AUTHOR ACCEPTED MANUSCRIPT

FINAL PUBLICATION INFORMATION

Cost-Efficiency of Rural Sanitation Promotion

The definitive version of the text was subsequently published in

Journal of Development Effectiveness, 7(4), 2015-11-03

Published by Taylor and Francis and found at http://dx.doi.org/10.1080/19439342.2015.1105848

THE FINAL PUBLISHED VERSION OF THIS ARTICLE IS AVAILABLE ON THE PUBLISHER'S PLATFORM

Cost-efficiency of Rural Sanitation Promotion: activity-based costing and experimental evidence from Tanzania

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August 2015

Abstract: This paper applies cost-efficiency analysis to an intervention that promotes behavior change for rural sanitation in Tanzania. The campaign targets a number of potential beneficiaries, out of which some are effectively encouraged to adopt the new practices (beneficiaries). As a result, the cost-efficiency of the program depends on the extent of take-up of improved sanitation by the target population, unknown in advance. To correctly account for the costs of households gaining access under this demand-driven approach, both costs (investments) as well as increased access to sanitation are considered outcomes and estimated from samples of beneficiary and control populations, using a randomized controlled trial design. Results show that sanitation promotion did not lead to higher investment relative to the control group and that the cost-per-person effectively gaining access to sanitation is substantially higher than the cost-per-person targeted or at-reach of the campaign. Using these estimates we find that universal coverage can be obtained for the equivalent of 4% of Tanzania's national GDP (2013). We use parameters estimated from the study to simulate cost-per-person of the program when take-up increases (efficiency gains).

Keywords: Sanitation, behavior change, health, Tanzania, field experiment

JEL codes: O12, I15, C93

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Briceño's work on this project between 2010 and 2014 was conducted as Senior Monitoring and Evaluation Specialist at WSP. The authors thank members of WSP including Eduardo Perez, Kaposo Mwambuli, Jason Cardosi, and Yolande Coombes for their support. Data collection was carried out by Hoji Shirima. The authors kindly acknowledge the advisory role of Arjen Naafs, Guy Hutton and Professor Paul Gertler to the study and impact evaluation. Excellent research assistance was provided by Nicolas Ajzenman and Juliana Chen. Generous funding was provided by the Bill and Melinda Gates Foundation. All opinions in this paper are those of the authors and do not necessarily represent the views of the Government of Tanzania, the World Bank, their Executive Directors or the governments they represent.

1. Introduction

Increasing access to sanitation remains a critical task linked to the burden of diarrheal disease (Prüss-Üstun, Bartram et al. 2014), a major cause of preventable deaths among young children in developing countries. According to the WHO/Unicef Joint Monitoring Program (JMP) for water supply and sanitation (WSS), 2.5 billion people lack access to improved sanitation and roughly 1.1 billion of these practice open defecation (WHO & UNICEF, 2013). Achieving the Millennium Development Goal (MDG) for sanitation, which calls for halving the proportion of the population without access to basic sanitation, is estimated to cost US$115 billion, while universal coverage will cost an additional US$217 billion (Hutton 2012). Cost-effective approaches to sanitation service delivery are urgently needed in order to meet these targets.

There is wide recognition that toilet building programs resulted in uneven coverage and failed to promote consistent and long-lasting behavior change. Sanitation promotion, a combination of Community-led Total Sanitation (CLTS) and demand generation, has become an increasingly common approach to stopping open defecation and stimulating demand for higher-service level sanitation. These programs focus on creating open defecation-free (ODF) villages (Chambers and Kar 2008) and moving households up the sanitation ladder from open defecation or unimproved sanitation to improved sanitation.[i] Demand generation activities include public or private sector marketing of sanitation and behavior change communication. Despite growing popularity, recent randomized-controlled trial impact evaluations have documented wide variations in the effectiveness of the approach (see (Cameron, Shah et al. 2013), (Briceno, Coville and Martinez, 2015), (Patil, Arnold et al. 2013), (Clasen, Boisson et al. 2014), (Alzua et al. 2014))

Sanitation and hygiene have received limited attention in economic evaluation of investments in water supply and sanitation (WSS). As early as 2008, an independent evaluation report by Howard White and Victoria Gunnarsson noted that "evidence of relative efficiency of investing in WSS (compared to in other sectors) are, so far, weak and mainly on the aggregate level" and called for an increase of cost-effectiveness studies to help allocate funds to achieve MDGs (IEG,2008).[ii] As such, an important step in this direction is the Economics of Sanitation Initiative (ESI)[iii], which assesses the comparative economic performance of sanitation technology options and program design in East Asia. A more recent global study commissioned by the World Health Organization assesses the costs and benefits of several sanitation interventions to reach the MDGs and universal coverage (Hutton 2012). These studies however, have relied on a paucity of rigorous evidence of program costs and effectiveness, requiring use of estimates of costs and benefits based on case control studies or by employing modeling approaches using published literature on risk reductions.

To our knowledge, this is the first economic evaluation in the WSS sector to be carried out alongside a randomized-controlled trial impact evaluation. Particularly, the study finds cost-per-access (cost-efficiency) of sanitation achieved by the promotion program.[iv] A standard costing methodology is used to estimate costs associated with project design and implementation, while household investment and sanitation parameters used are derived directly from the project's impact evaluation household surveys.

In this way, expenditures and outcomes are obtained simultaneously from the beneficiaries of the project and can be causally attributed to the sanitation promotion intervention, overcoming previous limitations to modeling and inference approaches.

The intervention being evaluated is a large-scale, government-led, rural sanitation and hand-washing promotion project implemented though local governments in Tanzania from mid-2009 to early 2011, with assistance of the Water and Sanitation Program (WSP). The project was implemented under real-world conditions, with little control over subjects' compliance. The behavior change project targets a number of beneficiaries, out of which only a fraction would effectively be encouraged to embrace the new practices. As a result, the effectiveness of the campaign understood as the extent to which sanitation access is effectively achieved, as well as its cost-efficiency and cost-effectiveness (cost-per-outcome)[v], depends on the level of investment and take-up of sanitation practices by the target population. Unlike in supply-driven programs, such as provision of textbooks for instance, the intervention take-up is unknown ex-ante. The costing of this type of project is more complex because of the various stakeholders and levels involved, and because associated household costs (i.e. expenditure on latrines), are considered outcomes of the project itself.

Section 2 discusses the project being evaluated and section 3 the methods. Sections 4 and 5 discuss the data and results. The final section concludes.

2. The Project

The rural sanitation and handwashing behavior change project was a large scale intervention implemented in 10 districts of Tanzania from mid-2009 to early 2011. The project covered 4 groups of wards receiving the sanitation activities alone, the handwashing activities alone, both sanitation and handwashing activities (collocated). A sub-set of wards with no intervention served as a comparison group. Because in Tanzania basic latrines were widespread as a result of a rapid top-down approach during the 1970s (World Bank, 1996), the sanitation project focused on moving people up the sanitation ladder towards having better quality latrines that meet the JMP "improved" sanitation standard, as well as strengthening of the supply of sanitation goods and services. The handwashing component focused on forming good handwashing habits through enabling technologies (e.g. handwashing stations) and behavior change communications. The remainder of this paper focuses on the sanitation intervention in both the sanitation-only and collocated arms of the project.

The rural sanitation project aimed to create demand for sanitation at the community level through CLTS and at the household level through sanitation marketing while simultaneously improving the supply of sanitation goods and services. It targeted 750,000 people (150,000 households). In total, 1,440 communities received CLTS triggering, and 540 masons were trained across the 10 districts.

With support of village authorities, trained facilitators performed the CLTS triggering in the village, after which the communities would develop a sanitation action plan to become ODF. To strengthen the supply of sanitation goods and services, the project trained masons in latrine construction and marketing. Sanitation was marketed through various media channels, including a radio campaign at the

national level. At the local level, promotional activities were delivered by village leaders, community health, water, and political figures, and 'CLTS champions'. A campaign slogan "choo bora chawesekana" ("a good latrine is possible") was used in radio talk shows and radio/live drama (WSP, 2010). The positive messages used by the campaign emphasizing modernity and empowerment were a departure from the usual focus of CLTS on shame to trigger behavior change (WSP, 2010).

The delivery model in Tanzania involved direct contracting of specialized agencies to provide capacity building, development of promotional events and materials, and organization of training of trainers. Implementation of project activities followed a "cascading" approach, by which initial trainees became trainers themselves in their communities.

The impact evaluation of the project (Briceno, Coville and Martinez, 2015) found significant impacts on access to JMP-improved sanitation in areas exposed to the sanitation alone intervention as well as in areas that received both the handwashing and sanitation project (collocated). Reported access to sanitation was 15.7 percentage points higher than in control areas in the sanitation-only arm, and 10.3 percentage points higher in the combined arm. Health effects on diarrhea, anemia, stunting and wasting were absent in the sanitation-only group and although diarrhea reductions were reported in the collocated intervention wards, this was accompanied by increased prevalence of anemia and lower average weight-for-age. Due to the absence of health effects, cost-effectiveness analysis was not conducted on these outcomes.

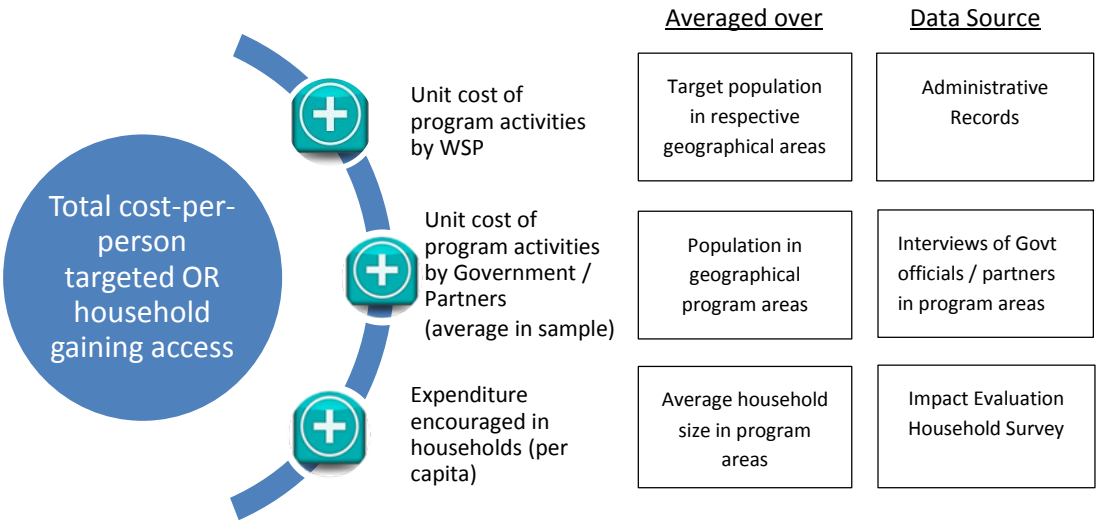
3. Costing Methodology and assumptions

Project costs were tabulated using an activity-based costing (ABC) approach. First, all activities directly associated with the project and the production of outputs and outcomes were identified. Second, bottom-up costing of all required inputs (ingredients) was done to identify resources required to carry out the activities. Activities were identified for the three primary stakeholders: government and partners, WSP, and households (Figure 1). The primary activities, as reported in key-informant interviews, are detailed in Table 1.

Household expenditure on improved sanitation and WSP project costs were both treated as investment costs and discounted at a 7% annual rate.[vi] WSP costs are assumed to be one-off technical support and capacity building costs that would sustain a local or national government to carry out future rural sanitation programs. The study assumes these initial investments have a lifespan of 10 years.[vii] Latrines purchased by households are assumed to have a relatively short lifespan of 7 years to account for the fact that some latrines are of higher quality, while others are basic latrines of low quality and would need to be replaced in a short period of time.

Costs are presented in 2010 US$ as unit cost-per-person of the project, defined as someone who was targeted by the project, and cost-per-household gaining access to sanitation, defined as a household who has 'gained access to' (e.g. constructed) an improved sanitation facility (sanitation).

Figure 1: Costing Components and Data



WSP coordinated activities

WSP provided technical assistance to project design, implementation and overall project management, funded capacity building for local actors, contracted local implementing agencies and hosted project workshops. In addition, WSP staff incurred costs generating political and financial support for sanitation (enabling environment), conducting operational research, and producing analytical products. Global support costs, such as salaries of headquarters staff and analytical work managed at headquarters, are not included.

Government and Partner-borne activities

Government and community partners include national, regional and local government officials and civil servants involved in the project at all levels, private sector actors (sanitation entrepreneurs, masons, sales agents), and community member volunteers. A cascading training model was employed to allow for at-scale reach, and after initial capacity building activities took place these actors were in turn responsible of socialization, promotion and monitoring activities in their communities.

Household-borne activities

Household costs include expenditure on latrine construction[viii], including materials and paid labor for installation and any other reported installation costs. . Expenditures were obtained from the impact evaluation endline household survey. Household member participation in the projects, such as time spent at CLTS triggering events was not included in the cost of the intervention.[ix]

Given a robust counterfactual generated through random assignment the causal impact of the project on latrine expenditure is estimated by comparing average outcomes between villages assigned to treatment against those assigned to control. This is known as the intention-to-treat parameter (ITT).

Randomized assignment of $Treat_i$ ensures that $E(\varepsilon_i \mid Treat_i) = 0$ such that the unadjusted OLS estimates of β will be unbiased. Additional controls for time invariant characteristics strongly correlated with the outcome are included to increase precision of the estimates. Both unadjusted and adjusted estimates are reported.

The impact of the sanitation project on latrine expenditures is examined by estimating the ITT parameter using the following regression (unadjusted model):

$$(1) \quad Y_i = a + \beta Treat_i + \varepsilon_i$$

The adjusted model adds a vector of control variables for household head age and education, household size, wall material and access to piped water, X_i :

$$(2) \quad Y_i = a + \beta Treat_i + \delta X_i + \varepsilon_i$$

Effects are estimated separately for poor and non-poor households since the project had a specific focus on reaching the poor. Households in the bottom quartile of an asset-based wealth index were classified as poor.

Where the project led to additional investment that was significantly different from zero in the treatment group relative to the control group the marginal investment in the treatment group is considered a cost of the project to the household. If differences in expenditure between treatment and control group were *not* found to be statistically different from zero these costs are not included in the analysis.

4. Sampling and data collection

WSP costs were obtained through internal records for the period July 2007 to June 2011. Household costs were collected through the impact evaluation endline survey administered between May and December 2012 in a representative sample of approximately 3,700 households with at least one child under 2 years at baseline.[x]

Government and partner costs were collected by trained local consultants during field work that took place between September and December 2011. Two districts were selected to represent different levels of implementation intensity, measured as the number of wards reached by the project. The selected districts were in two different regions, Kondoa district (high implementation intensity) in Dodoma region and Kiteto district (low implementation intensity) in Manyara Region. One ward was chosen at random in each of the selected districts participating in the sanitation arm of the study. Two to three villages per ward were visited. Village and sub-village selection was based on practical considerations such as distance and presence and availability of the village leader. Table 2 shows the sites selected for data collection and their population.

A total of 51 questionnaires/forms were completed in both the sanitation and collocated arms of the study covering approximately 198 observations of activities at various levels. Interviews included regional, district, ward and village administration officials, volunteers (frontline activators), CLTS facilitators, masons, and CLTS committee members.

5. Results

Total cost and stakeholder contribution

Nearly all project costs were covered by WSP, whose expenditures make up 99% of the total cost. Total WSP expenditures over the 4 year period from July 2007 – June 2011 amounted to a discounted value of US$ 10,407,001 (US$ 5,290,392 undiscounted). Neither government partners nor volunteers and masons[xi] made substantial investments in the project as evidenced by the small contribution – less than 1% - relative to the total cost of the project.

Marginal household investment induced by the program

Household descriptive statistics on expenditures are shown in Table 3, while results of the ITT analysis are shown in Table 4. Despite the sanitation project not providing subsidized hardware or labor for latrine construction, there was no evidence that households compensated this lack of resources by making additional private investments in sanitation. In fact, household investments were statistically identical in project and non- project areas, in both the sanitation-only and collocated arms. This was also the case for both poor and non-poor households.

Overall Household Expenditures

To understand the affordability of on-site sanitation in this context, we calculate the average household expenditure on sanitation over the 2-year period, regardless of household treatment status. Results are presented in relation to household GDP (2010) [xii]. Among all households that reported investments in sanitation over the 43 months prior to the follow-up survey, reported expenditure averaged US$ 20.22 in the sanitation-only arm and US$ 20.54 in the collocated arm. This amount represents approximately 8% of monthly household GDP (2010), which is more likely a lower bound since communities targeted for the intervention were rural and poor. Considering the project marketed a low-cost latrine slab for approximately US$ 5, actual expenditures by households who invested in toilets was considerably higher.

Cost per unit of output and cost-efficiency

The study analyzed the cost per unit of output of the project, defined as the increase in the number of observed improved household latrines, as per the Joint Monitoring Program definition, induced by the program. The base case scenario is the cost-per-person targeted, equivalent to full take-up of sanitation by beneficiaries. This base scenario assumes that all households targeted by the project gain access to sanitation (See Table 2 for population assumptions). We found that the cost-per-person targeted

(discounted) of the collocated project was US$ 9.04, while for the sanitation-only project it was US$ 5.42.

Certainly, full take-up by the target population is an optimistic scenario. From a policy makers perspective the more important indicator is the cost per household effectively gaining access under the project. We calculate this using the ratio of cost-per-household targeted to the average impact of the project on sanitation up-take in the project area, estimated from the randomized controlled trial. We present 95 percent confidence intervals alongside these estimates. The cost-per-household gaining access to sanitation is estimated to be US$ 194 (95% CI 337.1 – 136.2) and US$ 491 (95% CI 1198.5 – 309.1) respectively for the sanitation and collocated arms (Column D in Table 5). This translates into a cost of US$ 34.5 per capita in the sanitation arm of the study and US$ 87.8 in the collocated arm.

To estimate cost-per-household of the project under alternative scenarios of program effectiveness, we simulate effect sizes of 20 and 25% take-up as shown in the two rightmost columns of Table 5. These simulations assume the programs are operating at scale and all costs are variable, so that each unit increase in effectiveness (output) can be obtained for a lower average cost. The cost simulations do not account for these lower average costs, so should be viewed as upper bounds. If the program were to achieve 25% take-up, assuming returns to scale, the cost-per-household gaining access would decrease from US$ 194 to US$ 122.

Simulations for reaching the MDGs

The cost per household gaining access to sanitation under the project gives an indication of the resources needed to reach the MDG. We use findings from the study to estimate total costs required to achieve the sanitation MDG in Tanzania, as well as the costs required to achieve universal coverage. While we assume decreasing average cost in the efficiency simulations, it is logical to assume that average cost per unit of output (access) will increase as coverage increases and those remaining without access become harder to reach, such that there are decreasing returns to scale. In the absence of theoretical guidance as to when the inflection point occurs, the simulations to reach the MDG and universal access do not take into account (dis)economies of scale.

A total of 40.7 million people still lack access to sanitation in Tanzania, while access for 28.8 million people is needed in order to reach the MDG. Table 6 shows the cost estimates of reaching these targets using the estimated effect from the RCT and also provides the estimated costs, simulating project efficiency of 25% increase in access. Under the latter scenario, cost-per-person to reach the MDG decreases to US$ 21.70 and total cost for universal access reduces by over one third to US$ 883 million, which is 2.7% of the national GDP of Tanzania (2013).

6. Conclusions

The cost of sanitation promotion interventions is not well documented, making it difficult to compare sanitation promotion against competing approaches. This paper presents evidence from the first

economic evaluation in the WSS sector to be carried out alongside a RCT impact evaluation. The study finds the cost-per-person targeted by a sanitation promotion and behavior change project in Tanzania to be substantially less than the cost-per-person effectively gaining access under the project, due to limited take-up of improved sanitation in the target population. The cost-per-person is in line with the per capita investment requirement to reach rural sanitation coverage targets (US$ 34.5) recently estimated in the second round of Country Status Overviews (CSO2) on water supply and sanitation commissioned by the African Ministers' Council on Water (AMCOW)

Program expenditures were over US$ 5 million for the 4-year project, but local government and community partners reported contributing less than 1% of this, despite the intended cascading implementation approach of the project. The limited investment by the grassroots arm of the project could indicate either less involvement than expected from these actors or poor recall of resources and time invested.

A key question was to understand whether sanitation promotion and behavior change was able to leverage sufficient investment from households for on-site sanitation. Drawing on causal evidence generated through the impact evaluation we show that sanitation promotion did not lead to higher investment on latrines in the treatment group. Households who were not exposed to the campaign reported spending the same amount on average to improve their sanitation over the time period of the study. Reported expenditures by households who invested in sanitation, regardless of treatment status, were substantial, averaging 8% of household GDP.

Finally, we use parameters estimated from the study to simulate cost-effectiveness under alternative take-up scenarios and the corresponding cost to reach the MDGs and universal access. Under current effectiveness of sanitation promotion the cost to reach universal coverage is 4% of national 2013 GDP. Improving the effectiveness of sanitation promotion interventions is needed in order to attain these goals at a cost that is affordable to governments.

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7. Tables

Table 1: Main activities of government and community partners

Level of government	Main activities	Key persons involved
Region and District level	✓ Meetings, workshops, exposure visits ✓ Monitoring and reporting	✓ Ministry of Water representative ✓ Ministry of health and social welfare representative ✓ Regional water and sanitation team (RWST) members
Ward and village level	✓ Committee meetings ✓ Monitoring and village registry ✓ Training on CLTS ✓ preparation of slab (sungura) ✓ triggering at village level ✓ socialization / interpersonal sensitization activities	✓ Ward head ✓ Village head ✓ CLTS committee / health committee ✓ CLTS facilitator ✓ Mason ✓ Front line activators (volunteers)

Table 2: Selection criteria and selected sites for government and partner costs

(Population in parenthesis)

Country	Region	District	Ward	Village	Intervention	Intensity
Tanzania (33,003,140) Sanitation (750,000) Handwashing (1,297,000)	Dodoma (2,111,195)	Kondoa (503,856)	Goima (22,750)	Goima (3,302)	Sanitation only	High
				Makamaka (2,032)		High
			Thawi (14,016)	Sakami (7,050)	Handwashing & Sanitation	High
				Thawi Madukani (5,344)		High
	Manyara (1,349,569)	Kiteto (218,550)	Dosidosi (7,897)	Dosidosi (4,745)	Sanitation only	Low
				Nchimila (7,050)		Low
			Partimbo (41,328)	Ilera (7,807)	Handwashing & Sanitation	Low
				Kimana (1,407)		Low
				Namelok (7,807)		Low

Table 3: Household Descriptive Statistics

	Control		Treatment (Sanitation-only)			Treatment (Collocated)		
variable	**Mean**	**SD**	**Mean**	**SD**	**p-value**	**Mean**	**SD**	**p-value**
Improved sanitation (JMP)	0.76	0.43	0.87	0.33	0.004	0. 84	0.37	0.082
Household size	5.60	1.77	5.64	1.73	0.363	5.56	1.76	0.862
Latrine materials cost	6,327	12,989	6,850	15,317	0.650	6,401	11,857	0.492
Latrine (paid) labor cost	3,547	7,581	2,721	6,148	0.906	3,219	6,448	0.946
Latrine total cost	9,063	16,017	8,396	15,342	0.593	9,633	15,619	0.512

Note: All missing values excluded from calculation

Table 4: Estimated effect on latrine expenditures

	Sanitation-only		Collocated	
	Household	**Per capita**	**Household**	**Per capita**
Control Mean	6,691.0	1,379.0	6,273.0	1,379.0
Treatment Effect	-194.0	-45.2	1,733.0	258.4
	(1,306.0)	(270.9)	(1,273.0)	(267.4)
Set of Controls	Yes	Yes	Yes	Yes
Observations (in Treatment)	984	983	1026	1,027
R-squared	0.03	0.032	0.03	0.032

Notes: [1] Model controls for household head age and education, household size, wall material and access to piped water
[2] Robust Standard Errors in Parentheses [3] Exchange rate (2010, source: OANDA): 1 US Dollar = 1,408 TZ Shilling.

Table 5: Cost-per-person and cost-per-household gaining access to sanitation

					Simulated efficiency estimates[2]	
Program	**(A) Cost-per-person targeted** (base scenario)	**(B) Impact Estimate from RCT** (ppt increase and 95% CI)	**(C) Estimated Cost-per-*person* access** (95% CI)	**(D) Estimated Cost-per-*household* access[1]** (95% CI)	**20 ppt increase**	**25 ppt increase**
Access to sanitation						
Sanitation	$ 5.42	16% (.04 – .16)	$ 34.5 (60.0 – 24.0)	$ 194 (337.1 – 136.2)	$ 152	$ 122
Sanitation & Handwashing	$ 9.04	10% (.10 – .22)	$ 87.8 (214.0 – 55.2)	$ 491 (1198.5 – 309.1)	$ 253	$ 202

[1] Average household in sample has 5.6 members

[2] Assumes inputs (and costs) are unchanged

Table 6: Estimated cost to reach sanitation MDG and universal access in Tanzania

			Estimated Coverage Increase					
			Cost for MDG			Cost for Universal Access		
			Urban	Rural	National	Urban	Rural	National
Effect size	**As of (Year)**	**Estimated Cost-per-person access**	**Total Cost ($millions)**	**Total Cost ($millions)**	**Total Cost ($millions)**	**Total Cost ($millions)**	**Total Cost ($millions)**	**Total Cost ($millions)**
Current (16 ppt)	2011	34.5	247.3	747.5	994.9	323.3	1,082.3	1,405.6
Increase of 25 ppt	2011	21.7	155.3	469.5	624.8	203.0	679.7	882.7

[i] Open defecation refers to the practice of defecating in fields, rivers, or bush, without safe containment of human feces. An improved sanitation facility has been defined as one that hygienically separates human excreta from human contact. (WHO-Unicef JMP)

[ii] Cost-effectiveness implies the comparison of different interventions or courses of action. According to the OECD-DAC and IEG (2007), cost-effectiveness is the extent to which the program has achieved or is expected to achieve its results at a lower cost *compared with alternatives*.

[iii] For more information on ESI, see http://www.wsp.org/content/economic-impacts-sanitation

[iv] The study is not a cost-benefit analysis of the intervention, as it would have required estimation of a set of benefits of the intervention (health and non-health effects, such as dignity, privacy, comfort, etc..) in spite that the impact evaluation did not find any effects on diarrhea. Instead, the focus of this study is on the critical goal of sanitation access, in particular, finding the cost of sanitation access per person induced by this intervention, and the MDG access goal.

[v] The promotion intervention will compare more favorably to other interventions aiming to increase access to sanitation since the cost-per-person effectively gaining access decreases as the take-up increases.

[vi] This is in line with conventions of the Copenhagen Consensus (Whittington, et al., 2008) but lower than the 10% rate used by the World Bank for water infrastructure projects.

[vii] Indeed, it could be argued that WSP support would not be needed in the future once this enabling environment has been built

[viii] Latrine maintenance costs were collected as well, but were negligible and no significant differences were found between treatment and control arms.

[ix] This is because participation in these events, while important to the effectiveness of the project, was not a requirement. If on the other hand households had been required to attend a community meeting in order to receive a latrine subsidy, the time spent at this meeting would likely factor into the household cost. See for example (Dhaliwal, et al., 2011).

[x] For details on impact evaluation data and sample, see Briceno, Coville and Martinez, 2015.

[7] Unpaid volunteers include CLTS facilitators, front line activators and CLTS committee members. The day rate of village volunteers was valued at rates indicated by villagers but no higher than 5,000 shillings (USD 3.5). The typical rate was 2,000 shillings (USD 1.4). This rate was based on community estimation of field labor rates. The day rate used for masons was 5,000 shillings per day (USD 3.5).[xii] Salary income was not collected in Tanzania. GDP per capita in 2010 USD is US$527. On a monthly basis this would equal US$44. Assuming 5.6 household members, equivalent monthly household GDP is US$246.