reported receiving a subsidy during the intervention period. As a result, these subsidies are not contributing to eliminating open defecation or to increasing coverage of improved toilets. Given the high average cost of the hardware subsidy, inefficient targeting is a substantial concern that should be addressed before this approach is scaled up further.

88 Second, the quality of toilets built with the hardware support was consistently lower than that of the toilets built with the financial subsidy, although it was better than those built with neither financial or hardware subsidy. This is likely due to the wide variation in hardware subsidy composition and amounts. Data from one province for example shows subsidies ranging from US$ 40 to US$ 415. In some cases, households were required to contract out labor to construct the toilet or do this themselves and there was no guarantee that qualified masons were used. Moreover, a complete toilet package was not always provided. Instead, individual toilet components or materials such as ceramic latrine bowls, concrete blocks or cement were given. Without knowledge on where to obtain materials, the funds for these materials, and the lack of technical guidance on how to construct the system, households may not be able to complete a high-quality structure.

89 By comparison, toilets built with the MFI financial subsidy were complete systems, including a sub-structure and super-structure. Moreover, the ASA Philippines implementing modality used a certified mason for installation and performed verification of the toilet installation to confirm quality before any final payment was made to the mason. These processes were key in ensuring poor households obtain quality improved sanitation when investing in toilet construction or upgrades. This resulted in higher quality both in terms of the type of sanitation and the features of the toilet. Financing a full toilet package, complete with installation appears to be an important factor in adoption. For example, a sanitation lending program in Cambodia showed that only 30 – 40% of those who purchased a latrine with the loan had installed it at follow-up 18 – 24 months later and attribute these low installation rates to the lack of financing for latrine superstructure and construction (Yishay et al. 2017).

90 There is a need to understand the medium- and long-term effects of utilizing even subsidized loans to improve sanitation outcomes in 4Ps households. While the financial subsidy was originally designed as a matched savings grant, take-up was lower than expected so it was reconfigured as a loan by the MFI. Households that take out a loan may reduce spending in other areas to pay back the principal, which could lead to negative consequences if spending in the areas of food, education and health is reduced. On the other hand, improvements in sanitation and hygiene are associated with a range of health and wellbeing benefits including reductions in diarrheal disease, soil-transmitted helminth infections, and environmental enteric dysfunction (Hutton & Chase, 2016). Therefore, it is necessary to understand the net benefit to households taking these potential health benefits into account. While the study was not designed to assess health effects of improvements in sanitation, systematic reviews show sanitation reduces diarrhea in children by 25% on average with effects even larger when higher levels of community coverage are reached (Wolf et al. 2018).

9. Conclusion

91 In this study, households who were offered a 50% financial subsidy for toilet construction were 5 percentage points more likely to have an improved toilet after the intervention, compared with households who received behavior change communication alone. A smaller financial subsidy of 25% was no more effective than behavior change communication alone for adoption of improved sanitation. Neither the 25% nor 50% subsidy intervention was more effective than the comparison intervention for reducing reported open defecation. Importantly, all study arms had active hardware subsidy interventions that were likely a factor in the overall trend towards better sanitation at endline for all study arms.

92 Both the 50% and 25% financial subsidy encouraged more households to upgrade or construct toilets (38% for big subsidy and 21% for small subsidy), but a large share of these improvements were made in households who already had improved toilets at baseline. We demonstrate similar inefficiencies in targeting of the hardware subsidies.

93 Reported satisfaction with the toilet was higher in both financial subsidy study arms in relation to the comparison group households. The quality of toilets constructed using the financial subsidy, especially the 50% subsidy, likely contributes to this greater satisfaction. Households who received the 50% subsidy offer had higher sanitation service levels after the intervention, and their toilets were more likely to have positive features that enhance the usability, safety and security of toilets, making them more likely to be used, and likely contributing to greater satisfaction.

94 Cost analysis shows that a 50% financial subsidy on a PhP10,000 toilet could be provided to the estimated 2.7 million 4Ps households that lack sanitation for approximately US$ 729 million (PhP37.9B), as against the estimated cost of a hardware subsidy amounting to US$ 1.593 billion (roughly PhP83B). These estimates do not include fixed program costs that would be necessary for effective implementation. Importantly, improving the targeting efficiency of these subsidies 38 would be critical for realizing the cost-effectiveness of a scaled-up inclusive sanitation subsidy approach.

10 Recommendations

10.1 Program development & scale-up

95 **Sanitation subsidies can work to increase access to high quality improved toilets among poor households.** This study demonstrates that there is substantial unmet demand from poor households to improve their sanitation, and many households are willing to pay for these improvements when liquidity constraints are eased. Subsidizing half the cost of a high-quality toilet package could generate significant adoption of improved sanitation among 4Ps households. When a complete toilet package with installation is provided, hardware subsidies delivered

through DSWD's core programs could be an effective complement to financial subsidies offered through socially-oriented MFIs.

96 **Sanitation subsidies should be 'smart' and targeted to the population most in need.** The right mix of subsidies, targeted to the population most in need, could help achieve government targets of Zero Open Defecation Program as well as more ambitious targets of safely managed sanitation under SDG 6.2. However, to justify government spending on sanitation subsidies it is necessary to improve the efficiency of targeting. The use of 4Ps National Household Targeting System was hypothesized to be a starting point to identify households in need of sanitation improvements, but it is not clear whether this is sufficient for identifying households in need of sanitation. Improving the identification and classification of toilets in the NHTS (Listahanan) could provide the necessary data to inform targeting approaches for sanitation subsidies.

97 Mobilization of financial resources from various sources is needed to scale up an inclusive sanitation approach. Increasing adoption of improved sanitation among the estimated 2.7 million 4Ps beneficiaries who are currently in need will require substantial financial resources. Subsidizing half the cost of a PhP10,000 sanitation solution would require an estimated US$ 729 million (PhP38B) not including fixed costs to implement the modality. However, this is deemed to be substantially less than the projected US$ 1.593 billion (PhP82.68B) requirement for regular public hardware subsidy programs. The said investment estimates for household sanitation improvements in rural areas can be proposed for review and adoption in the finalization of NEDA's Philippine Water Supply and Sanitation Master Plan. Note that these investment costs could be reduced if subsidies are more efficiently targeted. It is likely that a harmonized approach based on household ability to pay is needed going forward. It is not evident that MFIs would continue to offer 0% interest on sanitation loans but would rather be aiming for an approach to cross-subsidize the poorest through higher value loans to higher income households or through partnership with government stakeholders.

98 Long run effects of loan-based sanitation investments in 4Ps beneficiary population are needed. One of the key motivations for conducting this impact evaluation with 4Ps beneficiaries was to generate evidence on how best to increase adoption of improved sanitation in poor households who are most at risk of fecal and water-borne disease while at the same time less resilient to illness and disease. Improvements in sanitation and hygiene are associated with a range of health and wellbeing benefits, but there is a risk that offering loan products to poor households could lead to unintended consequences. Follow up assessment and analysis jointly with ASA Philippines could shed light on long term viability of the loan-based sanitation investment modality, repayment rates and potential adverse effects on 4Ps households regarding indebtedness, consumption and savings decisions. Further understanding of potential health and wellbeing impacts of improvements in sanitation and hygiene for households who adopted sanitation through the program would also provide important context on the net benefit to households.

10.2 Lessons learned in implementation of the impact evaluation

99 **Development of mutual understanding with local governments regarding the rollout of evaluation:** Provinces and municipalities in the Philippines exercise a large degree of autonomy, and many so-called national development programs are decentralized in terms of implementation. As a result, working with the central agencies such as DSWD may not guarantee complete cooperation at the provincial or municipal level. For example, divergent priorities of assisting the impact evaluation and meeting the annual targets of "Zero Open Defecation" barangays likely resulted in subsidies being given to all barangays. It is often harder for municipal and provincial governments to deny a benefit to a barangay, than to assist in implementation of a new modality. Although various meetings and workshops were conducted with municipal actors, and the Water GP team had a team of coordinators on the ground to monitor implementation fidelity, it is evident that more extensive engagement is needed at the level of municipality to gauge willingness to withhold services from randomly selected barangays for a defined period of time.

100 **A strong implementation partner is essential to implementation fidelity:** The collaboration between the World Bank and ASA Philippines was instrumental in being able to detect effects of the financial subsidies on adoption of sanitation. This relationship was supported by a detailed Terms of Reference outlining the study objectives and guidelines, and protocols to ensure consistent implementation across the program area. Moreover, detailed implementation status reports prepared by the field coordinators with inputs from ASA Philippines team were useful to gain further insight into the results.

Annex

Study Design: Additional Detail

Example of latrines

1. JMP improved sanitation – latrines constructed with ASA financial subsidies.

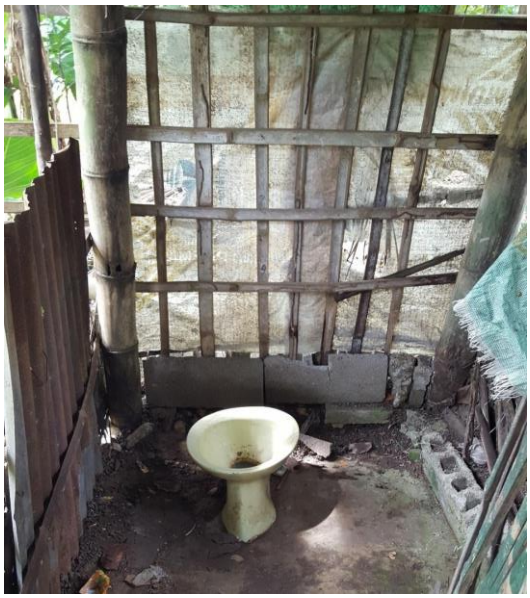
2. JMP improved sanitation – but improvements are needed

Latrine is missing a door, unclear if connected to septic tank or dry pit.

Latrine is built using non-durable materials, unclear if connected to septic tank or dry pit.

3. JMP unimproved sanitation.

This latrine is constructed with non-durable materials. It is also missing a bowl and source of water.



This latrine discharges to a septic tank, but sewage is not properly isolated and leaks to the surrounding areas. The bowl is not water sealed, allowing flies and odor to contaminate the area.

Dry Pit latrine with inadequate walls for privacy.

Example of a rural village in the Philippines. The common water course can become contaminated with sewage if latrines do not have septic tanks or are designed to discharge into the storm drains.

Data Collection

Baseline and endline surveys were conducted in 2015 and 2018 respectively using handheld tablets. The survey instrument covered household characteristics, house and latrine quality, and child health rosters. Data quality was checked using spot-checks and back-checks. At endline 2,849 study households were sampled, but 154 baseline households were not reached, because their members had permanently moved to another location or the household refused to participate in the endline survey. This represents a response rate of 95%.

Before fieldwork DSWD regional directors, municipal mayors and barangay captains were provided official World Bank letters to announce dates and locations of survey implementation. Letters were followed up by courtesy calls or personal visits to inform on the purpose of the study and broad operational plans and to request support for logistical details of how to navigate barangays. A small number of barangays were replaced due to safety concerns.

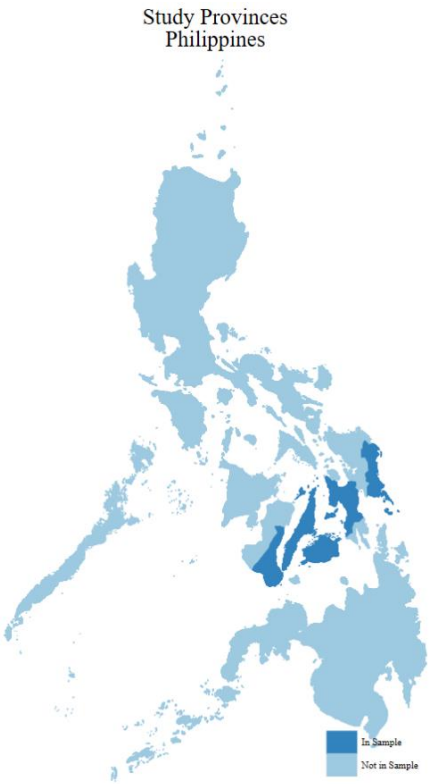
The IE originally intended to look at child diarrhea prevalence as a secondary outcome. However due to the shift in the focus of the evaluation and the different methodology of collecting the child health roster in each survey round, diarrhea was dropped as an outcome of the study. At baseline households were asked about each child's health status separately, while at endline households were asked about the aggregate incidence of diarrhea and other symptoms for all children under 5 years old in the household. This prevents us from supplementing the definition of child diarrhea using multiple symptoms, like blood or mucus in the stool. This is important as some primary caregivers are unable to accurately diagnose diarrhea in children. Additionally, our statistical power reduces by almost two thirds, because the number individual data points goes down from 2246 at baseline to 831 at endline.

Study population and sampling strategy

Following DSWD's program design and prioritization criteria[25], Central Visayas (Region 7) and Western Visayas (Region 8) were selected for the study. These are among the poorest regions, with the highest concentration of households in the lowest income quantile (i.e., USD 0-USD 229 annual per capita per region). Moreover, Region 7 and Region 8 are also among regions with highest percentage of households defecating the open and using unimproved toilets in the country, at 18% and 19% respectively. Therefore, they are key regions in Zero Open Defecation (ZOD) campaign.

[25] At municipal level, the selection criteria comprises of: (i) implementation of the Zero Open Defecation (ZOD) Program; (ii) high levels of OD and unimproved sanitation; (iii) high levels of poverty; and (iv) large numbers of barangays; while at barangay level, the criteria consists of: (i) WASH convergence priority areas for implementing ZOD; (ii) at least 40 Pantawid beneficiary households; and (iii) greater than 20% households practice open defecation

FIGURE 11 : MAP OF STUDY REGIONS



Treatment was randomly assigned at the barangay (village) cluster level. Barangays were randomized within municipality to one of the three treatment arms, or comparison arm. (stratified randomization within municipality).

For this evaluation we included 17 municipalities in the provinces of Negros Oriental, Cebu and Bohol (Region 7), and Leyte and Eastern Samar (Region 8). We selected those municipalities based on the levels of poverty, open defecation, unimproved sanitation and inclusion in the ZOD coverage area.

Figure 11 shows the geographic distribution of study barangays in one of the five study provinces (see Appendix for additional maps of other provinces). At baseline we selected 272 barangays across 17 municipalities, based on the following criteria:

- WASH priority areas identified for WASH convergence
- Participation in the national ZOD Program
- At least 20% of households in the barangay had no latrine
- At least 40 households in the barangay are 4Ps beneficiaries

In each barangay, we used the National Household Targeting System (NHTS-PR) list to randomly select 15 4Ps beneficiary households to be included in our sample. At baseline 4,080 households from 272 sample barangays were interviewed. The sample was reduced at the endline survey by 30% due to budget constraints. Therefore, the endline survey included 2,849 households from 190 barangays. For BCC and Hardware arms simple random selection was used to select 70% of the original study barangays. However, for the MFI arms, the barangays were split into 3 groups classified by uptake of the ASA financial package based on monitoring data, and from each group 70% of barangays were randomly selected to be revisited in the endline survey. This stratified random sampling was done to ensure that high uptake barangays (or the low uptake barangays) were not under or over-represented. The categories were 0-30% low uptake; 30-70% medium uptake and 71-100% high uptake.

To address concerns about internal validity due to this sampling design, we included Table 24 in the Annex on baseline balance between study barangays that were excluded at endline and those that were kept at endline. The results show that households share most characteristics, except for the improved sanitation variable, Sanitation Ladder Index and lower likelihood to have a handwashing station near the latrine. These findings raise internal validity concerns that the impacts of the financial subsidies may be overestimated.

Prior to the sample selection the baseline survey firm conducted a verification of the NHTS-PR to determine its accuracy and reliability. In each province, 3 barangays and 25 households per barangay were randomly selected for verification. A total of 450 households were verified.

Generally, the list was found to be accurate and reliable. All the names were verified to be living in the barangay or were once residents of the barangay.

FIGURE 13 : LOCATION OF STUDY BARANGAYS

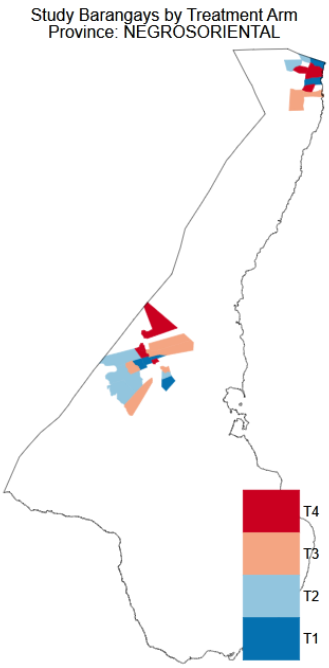


FIGURE 14 : LOCATION OF STUDY BARANGAYS

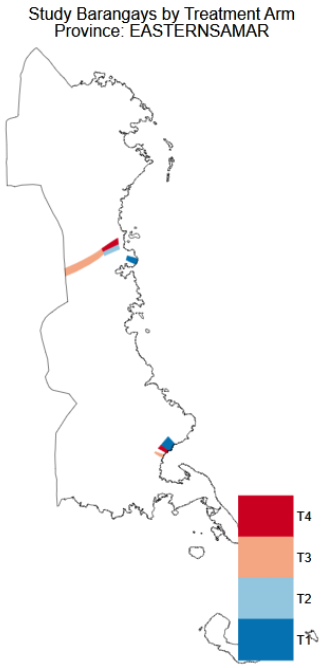


FIGURE 12 : LOCATION OF STUDY BARANGAYS

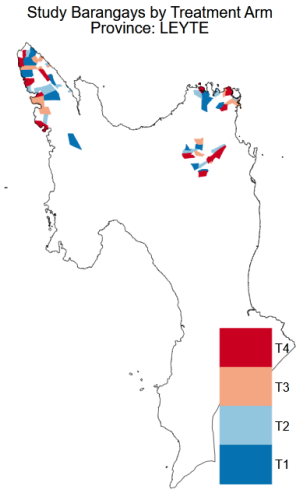


FIGURE 15 : LOCATION OF STUDY BARANGAYS

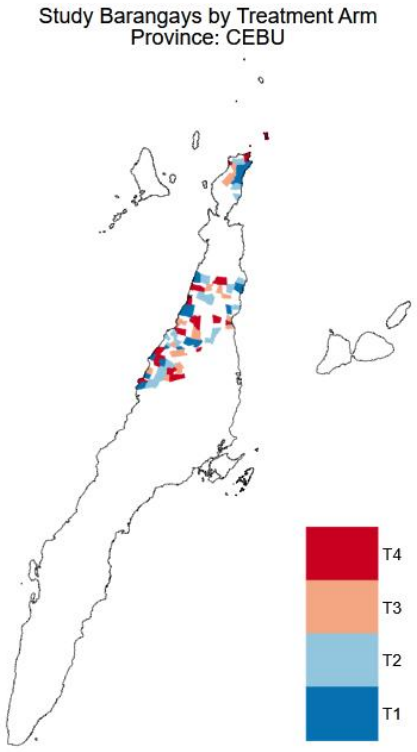
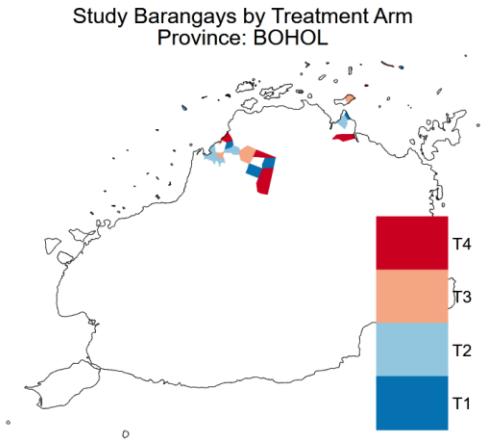


FIGURE 16 : LOCATION OF STUDY BARANGAYS



Power Calculations

Table 15 presents power calculations for the primary outcome of reductions in unimproved sanitation. Using the baseline data, we were able to directly estimate the proportion of our sample that practices open defecation (OD) and that does not have access to improved sanitation (i.e. unimproved sanitation). The minimum detectable effect (MDE) for unimproved sanitation is 12%.

TABLE 15 : EXPECTED POWER AND SAMPLE SIZES FOR REDUCTIONS IN UNIMPROVED SANITATION – FROM THE BASELINE DATA

Treatment Arm	Detectable Effect	Mean in Treatment Arm	Required Clusters	Households (15/cluster)	Power
T4	-12%	49%	68	1020	>80%
T3	-12%	49%	68	1020	>80%
T1*	-	61%	68	1020	-
Total:		-	272	4080	

* T1 clusters serve as the comparison group for all treatment arms

Recent impact evaluations in Tanzania and India suggest these MDEs on access to sanitation and open defecation are reasonable. In the Tanzania experiment (non-subsidy approach), there was a 12% increase in access to sanitation (versus 39% control) and 12% reduction in OD (vs. 23% control). In the India experiment (subsidy approach), there was 19% increase in access (vs. 22% control) and 10% reduction in OD (vs. 84% control).

TABLE 16 : EXPECTED POWER AND SAMPLE SIZES FOR REDUCTIONS IN UNIMPROVED SANITATION

Treatment Arm	Detectable Effect	Mean in Treatment Arm	Required Clusters	Households (15/cluster)	Power
T4	-12%	49%	68	1020	>80%
T3	-12%	49%	68	1020	>80%
T1*	-	61%	68	1020	-
Total:		-	272	4080	

*T1 clusters serve as the comparison group for T3 and T4

TABLE 17 : EXPECTED POWER AND SAMPLE SIZE FOR OPEN DEFECATION

Treatment Arm	Detectable Effect	Mean in Treatment Arm	Required Clusters	Households (15/cluster)	Power
T4	-13%	27%	68	1020	>80%
T3	-13%	27%	68	1020	>80%
T1*	-	40%	68	1020	-
Total:		-	272	4080	

*T1 clusters serve as the comparison group for T3 and T4

Baseline balance

The randomized controlled trial design assumes that households are balanced at baseline on all observable and un-observable variables. We confirmed this baseline balance by testing difference in means (using a t-test) across key variables between the study arms at baseline. We find only one variable, value of agricultural land, was statistically significantly different across the study arms at baseline. Therefore, we are confident that the random assignment has achieved balance across the study arms. Table 19 in the Annex shows the full balance table.

Attrition

We calculated how many households were unreachable in the barangays that were retained for the endline survey. The table below describes how many baseline households were assigned in each treatment arm and how many were successful. Table 18 below shows that T2 had the lowest attrition out of all treatment arms at 3.89% and T3 had highest attrition rate at 6.68%. Given that all treatment arms had low attrition, we do not think attrition biases our results.

TABLE 18 SAMPLE ATTRITION

	T1	T2	T3	T4
Assigned	705	720	704	720
Interviewed	668	692	657	678
Not reached	37	28	47	42
Attrition	5.25%	3.89%	6.68%	5.83%

Intervention Details

Behavior change materials used in FDS

FIGURE 17 : FLIPCHARTS

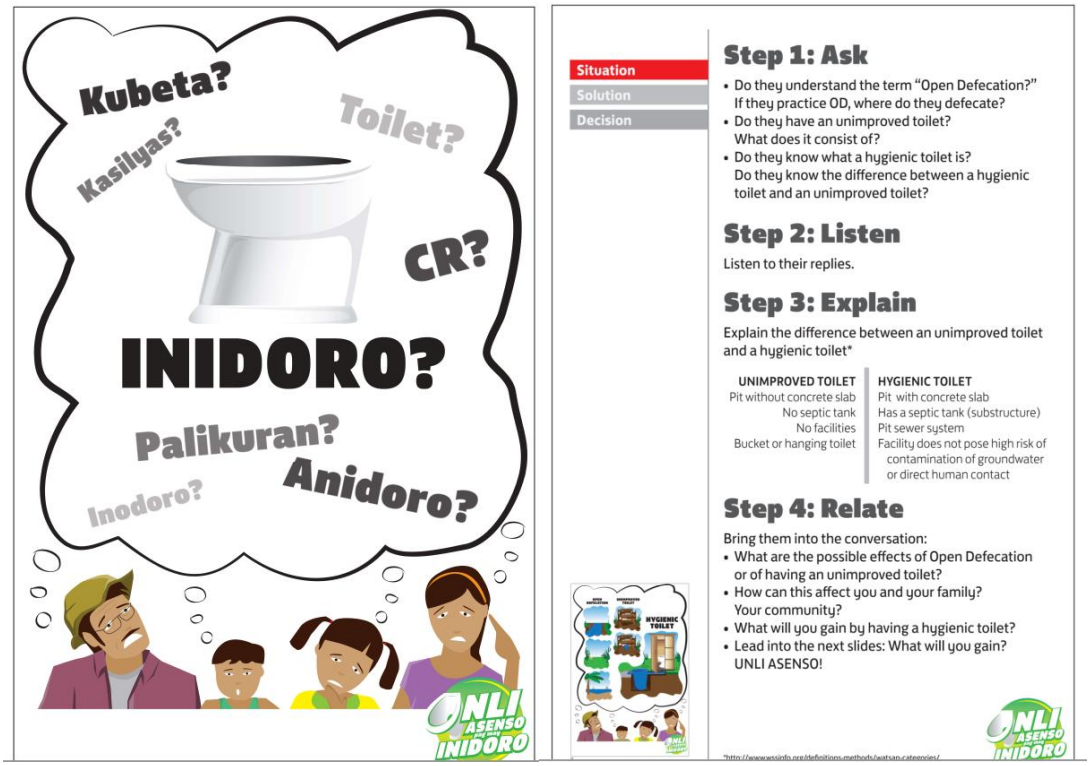


FIGURE 18 : POSTERS

Annex Tables

TABLE 19 : BASELINE BALANCE TABLE

		(1)		(2)		(3)		(4)	t-test	t-test	t-test	t-test	t-test	t-test
		T1		**T2**		**T3**		**T4**	Difference	Difference	Difference	Difference	Difference	Difference
Variable	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)
Household Size	668	5.690	692	5.671	657	5.712	678	5.740	0.020	-0.022	-0.050	-0.042	-0.070	-0.028
	[47]	[0.093]	[48]	[0.089]	[47]	[0.116]	[48]	[0.110]						
# Working age household members	668	0.885	692	0.815	657	0.811	678	0.866	0.070	0.073	0.019	0.004	-0.051	-0.055
	[47]	[0.057]	[48]	[0.056]	[47]	[0.051]	[48]	[0.058]						
# Adult household members	668	2.549	692	2.566	657	2.571	678	2.596	-0.017	-0.021	-0.046	-0.004	-0.029	-0.025
	[47]	[0.044]	[48]	[0.045]	[47]	[0.060]	[48]	[0.049]						
Number of children under 5 years old	668	0.704	692	0.733	657	0.726	678	0.717	-0.029	-0.022	-0.013	0.007	0.016	0.009
	[47]	[0.041]	[48]	[0.033]	[47]	[0.034]	[48]	[0.037]						
Number of bedrooms	668	1.493	692	1.425	657	1.411	678	1.426	0.068	0.082	0.066	0.014	-0.001	-0.015
	[47]	[0.042]	[48]	[0.043]	[47]	[0.040]	[48]	[0.041]						
Household Owns the house	668	0.763	692	0.731	657	0.772	678	0.749	0.032	-0.008	0.014	-0.040	-0.018	0.022
	[47]	[0.034]	[48]	[0.033]	[47]	[0.032]	[48]	[0.033]						
Household Rents the house	668	0.237	692	0.269	657	0.228	678	0.251	-0.032	0.008	-0.014	0.040	0.018	-0.022
	[47]	[0.034]	[48]	[0.033]	[47]	[0.032]	[48]	[0.033]						
Household has remittances	668	0.165	692	0.158	657	0.139	678	0.161	0.007	0.026	0.004	0.019	-0.003	-0.022
	[47]	[0.021]	[48]	[0.023]	[47]	[0.021]	[48]	[0.025]						
Household has salary income	668	0.073	692	0.068	657	0.097	678	0.091	0.005	-0.024	-0.018	-0.029	-0.024	0.006
	[47]	[0.020]	[48]	[0.020]	[47]	[0.024]	[48]	[0.021]						
Household has agricultural land	668	0.033	692	0.035	657	0.056	678	0.062	-0.002	-0.023	-0.029	-0.022	-0.027	-0.006
	[47]	[0.009]	[48]	[0.011]	[47]	[0.013]	[48]	[0.015]						
Agricultural land area m2	668	23.861	692	8.884	657	62.574	678	80.084	14.976	-38.713	-56.223	-53.689	-71.200	-17.510
	[47]	[19.709]	[48]	[7.282]	[47]	[60.952]	[48]	[47.579]						
Agricultural land value PHP	668	425.322	692	534.682	657	1063.927	678	1210.914	-109.360	-638.605**	-785.593**	-529.245*	-676.232*	-146.988
	[47]	[142.987]	[48]	[152.928]	[47]	[257.569]	[48]	[315.216]						
Toilet has handwashing station	668	0.174	692	0.175	657	0.160	678	0.158	-0.001	0.014	0.016	0.015	0.017	0.002
	[47]	[0.026]	[48]	[0.026]	[47]	[0.027]	[48]	[0.022]						
Reported Toilet Satisfaction	668	2.487	692	2.590	657	2.493	678	2.504	-0.103	-0.007	-0.018	0.096	0.085	-0.011
	[47]	[0.099]	[48]	[0.100]	[47]	[0.099]	[48]	[0.100]						
Toilet is under construction	668	0.216	692	0.179	657	0.209	678	0.195	0.036	0.007	0.021	-0.029	-0.015	0.014
	[47]	[0.024]	[48]	[0.026]	[47]	[0.026]	[48]	[0.026]						
Binary for JMPSan indicator	668	0.561	692	0.600	657	0.525	678	0.546	-0.038	0.036	0.016	0.075	0.054	-0.021
	[47]	[0.036]	[48]	[0.038]	[47]	[0.037]	[48]	[0.038]						
Binary for JMPWater indicator	668	0.696	692	0.647	657	0.673	678	0.712	0.049	0.023	-0.016	-0.025	-0.065	-0.040
	[47]	[0.033]	[48]	[0.032]	[47]	[0.033]	[48]	[0.033]						
Sanitation Ladder Index	668	1.548	692	1.632	657	1.464	678	1.547	-0.084	0.084	0.001	0.167	0.084	-0.083
	[47]	[0.103]	[48]	[0.107]	[47]	[0.109]	[48]	[0.110]						

The value displayed for t-tests are the differences in the means across the groups.

Standard errors are clustered at the barangay level.

All missing values in balance variables are treated as zero.

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

TABLE 20 : PROFILE OF HOUSEHOLDS THAT RECEIVED HARDWARE SUBSIDIES

		T1		T2	t-test Difference
Variable	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	(1)-(2)
Household Size	120	5.667	188	5.505	0.161
	[40]	[0.201]	[40]	[0.137]	
# Working age household members	120	0.908	188	0.851	0.057
	[40]	[0.098]	[40]	[0.083]	
# Adult household members	120	2.450	188	2.431	0.019
	[40]	[0.077]	[40]	[0.071]	
Number of children under 5 years old	120	0.733	188	0.729	0.005
	[40]	[0.083]	[40]	[0.070]	
Number of bedrooms	120	1.358	188	1.314	0.045
	[40]	[0.068]	[40]	[0.059]	
Household Owns the house	120	0.742	188	0.739	0.002
	[40]	[0.045]	[40]	[0.047]	
Household Rents the house	120	0.258	188	0.261	-0.002
	[40]	[0.045]	[40]	[0.047]	
Household has remittances	120	0.167	188	0.160	0.007
	[40]	[0.038]	[40]	[0.040]	
Household has salary income	120	0.075	188	0.074	0.001
	[40]	[0.031]	[40]	[0.025]	
Household has agricultural land	120	0.050	188	0.032	0.018
	[40]	[0.022]	[40]	[0.015]	
Agricultural land area m2	120	0.033	188	0.096	-0.062
	[40]	[0.016]	[40]	[0.066]	
Agricultural land value PHP	120	408.333	188	664.894	-256.560
	[40]	[269.860]	[40]	[321.106]	
Toilet has handwashing station	120	0.158	188	0.181	-0.023
	[40]	[0.054]	[40]	[0.044]	
Reported Toilet Satisfaction	120	2.158	188	2.574	-0.416*
	[40]	[0.164]	[40]	[0.137]	
Toilet is under construction	120	0.192	188	0.186	0.005
	[40]	[0.038]	[40]	[0.038]	
Binary for JMPSan indicator	120	0.408	188	0.564	-0.155*
	[40]	[0.063]	[40]	[0.060]	
Binary for JMPWater indicator	120	0.675	188	0.644	0.031
	[40]	[0.051]	[40]	[0.045]	
Sanitation Ladder Index	120	1.108	188	1.505	-0.397
	[40]	[0.175]	[40]	[0.166]	

The value displayed for t-tests are the differences in the means across the groups.

Standard errors are clustered at the barangay level.

All missing values in balance variables are treated as zero.

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

TABLE 21 : TOILET ATTRIBUTES BY TYPE OF SUPPORT

		(1) No Support in BCC arm		(2) Any Hardware Subsidy		(3) 25% MFI		(4) 50% MFI	t-test Difference	t-test Difference	t-test Difference	t-test Difference	t-test Difference
Variable	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)
Sewage	548	0.051	429	0.047	169	0.036	267	0.037	0.004	0.016	0.014	0.011	0.009
	[47]	[0.012]	[129]	[0.011]	[26]	[0.015]	[42]	[0.015]					
Latrine Features: Raised platform	548	0.093	429	0.159	169	0.083	267	0.082	-0.065**	0.010	0.011	0.076*	0.076**
	[47]	[0.023]	[129]	[0.025]	[26]	[0.035]	[42]	[0.022]					
Latrine Features: Footrest	548	0.108	429	0.149	169	0.077	267	0.097	-0.042	0.031	0.010	0.072*	0.052
	[47]	[0.030]	[129]	[0.027]	[26]	[0.027]	[42]	[0.031]					
Latrine Features: Seat	548	0.553	429	0.709	169	0.852	267	0.831	-0.156***	-0.299***	-0.279***	-0.143***	-0.123***
	[47]	[0.041]	[129]	[0.031]	[26]	[0.027]	[42]	[0.029]					
Latrine Features: Floor tiles/concrete	548	0.482	429	0.590	169	0.769	267	0.749	-0.108**	-0.287***	-0.267***	-0.179***	-0.159***
	[47]	[0.045]	[129]	[0.036]	[26]	[0.054]	[42]	[0.036]					
Latrine Features: Fully enclosed wall	548	0.476	429	0.604	169	0.799	267	0.835	-0.127***	-0.323***	-0.359***	-0.195***	-0.231***
	[47]	[0.036]	[129]	[0.031]	[26]	[0.034]	[42]	[0.030]					
Latrine Features: Fully covered roof	548	0.471	429	0.597	169	0.805	267	0.828	-0.126***	-0.334***	-0.357***	-0.208***	-0.231***
	[47]	[0.036]	[129]	[0.031]	[26]	[0.027]	[42]	[0.029]					
Latrine Features: Door/curtain	548	0.553	429	0.690	169	0.840	267	0.869	-0.137***	-0.287***	-0.316***	-0.150***	-0.179***
	[47]	[0.039]	[129]	[0.030]	[26]	[0.029]	[42]	[0.024]					
Latrine Features: Water seal	548	0.137	429	0.191	169	0.095	267	0.172	-0.054	0.042	-0.035	0.096*	0.019
	[47]	[0.028]	[129]	[0.029]	[26]	[0.044]	[42]	[0.045]					
Flies	548	0.002	429	0.007	169	0.000	267	0.007	-0.005	0.002	-0.006	0.007	-0.000
	[47]	[0.002]	[129]	[0.005]	[26]	[0.000]	[42]	[0.005]					
Toilet has handwashing station	548	0.182	429	0.198	169	0.302	267	0.292	-0.016	-0.119**	-0.110	-0.104*	-0.094
	[47]	[0.037]	[129]	[0.026]	[26]	[0.047]	[42]	[0.060]					
Soap Water	548	1.770	429	2.226	169	2.604	267	2.697	-0.456***	-0.833***	-0.927***	-0.377***	-0.471***
	[47]	[0.124]	[129]	[0.087]	[26]	[0.082]	[42]	[0.065]					
Toilet Quality Index	548	2.995	429	3.848	169	4.391	267	4.543	-0.854***	-1.396***	-1.549***	-0.542**	-0.695***
	[47]	[0.214]	[129]	[0.173]	[26]	[0.193]	[42]	[0.114]					

THE VALUE DISPLAYED FOR T-TESTS ARE THE DIFFERENCES IN THE MEANS ACROSS THE GROUPS. STANDARD ERRORS ARE CLUSTERED AT THE BARANGAY LEVEL. ALL MISSING VALUES IN BALANCE VARIABLES ARE TREATED AS ZERO.

***, **, AND * INDICATE SIGNIFICANCE AT THE 1, 5, AND 10 PERCENT CRITICAL LEVEL.

TABLE 22 : ENDLINE PROBIT ESTIMATES

	(1)	(2)	(3)	(4)
	Improved Sanitation	HH built or upgraded latrine	Constraint is Credit	Constraint is Hardware
T3	-0.16	0.59***	-0.37***	-0.20*
	(0.13)	(0.12)	(0.12)	(0.12)
T4	0.28**	1.08***	-0.73***	-0.43***
	(0.13)	(0.10)	(0.11)	(0.09)
HH head's age	0.02***	0.00	-0.00	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)
HH head's sex	0.08	-0.07	0.00	0.01
	(0.13)	(0.11)	(0.10)	(0.11)
HH head's education	0.21***	0.05**	-0.06***	-0.07***
	(0.03)	(0.02)	(0.02)	(0.03)
Constant	-0.13	-0.90***	0.04	-0.35
	(0.32)	(0.25)	(0.27)	(0.26)
N. of obs.	1959	2003	2003	2003

Dummy for each municipality is added

Standard errors are clustered at the barangay level.

Outcome variable definitions:

All outcomes variables: 1-Yes 0-No

TABLE 23 : ENDLINE PROBIT ESTIMATES

	(1) HH is *Very Satisfied* with toilet	(2) HH has flush toilet	(3) No one in HH does OD	(4) HH Has Loan for Latrine Improve - ments
T3	0.30***	-0.11	-0.01	1.25***
	(0.10)	(0.12)	(0.14)	(0.18)
T4	0.46***	0.28**	0.27**	1.72***
	(0.09)	(0.13)	(0.12)	(0.17)
HH head's age	0.00	0.01**	0.01**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
HH head's sex	-0.11	0.07	0.13	-0.08
	(0.09)	(0.11)	(0.12)	(0.13)
HH head's education	0.05**	0.13***	0.20***	0.01
	(0.02)	(0.03)	(0.03)	(0.03)
Constant	-0.69**	0.50*	-0.25	-2.04***
	(0.29)	(0.28)	(0.33)	(0.32)
N. of obs.	2003	1959	1959	2003

Dummy for each municipality is added
Standard errors are clustered at the barangay level.
Outcome variable definitions:
All outcomes variables: 1-Yes 0-No

TABLE 24 : BASELINE BALANCE BETWEEN BARANGAYS KEPT AND DROPPED FROM ENDLINE SURVEY

Variable	N/[Clusters]	(1) Kept at Endline Mean/SE	N/[Clusters]	(2) Dropped at Endline Mean/SE	t-test Difference (1)-(2)
Household Size	2695	5.703	1385	5.580	0.123
	[190]	[0.051]	[176]	[0.076]	
# Working age household members	2695	0.844	1385	0.825	0.020
	[190]	[0.028]	[176]	[0.039]	
# Adult household members	2695	2.571	1385	2.565	0.005
	[190]	[0.025]	[176]	[0.039]	
# children under 5	2695	0.720	1385	0.707	0.013
	[190]	[0.018]	[176]	[0.024]	
Number of bedrooms	2695	1.439	1385	1.428	0.010
	[190]	[0.021]	[176]	[0.035]	
Household Owns the house	2695	0.754	1385	0.751	0.003
	[190]	[0.016]	[176]	[0.025]	
Household Rents the house	2695	0.246	1385	0.249	-0.003
	[190]	[0.016]	[176]	[0.025]	
Household has remittances	2695	0.155	1385	0.183	-0.028
	[190]	[0.011]	[176]	[0.017]	
Household has salary income	2695	0.082	1385	0.075	0.007
	[190]	[0.010]	[176]	[0.013]	
Household has agricultural land	2695	0.046	1385	0.056	-0.010
	[190]	[0.006]	[176]	[0.010]	
Agricultural land area m2	2695	43.597	1385	20.931	22.666
	[190]	[19.718]	[176]	[11.684]	
Agricultural land value PHP	2695	1122.121	1385	1423.141	-301.020
	[190]	[165.082]	[176]	[265.569]	
Toilet has handwashing station	2695	0.167	1385	0.131	0.035*
	[190]	[0.013]	[176]	[0.015]	
Reported Toilet Satisfaction	2695	2.519	1385	2.463	0.056
	[190]	[0.049]	[176]	[0.073]	
Toilet is under construction	2695	0.199	1385	0.179	0.020
	[190]	[0.013]	[176]	[0.018]	
Binary for JMPSan indicator	2695	0.558	1385	0.500	0.058*
	[190]	[0.019]	[176]	[0.027]	
Binary for JMPWater indicator	2695	0.682	1385	0.651	0.031
	[190]	[0.016]	[176]	[0.025]	
Sanitation Ladder Index	2695	1.549	1385	1.404	0.145
	[190]	[0.053]	[176]	[0.077]	

The value displayed for t-tests are the differences in the means across the groups.

Standard errors are clustered at the barangay level.

All missing values in balance variables are treated as zero.

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

TABLE 25 : BASELINE BALANCE OF HOUSEHOLDS THAT RECEIVED HARDWARE SUBSIDY

		(1)		(2)		(3)	t-test	t-test	t-test
		T1		T3		T4	Difference	Difference	Difference
Variable	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	N/[Clusters]	Mean/SE	(1)-(2)	(1)-(3)	(2)-(3)
Household Size	120	5.667	117	5.803	114	6.061	-0.137	-0.395	-0.258
	[40]	[0.201]	[35]	[0.283]	[41]	[0.191]			
# Working age household members	120	0.908	117	0.932	114	1.096	-0.023	-0.188	-0.165
	[40]	[0.098]	[35]	[0.102]	[41]	[0.105]			
# Adult household members	120	2.450	117	2.530	114	2.842	-0.080	-0.392***	-0.312*
	[40]	[0.077]	[35]	[0.117]	[41]	[0.113]			
# children under 5	120	0.733	117	0.744	114	0.807	-0.010	-0.074	-0.063
	[40]	[0.083]	[35]	[0.088]	[41]	[0.075]			
Number of bedrooms	120	1.358	117	1.350	114	1.368	0.008	-0.010	-0.018
	[40]	[0.068]	[35]	[0.065]	[41]	[0.066]			
Household Owns the house	120	0.742	117	0.726	114	0.711	0.015	0.031	0.016
	[40]	[0.045]	[35]	[0.059]	[41]	[0.072]			
Household Rents the house	120	0.258	117	0.274	114	0.289	-0.015	-0.031	-0.016
	[40]	[0.045]	[35]	[0.059]	[41]	[0.072]			
Baseline annual income in PHP	120	16896.542	117	16602.359	114	17657.851	294.183	-761.309	-1055.492
	[40]	[1596.698]	[35]	[1498.703]	[41]	[1977.602]			
Baseline annual per capita income in PHP	120	3310.314	117	3283.300	114	3106.637	27.014	203.677	176.663
	[40]	[322.733]	[35]	[415.890]	[41]	[390.841]			
Household has remittances	120	0.167	117	0.128	114	0.105	0.038	0.061	0.023
	[40]	[0.038]	[35]	[0.038]	[41]	[0.032]			
Household has salary income	120	0.075	117	0.077	114	0.114	-0.002	-0.039	-0.037
	[40]	[0.031]	[35]	[0.024]	[41]	[0.034]			
Household has agricultural land	120	0.050	117	0.060	114	0.105	-0.010	-0.055	-0.045
	[40]	[0.022]	[35]	[0.020]	[41]	[0.030]			
Agricultural land area m2	120	0.033	117	0.538	114	0.219	-0.505	-0.186	0.319
	[40]	[0.016]	[35]	[0.387]	[41]	[0.176]			
Agricultural land value PHP	120	408.333	117	974.359	114	2228.070	-566.026	-1819.737**	-1253.711
	[40]	[269.860]	[35]	[443.136]	[41]	[687.095]			
Toilet has handwashing station	120	0.158	117	0.154	114	0.132	0.004	0.027	0.022
	[40]	[0.054]	[35]	[0.041]	[41]	[0.031]			
Reported Toilet Satisfaction	120	2.158	117	2.735	114	2.281	-0.577**	-0.122	0.454**
	[40]	[0.164]	[35]	[0.152]	[41]	[0.169]			
Toilet is under construction	120	0.192	117	0.222	114	0.237	-0.031	-0.045	-0.015
	[40]	[0.038]	[35]	[0.051]	[41]	[0.047]			
Improved Sanitation	120	0.408	117	0.581	114	0.491	-0.173**	-0.083	0.090
	[40]	[0.063]	[35]	[0.054]	[41]	[0.061]			
Binary for JMPWater indicator	120	0.675	117	0.667	114	0.693	0.008	-0.018	-0.026
	[40]	[0.051]	[35]	[0.063]	[41]	[0.060]			
Toilet Quality Index	120	1.108	117	1.615	114	1.351	-0.507**	-0.243	0.265
	[40]	[0.175]	[35]	[0.159]	[41]	[0.170]			

The value displayed for t-tests are the differences in the means across the groups.

Standard errors are clustered at barangay level.

All missing values in balance variables are treated as zero.

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

TABLE 26 : COST OF SUBSIDIZED LOANS

Cost of subsidized ASA loan is as follows*:					
Treatment Arm	Subsidy Amount	Default Amount	Total Variable costs	# of beneficiary HHs	Per HH variable costs USD $
T3	PHP 418,750	PHP 10,100	PHP 428,850	331	USD 24.9
T4	PHP 1,428,500	PHP 26,550	PHP 1,455,050	487	USD 57.4
Note: Exchange rate of 52 PhP per 1 USD used in calculations *Information provided by ASA					

TABLE 27 : COST OF HARDWARE SUBSIDY INTERVENTION - EXAMPLE

Program Name	Location	Total program cost	HH	Persons	Cost/Capita	Cost/HH	Cost/Capita	Cost/HH
KC-NCDDP	Municipality A*				PhP	PhP	USD	USD
	Barangay 1	PHP 1,186,989	98	490	PHP 2,422	PHP 12,112	USD 47	USD 233
	Barangay 2	PHP 3,788,000	357	1785	PHP 2,122	PHP 10,611	USD 41	USD 204
	Municipality B							
	Barangay 1	PHP 1,879,179	90	450	PHP 4,176	PHP 20,880	USD 80	USD 402
	Barangay 2	PHP 2,141,680	101	505	PHP 4,241	PHP 21,205	USD 82	USD 408
	Barangay 3	PHP 1,747,097	81	405	PHP 4,314	PHP 21,569	USD 83	USD 415
Cash for Work / Cash for Building Livelihood Assets (CBLA) - integrated with SLP	Municipality C							
	Barangay 1	PHP 158,400	60	300	PHP 528	PHP 2,640	USD 10	USD 51
	Barangay 2	PHP 332,640	126	630	PHP 528	PHP 2,640	USD 10	USD 51
	Barangay 3	PHP 2,999,040	1136	5680	PHP 528	PHP 2,640	USD 10	USD 51
	Municipality D							
	Barangay 1	PHP 500,000	242	1210	PHP 413	PHP 2,066	USD 8	USD 40
*Actual names of barangays and municipalities was deanonymized.								

TABLE 28 : COST ANALYSIS

Row	Intervention	Cost per HH (US$)	Additional cost of CLTS (all HH receive CLTS) (US$)	Number of HHs who took up intervention	Improved Sanitation At Baseline (% of all HH who took up intervention)	Improved Sanitation At Endline (% of all HH who took up intervention)	Change (%)	Change (N)	Total cost (All HHs who took up intervention multiplied by per HH cost) (US$)	Cost per HH to adopt improved sanitation (US$)
1	FDS	No data								
2	CLTS	13		548	59.5%	79.2%	19.7%	108	7,124	66
3	Hardware (WB estimate)	73	13.0	429	50.1%	87.2%	37.1%	159	36,894	232
4	Hardware (average cost for barangays where data was available)	205.9	13.0	429	50.1%	87.2%	37.1%	159	93,908	590
5	25% subsidy loan (from ASA documents)	24.9	13.0	169	59.8%	98.8%	39.1%	66	6,408	97
6	50% subsidy loan (from ASA documents)	57.4	13.0	267	59.2%	99.6%	40.4%	108	18,812	174
7	25% subsidy loan (assuming 2500 php per hh subsidy and 2500 php for MFI operations)	96.1	13.0	169	59.8%	98.8%	39.1%	66	18,447	280
8	50% subsidy loan (assuming 5000 php per hh subsidy and 2500 php for MFI operations)	144.2	13.0	267	59.2%	99.6%	40.4%	108	41,981	389
9	25% subsidy loan (assuming 2500 php per hh subsidy)	48.0	13.0	169	59.8%	98.8%	39.1%	66	10,322	156
10	50% subsidy loan (assuming 5000 php per hh subsidy)	96.1	13.0	267	59.2%	99.6%	40.4%	108	29,144	270

TABLE 29 : GEOGRAPHIC COVERAGE OF HARDWARE SUBSIDIES

		Source of Hardware Support		
Municipality	N Obs.	Municipality / Barangay	SLP	Kalahi CIDDS
Alangalang	170	10.0%	0.6%	0.6%
Asturias	170	17.1%	0.0%	1.8%
Babatngon	130	4.6%	2.3%	6.2%
Bien Unido	84	3.6%	0.0%	0.0%
Borbon	89	10.1%	5.6%	2.2%
Buenavista	146	13.0%	3.4%	0.0%
Calubian	167	9.0%	4.2%	3.0%
Daanbantayan	130	10.0%	0.8%	0.8%
Gen MacArthur	59	6.8%	3.4%	16.9%
Mabinay	184	20.7%	0.0%	0.0%
San Isidro	118	5.1%	0.0%	27.1%
Sogod	83	13.3%	6.0%	3.6%
Sulat	44	9.1%	2.3%	68.2%
Tabango	39	2.6%	0.0%	0.0%
Tabuelan	60	11.7%	0.0%	3.3%
Tuburan	229	22.3%	5.2%	0.9%
Vallehermoso	101	5.0%	0.0%	6.9%
Total	2003			

References

Ahmed, M., Alam, J. B., Rahman, M. T., Hoque, M. A., & Sarkar, M. S. (2008). Sanitation Condition of Low-Income Areas in Sylhet City and Ways to Its Improvement. *Asian Journal of Water, Environment and Pollution, 5*(3), 29-34. Retrieved 4 29, 2019, from https://content.iospress.com/articles/asian-journal-of-water-environment-and-pollution/ajw5-3-06

Alessandro Tarozzi, A. M. (2014). Micro-Loans, Insecticide-Treated Bednets, and Malaria:Evidence from a Randomized Controlled Trial in Orissa, India. *American Economic Review*, 104(7): 1909–1941.

Andrés et al. (2017). Sanitation and externalities: evidence from early childhood health in rural India. *Journal of Water, Sanitation and Hygiene for Development*, 272-289.

Banerjee, A. V. (2003). *The World Bank of the Future .* Washington DC: World Bank.

Baskovitch, M. (2011). *Sanitation markets at the bottom of the pyramid: A win-win scenario for government, the private sector, and communities. .* Washington DC: World Bank.

Briceno, B., Coville, A., & Martinez, S. (2015). *Promoting handwashing and sanitation : evidence from a large-scale randomized trial in rural Tanzania.* Washington DC: World Bank Group.

Cairncross, S., Bartram, J., Cumming, O., & Brocklehurst, C. (2010). Hygiene, Sanitation, and Water: What Needs to Be Done? *PLOS Medicine, 7*(11). Retrieved 4 29, 2019, from https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000365

Cameron, L. &. (2010). Scaling up rural sanitation: findings from the impact evaluation baseline survey in Indonesia. *WSP. Technical Paper* .

Crocker, J. S. (2017). The true costs of participatory sanitation: evidence from community-led total sanitation studies in Ghana and Ethiopia. *Science of the Total Environment*, 601, 1075-1083.

Curtis V, C. S. (2003). Effect of washing hands with soap on diarrhea risk in the community: a systematic review. *Lancet Infectious Diseases, 3*(5), 275–81. Retrieved 4 29, 2019

Dangour, A. D. (2013). Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children. *Reviews*. Retrieved 4 29, 2019, from http://researchonline.lshtm.ac.uk/1119171/1/CD009382.pdf

Devoto, F., Duflo, E., Dupas, P., Parienté, W., & Pons, V. (2011). Happiness on Tap: Piped Water Adoption in Urban Morocco. *National Bureau of Economic Research*. Retrieved 4 29, 2019, from https://ideas.repec.org/p/nbr/nberwo/16933.html

Dupas, P. (2011). Health Behavior in Developing Countries. *Annual Review of Economics*, Vol. 3:425-449.

EDCOP. (2018). Formulation of Philippine Water Supply and Sanitation Master Plan. *Philippines Water and Sanitation Forum* (pp. 242-263). water.org.

Günther, I., & Fink, G. (2010). *Water, sanitation and children's health : evidence from 172 DHS surveys*. Retrieved 4 29, 2019, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1593423

Hammer, J. S., & Spears, D. (2013). *Village sanitation and children's human capital: evidence from a randomized experiment by the Maharashtra government*. Retrieved 4 29, 2019, from http://documents.worldbank.org/curated/en/2013/08/18125015/village-sanitation-childrens-human-capital-evidence-randomized-experiment-maharashtra-government

Hanchett, S., Krieger, L., Kahn, M., Kullmann, C., & Ahmed, R. (2011). *Long-term Sustainability of Improved Sanitation in Rural Bangladesh.* Washington D.C.: World Bank. Retrieved from https://www.wsp.org/sites/wsp/files/publications/WSP-Sustainability-Sanitation-Bangladesh-Report.pdf

Hutton et al. (2008). *Economic Impacts of Sanitation in Southeast Asia.* Washington DC: World Bank.

IDInsight. (2013). Microfinance loans to increase sanitary latrine sales: Evidence from a randomized trial in rural Cambodia. IDInsight. Retrieved from http://idinsight.org/insights/wtp/IDinsight%20policy%20brief%20-%20microfinance%20loans%20for%20latrines%20in%20Cambodia.pdf

Kunthy, S., & Catalla, R. (2009). *Community-Led Total Sanitation (CLTS) in Cambodia: A Formative Evaluation Report.* UNICEF and Ministry of Rural Development.

Levine, D. I. (2012). What impedes efficient product adoption? Evidence from randomized variation in sales offers for improved cookstoves in Uganda. *Working Paper Series, Institute for Research on Labor and Employmen*, San Francisco: University of California at Berkeley.

Mukherjee, N. &. (2008). *The CLTS Story in Indonesia: Empowering Communities, Transforming Institutions, Furthering Decentralization.* Retrieved from https://doi.org/10.3362/9781780440347.010

O'Donoghue, T. a. (1999). Doing It Now or Later. *American Economic Review*, 89 (1): 103-124.

Pfadenhauer, L., & Rehfuess, E. (2015, February 5). Towards Effective and Socio-Culturally Appropriate Sanitation and Hygiene Interventions in the Philippines: A Mixed Method Approach. *Int J Environ Res Public Health.*(12(2)). doi:10.3390/ijerph120201902

PWSSMP. (2019, 05 30). Retrieved from Philippine Water Supply & Sanitation Master Plan : http://www.pwssmp.com/databook/page/sanitation

Robinson, A., & Gnilo, M. (2016). Beyond ODF: a phased approach to rural sanitation development. In P. Bongartz, N. Vernon, & J. Fox (Eds.), *Sustainable Sanitation for All: Experiences, Challenges, and Innovations.* Rugby: Practical Action Publishing.

Robinson, A., & Gnilo, M. (2016). Promoting choice: Smart finance for rural sanitation development. In P. Bongartz, N. Vernon, & J. Fox (Eds.), *Sustainable Sanitation for All: Experience, Challenges, and Innovations.* Rugby: Practical Action Publishing.

Sophie Trémolet, G. M. (2015). Microfinance for sanitation: what is needed to move to scale? *Waterlines*, Vol. 34 No. 3.

Trémolet, S. (2011). *Identifying the potential for results-based financing for sanitation.* Retrieved 4 29, 2019, from http://wsp.org/sites/wsp.org/files/publications/wsp-tremolet-results-based-financing.pdf

UNICEF. (2017). *UNICEF Field Notes on Community: Learning from Five Country Programmes.*

water.org. (2019, 05 30). *Our Impact - Philippines*. Retrieved from water.org: https://water.org/our-impact/philippines/

World Bank. (2015). *Financing Water And Sanitation for the Poor.* Washington DC: World Bank Group.

World Bank. (2015). *Support to Rural Sanitation Scale Up Under the Philippine National Sustainable Sanitation Plan.* Washigton DC: World Bank.

World Bank. (2016). *Changing Behaviors to Scale Up Rural Sanitation Lessons from Learning Laboratories in the Philippines.* World Bank Group.

World Bank. (2018). *Expanding access to improved sanitation for the poor : insights from the Philippines.* Washington, D.C.: World Bank Group.

WSP. (2011). *Economic Assessment of Sanitation Interventions in the Philippines. A six-country study conducted in Cambodia, China, Indonesia, Lao PDR, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI).*

WSP. (2011). *Factors Associated with Achieving and Sustaining Open Defecation Free Communities: Learning from East Java.* Research Brief. Retrieved from Communities: Learning from East Java

WSP. (2014). Making toilets more affordable for the poor through micro finance. *Learning Note*.

Yishay, A. B. (2017). Microcredit and willingness to pay for environmental quality: Evidence from a randomized-controlled trial of finance for sanitation in rural Cambodia. *Journal of Environmental Economics and Management*, 86, 121-140.

Acronyms

4P	Pantawid Pamilyang Pilipino Program
ADB	Asian Development Bank
CCT	Conditional Cash Transfer
CDD	Community Driven Development
CLTS	Community-Led Total Sanitation
BCC	Behavior Change Communication
DSWD	Department of Social Welfare and Development
FDS	Family Development Session
IE	Impact Evaluation
IPC	Interpersonal Communication
JMP	Joint Monitoring Programme for Water Supply and Sanitation
KC	Kalahi CIDDS or Community Driven Development Program of DSWD
Kalahi CIDDS	Kapit-Bisig Laban Sa Kahirapan - Comprehensive and Integrated Delivery of Social Services
LGU	Local Government Unit
MFI	Micro-Finance Institution
MOH	Ministry of Health – Philippines
NHTS-PR	National Household Targeting System for Poverty Reduction
OD	Open Defecation
S4P	Sanitation for Poor
SIEF	Strategic Impact Evaluation Fund
SLP	Sustainable Livelihood Program
WASH	Water Access, Sanitation and Hygiene
Water GP	Water Global Practice of the World Bank
WB	World Bank
WHO	World Health Organization
WSP	Water and Sanitation Program
ZOD	Zero Open Defecation

Outcome Variable Definitions

Outcome Variable	Definition
Sanitation Ladder Index	0 - No Latrine 1 - Unimproved Pit Latrine 2 - Improved Pit Latrine 3 - Flush Toilet
Reported share of HH members practicing open defecation	5 - All of us 4 - Most of us 3 - Some of us 2 - Few of us 1 - None of us
Toilet satisfaction	1 - Very dissatisfied 2 - Somewhat dissatisfied 3 - Somewhat satisfied 4 - Very satisfied
Toilet Quality Index	Add one point for presence of each latrine feature: Latrine Features: Raised platform Latrine Features: Footrest Latrine Features: Seat Latrine Features: Floor tiles/concrete Latrine Features: Fully enclosed wall Latrine Features: Partially enclosed wall Latrine Features: Fully covered roof Latrine Features: Partially covered roof Latrine Features: Door/curtain Latrine Features: Water seal