WASHCost

Briefing note S03
Mozambique

Costs and effectiveness of hygiene promotion within an integrated WASH capacity building project in Mozambique

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Photo
Handwashing facility in a Mozambican school (Egidio Vaz Raposo)

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WASHCost is a five-year action research project investigating the costs of providing water, sanitation and hygiene services to rural and peri-urban communities in Ghana, Burkina Faso, Mozambique and India (Andhra Pradesh). The objectives of collecting and disaggregating cost data over the full life cycle of WASH services are to be able to analyse expenditure per infrastructure, by service level, per person and per user. The overall aim is to enable those who fund, plan and budget for services to understand better costs and service levels to enable more cost effective and equitable service delivery. WASHCost is focused on exploring and sharing an understanding of the costs of sustainable services (see www.washcost.info).

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Abbreviations

CapExH	Capital Expenditure Hardware
CapExS	Capital Expenditure Software
CapManEx	Capital Maintenance Expenditure
CHAST	Child Hygiene and Sanitation Training
CLTS	Community-led Total Sanitation
CoC	Costs of Capital
ExpDS	Expenditure on Direct Support
JMP	Joint Monitoring Programme for Water Supply and Sanitation (of WHO/ UNICEF)
OpEx	Operating Expenditure
PEC	*Promoção e Educacão Comunitário* (Community mobilisation and education)
PHAST	Participatory Hygiene and Sanitation Transformation
SPSS	Statistical Product and Service Solutions
UNICEF	UN Children's Fund
VIP	Ventilated Improved Pit
WHO	World Health Organization

Introduction

Hygiene promotion interventions are activities aimed at changing specific hygiene behaviours within a designated time frame. These interventions, which are applications of hygiene promotion approaches, are often linked with sanitation promotion and/ or improvements to water supply and sanitation, which may focus on the provision and use of "hardware" such as latrines or water supply. Hygiene promotion focuses on hygiene education, where Participatory Hygiene and Sanitation Transformation (PHAST) and Child Hygiene and Sanitation Training (CHAST) are examples of hygiene promotion approaches aimed at reducing disease burden and improving health. With the existence of various possible hygiene promotion approaches, studies are needed in order to determine the cost effectiveness of each intervention so that different interventions can be compared.

WASHCost Working Papers 6 and 7 (Potter, et al., 2011 and Dubé, et al., 2012 respectively) outline a method to assess the cost effectiveness of hygiene interventions. In these Working Papers, the effectiveness of an intervention is determined by assessing hygiene behaviour before and after an intervention. The cost of an intervention is assessed by adapting a life-cycle costs approach that encompasses household costs and implementer costs[1].

This Briefing note presents the findings of the application of the WASHCost methodology in examining the cost effectiveness of a hygiene promotion intervention in Mozambique. The Briefing note is part of a series of WASHCost hygiene promotion-related studies, which were also applied in Burkina Faso and Ghana[2].

1 WASHCost methodologies

1.1 Defining hygiene effectiveness levels

To determine the effectiveness of a hygiene promotion intervention, effectiveness was defined as the degree of success in producing a desired result—that is, a change in hygiene behaviour (Dubé, et al., 2012).

To assess hygiene behaviour before and after the intervention, three hygiene behaviours (or indicators)—suggested in earlier literature (Hernandez and Tobias, 2010) to target the majority of hygiene promotion interventions as having the greatest positive impact on individual health—were used:

1. Faecal containment and latrine use.
2. Handwashing with soap or substitute at critical moments, particularly after defecation and before handling food.
3. Use of safe drinking water source, and management of drinking water at the household level.

[1] A detailed discussion on the **approach** is accessible here: http://www.washcost.info/page/1629 (by Potter, et al., 2011b), and the **methodology** here: http://www.washcost.info/page/2341 (by Dubé, et al., 2012). Complete referencing is found in the reference list of this paper.

[2] For the **Burkina Faso study**, read Dubé, A., Carrasco, M. and Bassono, R., 2013. Assessment of hygiene interventions: cost-effectiveness study applied to Burkina Faso. (WASHCost Burkina Faso Working Paper 6) [pdf] The Hague: IRC International Water and Sanitation Centre and Ouagadougou: WASHCost Burkina Faso. Available at: <http://www.washcost.info/page/2847> [Accessed 17 June 2013]; the Ghana study is still forthcoming.

WASHCost then determined the three hygiene behaviours (indicators) at the household level through the use of household surveys. Each of the three hygiene behaviours was broken down into several sub-indicators[3]. These sub-indicators were used to design the three flowcharts, which guided data collection in the household surveys conducted for WASHCost's hygiene promotion cost-effectiveness studies (see annexes 1-3).

Data gathered was analysed against a metric of hygiene behaviour at household level. For Indicators 1 and 3, WASHCost defined four possible metrics of hygiene behavior; Indicator 2 was assigned three possible metrics. The different metrics of hygiene behaviour are referred to by WASHCost as hygiene effectiveness levels: 'Not effective', 'Limited', 'Basic' and 'Improved' (table 1).

Table 1 Hygiene effectiveness ladder[4]

Effectiveness level	Faecal containment and latrine use	Handwashing with soap/ substitute	Drinking water source and management
Improved	All household members use a latrine all the time The latrine used separates users from faecal waste	There is an accessible and designated handwashing facility Sufficient water is available for handwashing Water for handwashing is poured/ not re-contaminated by handwashing Soap or substitute is available and is used All household members wash their hands with soap/ substitute at critical times	Protected water sources are always used Collection vessel (where available) is regularly cleaned with soap or substitute Water storage vessel (where available) is covered Water is drawn in a safe manner
Basic	All or some household members use a latrine some or most of the time When there is no access to a latrine, faeces are generally buried The latrine separates users from faecal waste		Protected water sources are always used Collection vessel (where available) is regularly cleaned with soap or substitute Water storage vessel (where available) is uncovered and/ or Water is not drawn in a safe manner

[3] The sub-indicators used for the purpose of WASHCost's study of hygiene promotion interventions were selected by the WASHCost team.

[4] Note that the hygiene effectiveness levels are based solely on the responses to the indicator questions chosen by WASHCost as determinants of hygiene behaviour. These determinants had not been validated with health outcomes such as incidence of diarrhoea. Instead, WASHCost uses hygiene effectiveness levels to focus only on whether certain desired behaviours have been adopted (preferably at least six months after the intervention). In Mozambique, a phased programme evaluation approach entailed the collection of midline data directly after completion in 50% of the communities and the collection of data on the other 50% of communities two years after the intervention.

Effectiveness level	Faecal containment and latrine use	Handwashing with soap/ substitute	Drinking water source and management
Limited	The latrine does not provide adequate faecal separation and/ or All/ some family members generally do not bury faeces when not using a latrine and/ or All family members practice burying faeces	Most household members wash their hands after defecation but not during other critical times and/ or Water for handwashing is not poured and the same water is used each time and/ or No soap or substitute is available and/ or is soap/ substitute is not used for handwashing	Protected drinking water sources are not always used and/ or Collection vessel (where available) is not cleaned Water is not drawn in a safe manner
Not effective	Open defecation	Household members have no designated place for handwashing and/ or Household members rarely wash their hands after defecation	Unsafe sources are mostly/ always used to collect drinking water from

Source: Dubé, et al., 2012.

1.2 Determining the cost of hygiene interventions

Hygiene intervention costs are typically associated with the costs of community mobilisers, hygiene promotion material, community training, and household visits or focus groups. To conduct a proper cost calculation, the following are included: the costs of labour and materials associated with the intervention; and activities with no direct monetary value, such as the time spent by community members for hygiene promotion activities. Within a specific year, the total cost of an intervention is calculated based on a per capita and/ or per household cost. In order to determine the cost of an intervention, the WASHCost methodology follows a three-step approach, which is an adaptation of WASHCost's life-cycle costs approach for water[5].

In the **first step**, costs are identified and disaggregated by source, such as household costs, implementer costs, and support costs incurred. WASHCost then arranges all costs in six cost categories (see table 2). These categories represent the main cost components of hygiene promotion interventions following a life-cycle costs approach.

[5] For a comprehensive discussion on a life-cycle costs approach for water, read Burr, P. and Fonseca, C., 2012. Applying a life-cycle costs approach to water: costs and service levels in rural and small town areas in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique. (WASHCost Working Paper 8) [pdf] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/2665> [Accessed 21 February 2013].

Table 2 WASHCost classification of hygiene promotion intervention cost categories

Cost Category	Definition
Capital Expenditure Hardware (CapExH)	The capital invested in constructing fixed assets, e.g., handwashing facilities.
Capital Expenditure Software (CapExS)	One-off work with stakeholders prior to the implementation, e.g., training of trainers.
Costs of Capital (CoC)	Costs of interest payments on loans, e.g., loans for household latrines.
Operating Expenditure (OpEx)	Operating and minor maintenance expenditure, e.g., monitoring costs.
Capital Maintenance Expenditure (CapManEx)	Expenditure on asset renewal, replacement and rehabilitation, e.g., replacing handwashing facilities and re-training community members.
Expenditure on Direct Support (ExpDS)	Post-construction support activities for local-level stakeholders, users or user groups, provided at the district level, e.g., costs for supporting community-based organisations at the district level.

Source: Adapted from Dubé et al., 2012.

The **second step** in the WASHCost methodology involves the collection and quantification of costs for each category. Cost data can be collected through household surveys, observational data, and from proposed and/ or actual project budgets. All costs are brought to the current value in US$, and recurrent costs are annualised.

In the **third step**, when relevant, the WASHCost methodology identifies costs from data gathered, which have an economic value but were not quantified. The economic value of these costs is converted into financial costs. For example, time spent by community members in participating in hygiene promotion is designated a cost; the value of a person's time is important as time spent in other activities can result in the loss of income from a job, childcare, or other labour—this is estimated using the 'human capital approach' (Dubé, et al., 2012, p. 9).

1.3 Determining cost effectiveness of interventions

The cost effectiveness of an intervention is determined by comparing the cost of the intervention with the effectiveness of the intervention in changing hygiene behaviour. The WASHCost methodology assumes that behavioural changes is measured by assessing the change in hygiene effectiveness level before and after the intervention, for each of the three criteria (faecal containment and latrine use, handwashing with soap or substitute, and safe drinking water source and management). Following the WASHCost methodology, household surveys administered after an intervention should occur at least six to eight months after the end of an intervention. It is further assumed that other programme activities do not influence the findings.

2 An introduction to the hygiene promotion intervention studied in this paper

2.1 Background of the study

Between 2000 and 2003, a water point development programme (from here on referred to as the "bilateral programme") was carried out in four districts in the Zambézia province of Mozambique, with the aim of constructing 152 boreholes that provide water to approximately 75,000 inhabitants. The bilateral programme sought to reduce childhood mortality and improve the health condition of communities—by providing a safe water source. To the Government of Mozambique, an improved water source alone was incapable of guaranteeing improvements in health: in addition to the construction of a water source, the Government emphasised the need for communities to be educated in the maintenance of water supplies. Accordingly, the Government placed a request for the same bilateral programme to sponsor an intervention that would aid in ensuring the sustainability of the community's water supplies, and improve sanitation through education that promoted improved hygiene practices. The Government's proposed intervention was approved, and is the object of this paper's research study—referred hereon as the "hygiene promotion intervention" (HPI).

The HPI occurred in 2007-2011 and benefitted the same target communities of the bilateral programme. It combined water, sanitation, and hygiene interventions, and had the overall objective to reduce water-related diseases. The HPI and the household surveys conducted before (baseline) and after (endline) the intervention were not conducted by the WASHCost team; actual work was contracted out to different consulting companies[6]. The objectives of the HPI were to:

1. Sensitise the communities and schools on the basic principles of the operation and maintenance of water supply and sanitation facilities.
2. Strengthen the capacity of the communities and schools to identify the strengths, weaknesses, opportunities and obstacles in the management of water and sanitation facilities, and to plan and take action to improve and maintain water and sanitation facilities.
3. Maximise the adoption of hygiene practices by community members, teachers, and students, with an emphasis on the benefits of safe water supply and adequate sanitation and hygiene behaviour in the prevention of water-related diseases.
4. Support the communities and schools to institutionalise the monitoring of: (i) the operation and maintenance of water supplies; and (ii) the improvement of sanitation and hygiene.

To accomplish these objectives, the bilateral programme developed a hygiene promotion methodology that was carried out by consulting companies. Community water committees were established, and the necessary personnel were identified and trained. For hygiene and sanitation promotion, the community activists were trained in PHAST and CLTS (Community-led Total Sanitation) approaches. Community exercises in appropriate handwashing practices were conducted by an animator to educate members on handwashing behaviour. In addition to hygiene and sanitation promotion, three households in each community received model latrines. The model latrines showed the different types of latrines that could be constructed, and the three households had the responsibility to promote the construction of these latrine types. Two local artisans/ bricklayers from each community were trained in the techniques and skills needed for latrine construction so that each community had the capability to build

[6] One company was contracted for the baseline and one for the intervention and the endline.

latrines. The local district government was also involved in liaising with and encouraging communities to participate in the intervention activities, as well as in monitoring community activities.

2.2 Target communities and schools

The HPI was conducted in the Zambézia Province of Mozambique in four districts: Alto-Molócuè, Gilé, Mocuba, and Ile (see figure 1). Alto-Molócuè is located in the north of the Zambézia Province with the Ligonha river running along its southern border. The land area is approximately 6,434 km^2 with a 2007 census population of 217,650. The Gilé district is also located in the northern part of the Zambézia Province, just east of the Alto-Molócuè district. Gilé has an area of 9,526 km^2 and a 2007 census population of 169,300. Mocuba is located in the centre of the Zambézia Province. It has an area of 8,733 km^2 and an estimated population of 252,300. The Ile district is located northeast of Mocuba with an area of 5,643 km^2 and an estimated population of 246,700[7].

The baseline survey was conducted in 30 target communities and 20 schools between May and June 2007. Within each of the four districts, target communities were selected for inclusion in the bilateral programme based on the criteria that the community needed to have a working water source within 100 km from the district capital. The final communities surveyed were nine communities in Alto-Molócuè and Ile, and six communities in Gilé and Mocuba. For the target schools, two types were selected: (i) EP1 schools which have grades 1-5 and are generally located within the communities, and (ii) EPC schools (also referred to as ZIP schools) which have grades 1-7 and are considered to be regional schools. Within each of the four districts, five schools of both EP1 and EPC types were selected.

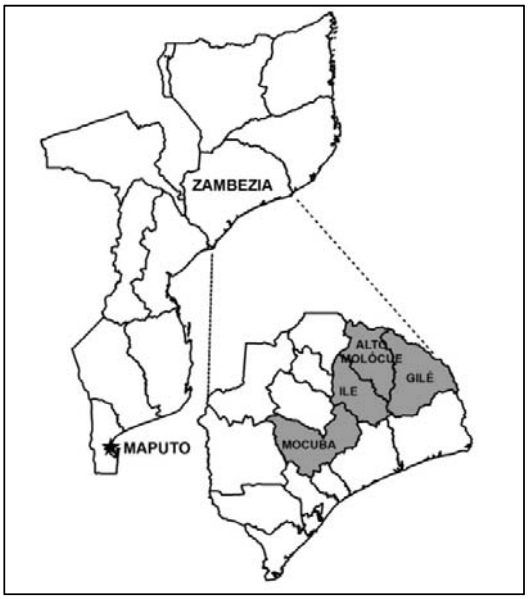

Figure 1 **Map of the Republic of Mozambique with a zoom into the Zambézia Province and the four target districts** (Illustration by Arjen Naafs)

[7] Census National Bureau of Statistics (INE), 2007.

The HPI (and endline survey) was conducted in 20 communities and 15 schools: with six communities in each of Alto-Molócuè and Ile, and four communities in each of Gilé and Mocuba. Communities were selected based on the criteria that it must have a water supply source previously built by the bilateral programme (in a previous intervention between 2000 and 2003). The final selection of target communities was made by the bilateral programme with input from the provincial and district counterparts[8].

2.3 Project timeline

The HPI lasted a total of 57 months, from February 2007 to July 2011, which the bilateral programme divided into three phases as shown in figure 2 below. In Phase 1 (six months), all preparatory activities for the HPI and the baseline survey were performed. Phase 2, which lasted 23 months, consisted of implementing the HPI in the districts of Mocube and Ile. Phase 3 (28 months) consisted of implementation activities in Gilé and Alto-Molócuè, with follow-up activities in Mocuba and Ile. Both community and school activities occurred over the same period of time. The endline survey was conducted in 2011; the endline surveys for Mocube and Ile were taken two years after the intervention took place.

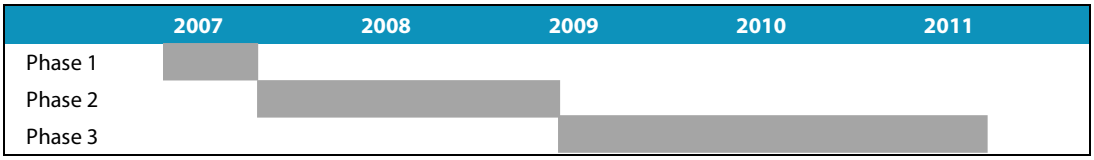

Figure 2 Timeline of project activities divided in three phases between 2007 and 2011

2.4 Sampling methodology and data collection

The survey questionnaire was developed by the bilateral programme's project team (while most questions are present in both baseline and endline surveys, different questions are asked in each). A one-week training session to test the questionnaire in the field was performed by the consultants, and modifications were made, as necessary. The target sample size was 20 household surveys in each community, resulting in a total of 600 surveys. The household sampling strategy was conducted for every tenth house, and in three directions from the water source. For communities that were small or spread out, household surveys were taken at intervals of less than ten houses. Thus, the survey results—average percentages/ answers for each question—are only representative of the study's respondents, and not that of the entire community's. The survey sampling design provided by the bilateral programme is limited to representative sampling at the project level—results are therefore applicable only at the project level.

2.5 Data sources

Baseline and endline household survey data were obtained using a Statistical Product and Service Solutions (SPSS) format from the government. Of the 600 households (covering 30 communities) that made up the baseline survey target sample, only 400 household data was available in the SPSS format. Endline survey data was available for 500 households in 20 communities. The WASHCost Mozambique in-country team performed preliminary analyses of

[8] Annex 4 presents the districts, communities, schools and borehole numbers selected for study in both the 2007 baseline study and the 2011 intervention and endline surveys.

data gathered from the SPSS formats to determine hygiene effectiveness levels and arrive at the team's own cost analysis of the HPI. All costs data were (i) provided by the consultancy companies; (ii) analysed and corrected for inflation; and (iii) converted in 2011 US$[9].

3 Scope and limitations

There are several considerations important to mention to set the scope of the paper. Given that there is limited analysis of the costs and effectiveness of HPIs in Mozambique, the subject is fairly new. The contents of this paper should therefore be treated as preliminary findings in testing the WASHCost methodology on one HPI. The purpose of the paper is to provide insights into methods of designing and evaluating hygiene promotion activities and/ or interventions on data gathered by staff of the HPI and does not provide a comparison of approaches[10].

A summary of key limitations of the research study are presented below.

1. Research methods
   a. The household survey questionnaire was developed independently of and before the WASHCost methodology was finalised. Proxy questions therefore had to be used.
   b. Secondary data was used to test the methodology. The secondary data used was collected for a different purpose.
   c. Almost all survey responses (for all sub-indicators, including diarrhea incidence data) were self-reported and could not be verified. Questions particularly subject to bias included those in which the respondent was asked about drinking water source in a different season (thus relying on memory recall), or handwashing practice of another household member (adults or children).
   d. Half of the endline surveys were undertaken two years after the end of the intervention (for two of the districts), while the other half were conducted shortly after the final implementation (for the other two districts). During the two years between the end of the intervention and the endline survey, it is not known (but is considered unlikely) whether additional interventions occurred.
2. Datasets used
   a. The data used in this study was derived from a combined water, sanitation, and hygiene intervention—it was therefore difficult to disaggregate these costs into separate categories (see Section 4.2). Within the schools, teachers were trained to promote hygiene and sanitation through school activities with students, and sensitise the school and community to the cleaning, construction and maintenance of school latrines and handwashing facilities. Changes observed between 2007 and 2011 were attributed to the hygiene intervention, but it was not possible to distinguish whether the changes in for example faecal containment and latrine use, were due to sanitation or hygiene promotion. Furthermore, as intervention activities occurred concurrently in both schools and communities, children who attended schools were exposed to the HPI twice. It was not possible to determine therefore whether behaviour change resulted from school or community interventions, and/ or whether this was due to a transfer of second-hand knowledge/ practice to children by other household members.

[9] Analyses of the household survey data in this report were performed in STATA 12 (Stata Corp., College Station, TX).

[10] Further information, supporting documentation (i.e., bilateral programme's final report) and data sets used in this paper are available upon request. Contact Alana Potter at potter@irc.nl.

b. No control data was available to assess changes in hygiene behavior in similar communities between 2007 and 2011. Instead, all changes observed in the intervention were assumed to be due to the HPI. This could possibly lead to an overestimation of impact.
c. Household and support costs data were not obtained—only implementer data was used to calculate costs.
d. The dataset of the bilateral programme is an internal document and has not been made public as yet. The bilateral development partner was also unavailable to participate in the study.

4 Results

4.1 Evaluating baseline and endline hygiene effectiveness levels

The hygiene effectiveness level for (1) faecal containment and latrine use, (2) handwashing with soap or substitute, and (3) safe water source and management were assessed using a modified version of WASHCost's flowcharts, which are presented in figures 3-5 below. Modifications were necessary as the WASHCost methodology of assessing hygiene effectiveness levels was developed independently from the household survey questionnaires used by the HPI. Since the household surveys that were administered to the target communities did not necessarily ask the exact questions found in the WASHCost flowcharts—proxy questions were used and assumptions were made as described below.

Across all three indicators, the following information is contained below: (i) WASHCost's original formulation of the survey questions (in grey); (ii) the proxy used for this study (i.e., the exact question taken by household surveys conducted by the HPI, previous to the WASHCost study); (iii) an explanation of the assumptions and/ or limitations of the proxy and/ or original WASHCost question; and iv) the modified WASHCost indicator flowcharts used in this study.

4.1.1 Indicator 1: faecal containment and latrine use

The original WASHCost flowchart used six questions to assess the hygiene effectiveness level of faecal containment and latrine use (see annex 1). For the purpose of this study, the flowchart used to assess hygiene effectiveness levels was modified to contain five questions (see figure 3).

For questions that were modified, the modified version was used in the flowchart.

Q1 - Do you have a household latrine?

The proxy used was **'Q1: Does your household have a latrine?'**. No modifications were made. As the first question in the flowchart, the presence of a latrine is a significant determining factor of the hygiene effectiveness level for Indicator 1. Even if household members were triggered to change their sanitation and hygiene behaviour through the PHAST and CLTS approaches, an 'Improved' hygiene effectiveness level is not considered to have been attained in the absence of a latrine within the household, or in neighbouring households.

Q2 - Does the household use a shared/ public latrine?

There was no specific question in the household surveys related to shared and/ or public latrines, possibly because these are rare in the rural context in Mozambique. The proxy used was **'Q2: In case your household does not have a latrine, please indicate where do you and your household members go to for toilet use**?'. All answers that responded in the affirmative were considered to be equivalent to using a shared/ public latrine. Previously, WASHCost's original formulation of Q2 placed shared and public latrines in the same category; however, the study found these to be substantively different. Shared latrines have a definitive number of people who use the latrine; the users are known to each other; and there is a sense of ownership and responsibility towards the cleanliness and

maintenance of the latrine. Public latrines are available for anyone to use; users do not necessarily know all the latrine's users; and, in general, no one takes responsibility for its cleanliness and maintenance. Ideally, a differentiation should be made between shared and public latrine use. For the intervention areas targeted in this study, there were no public latrines.

Q3 - Do all, some, or none of the household's members use the latrine?

There were no questions in the household surveys that could be used as a proxy. No question asked about member usage of the latrine and, therefore, this question was excluded from Indicator 1 flowchart.

Q4 - Does the latrine provide adequate separation for the user from faeces (may also be determined by the type of latrine)?

To determine whether there is adequate separation between the user and human excrement, the proxy used was **'Q3: Which type of latrine does your household use?'**. Latrine types are classified as 'improved' or 'unimproved' by the WHO/ UNICEF (2012) Joint Monitoring Programme (JMP) for Water Supply and Sanitation, where improved sanitation technologies are defined as facilities that hygienically separate human excreta from human contact. Similar to the JMP classification of latrines, survey answers of "ventilated improved pit (VIP) latrine", "pour flush latrine", "ecological latrine (Ecosan)", "traditional latrine improved with concrete slab", and "latrine with cistern" were considered to provide adequate separation, and were qualified affirmatively (Yes). A traditional pit latrine response resulted in a negative qualification (No) as this latrine type is considered equal to the JMP classification of "pit latrines without slab".

Q5 - How frequent do family members use the latrine?

No proxy questions were available to address the frequency of latrine use and thus the question was changed to **'Q4: Are latrines really used?'**. Obvious signs of latrine use (and the availability of anal cleaning facilities [paper and/ or water], absence/ presence of faecal smell, and general state of the latrine) were used by the interviewer as qualifiers for a "Yes" or "No" answer.

Q6 - Do family members generally bury faeces when defecating in the open?

The proxy used was **'Q5: In case your household does not have latrines, please indicate where do you and the household members go for toilet use?'** One of the possible answers was "cat method" in which faeces are disposed of in a hole and covered with soil. Answers of "cat method" were taken to be family members generally bury faeces.

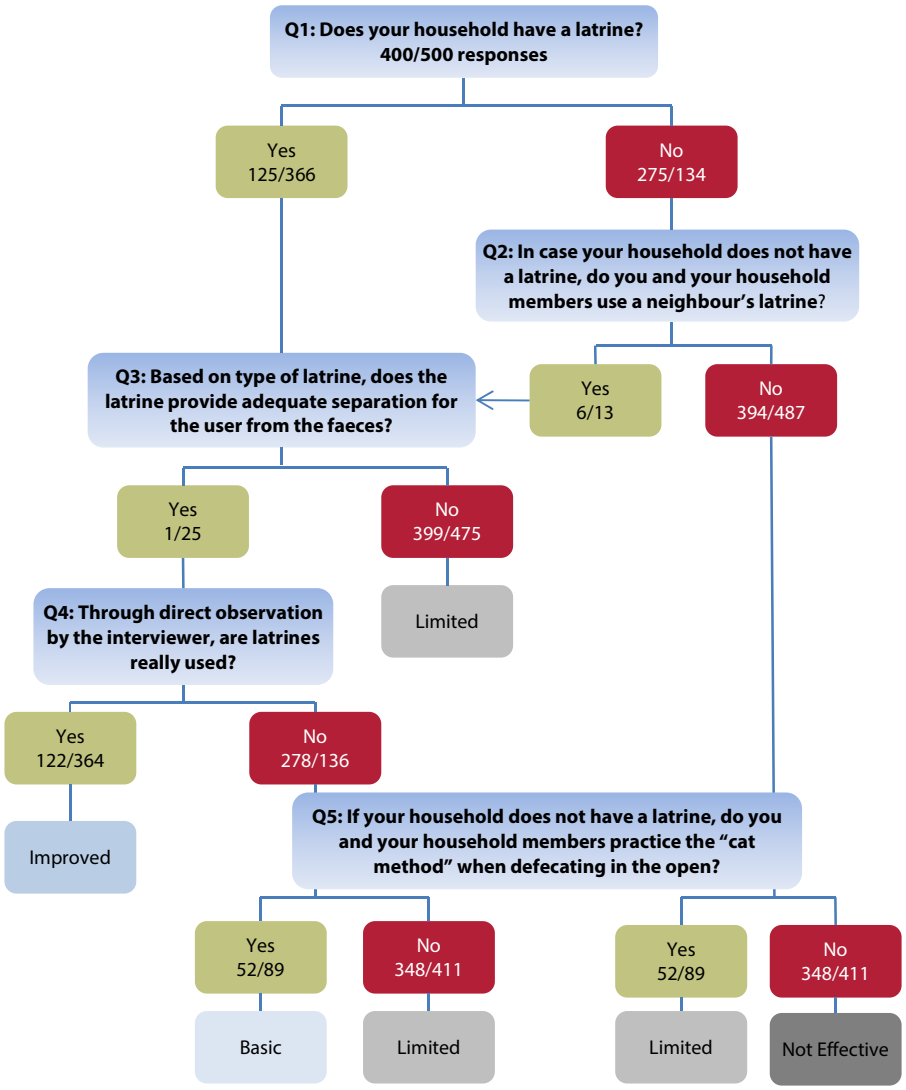

Figure 3 Flowchart for Indicator 1 (modified): faecal containment and latrine use[11]

4.1.2 Indicator 2: handwashing with soap or substitute

The original WASHCost flowchart used five questions to assess the hygiene effectiveness level of handwashing with soap or substitute (see annex 2). After modifications that take into account the assumptions, limitations, and proxies used, figure 4 below presents the modified flowchart, which used four out of the five (original) questions used by WASHCost. For the results presented here, the questions and proxies used do not differentiate between the availability of water or soap, and use of water or soap. The proxies used focused on handwashing practices; no possible answers accounted for lack of water or soap.

[11] Figures represent the numbers of household responses, 2007/ 2011.

The proxies used here focused on handwashing after latrine use, and the study's respondents were classified according to adults (over 18 years old) and children (5-17 years old). Despite data availability on adults and children, there was only one respondent for each household survey and therefore, the response for either adult(s) or children was based on what the respondent reported to be the overall handwashing practice of the household.

In addition to the inability to distinguish use from availability of water and soap/ substitute, the hygiene effectiveness levels determined by the flowchart differ from handwashing promotion practices suggested in other literature. As observed in figure 4, the effectiveness level 'Not Effective' was obtained if the water used for handwashing was insufficient and/ or was not poured. This is the same level reached if household members are found to never wash their hands after critical moments. However, Burton, et al. (2011) argues that any handwashing, regardless of use of soap and amount of water, is better than no handwashing at all. As such, no differentiation was made between the two.

Q7 - Do family members have an accessible and designated place to wash their hands?

For 2011, one possible proxy was "Do you have a container of water to wash your hands near the latrine?" which did not necessarily address the question of designation or accessibility. As there was no proxy for 2007 that inquired about accessibility or a designated place for handwashing, this question was removed from the flowchart.

Q8 - Is water for handwashing poured over hands and not re-contaminated?

The proxy used was **'Q7: How do your household members practice handwashing after latrine use?'.** The following answers were all considered to be in the affirmative: "pour water from a cup/ jar without soap", "pour water from a cup/ jar with soap", "handwashing device without soap", and "handwashing device with soap" . The following answers were all considered to be in the negative: "in a bowl shared without soap", "in a bowl shared with soap", and "no handwashing practice". One possible answer was "other" and, for 2007, these answers corresponded to "water and ash", which was classified as re-contaminated water used for handwashing. However, for 2011, the majority of answers specified running water, and was therefore classified as water was poured and not re-contaminated for handwashing.

Q9 - Is sufficient water available for handwashing (sufficient = at least 1 small cup)?

There is no proxy question that asked about the availability of water for handwashing. Instead, the proxy used was **'Q8: How do your household members practice handwashing after latrine use?'**—at least one small cup of water was assumed to be used for the following answers: "in a bowl", "pour water from a cup", and "handwashing device". One possible answer was "no handwashing after latrine use". However, there was no follow-up question to determine whether handwashing was not practiced because household members did not want to do so, or because there was no water available. In addition, the assumption that one small cup of water is sufficient for handwashing was not validated by the survey questions.

Q10 - Is soap or substitute available and used for handwashing?

The original question was a two-part question that asked about: (1) availability; and (2) use. The proxy used did not distinguish between these, was limited to asking: **'Q9: How do your household members practice handwashing after latrine use?**'. Answers that indicated the use of soap, substitute, or ash were all taken to be in the affirmative.

Q11 - Do all members of the household wash their hands at critical moments?

Critical moments are understood to occur before eating and after latrine use. Two proxy questions were used: **'Q6 (modified and moved higher in the survey questionnaire for indicator 2 owing to significance): How do your household members practice handwashing before eating?'** and **"How do your household members practice handwashing after latrine use?"** where any form of handwashing (with bowl, water from cup, etc.) was taken as household members having washed their hands. Possible answers to this question include: "household members

always wash their hands at critical moments"; "household members only wash their hands after latrine use"; and "household members do not wash their hands at critical moments".

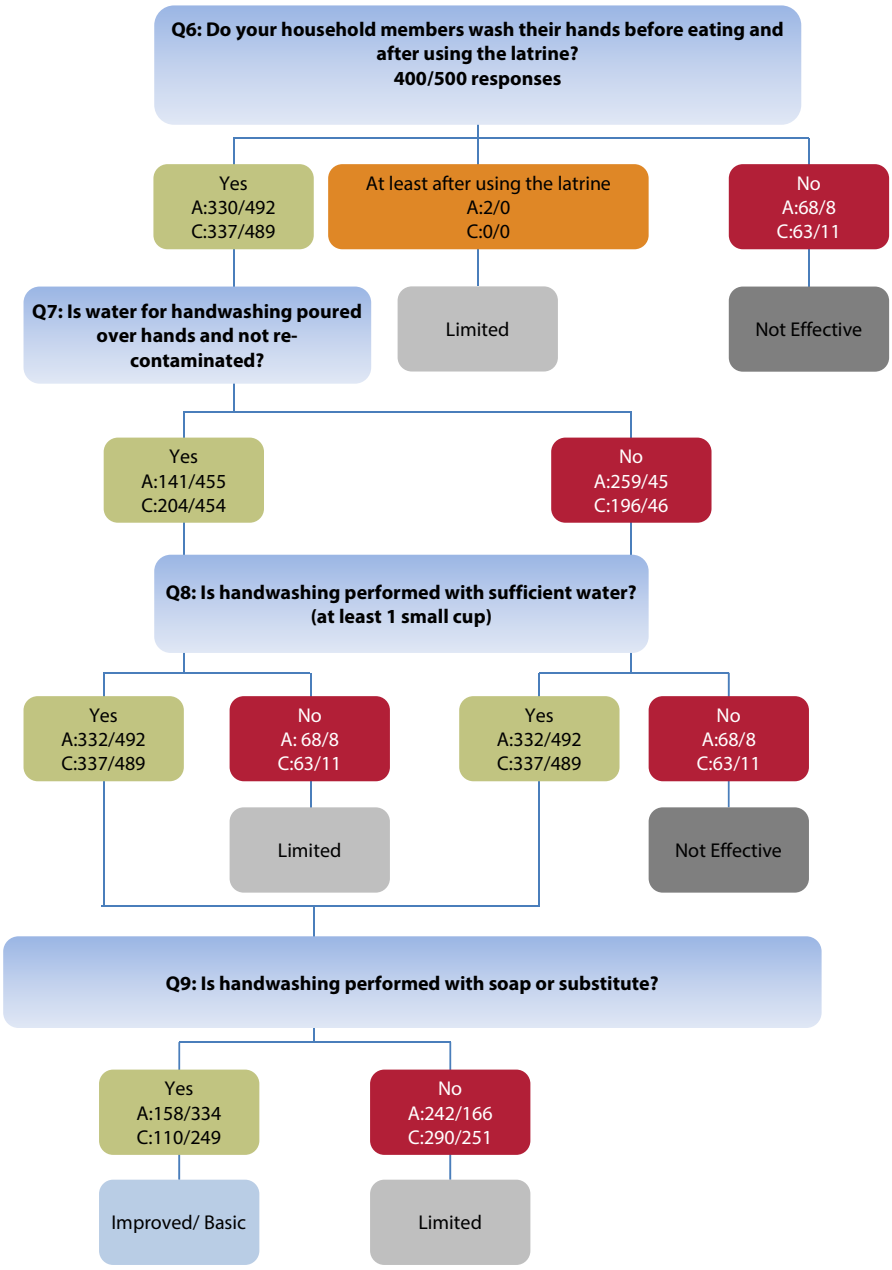

Figure 4 **Flowchart for Indicator 2 (modified): handwashing with soap or substitute**[12]

[12] Figures represent the number of household responses, 2007/ 2011, where A stands for responses of adults (18 years and over), and C stands for responses of children (5-17 years).

4.1.3 Indicator 3: safe water source and management

The original WASHCost flowchart used four questions to assess the hygiene effectiveness level of safe water source and management (see annex 3). After modifications that take into account the assumptions, limitations and proxies that could be used, the survey questions for indicator 3, as shown in figure 5, was expanded to a total of five.

Q12 - How often is a protected source used for drinking water?

The proxy used was **'Q10: What type of drinking water source does your household use mainly during rainy and dry seasons?'.** Household surveys provided drinking water source type for both rainy and dry seasons, although it should be noted that these were asked at the same time and, therefore, the response for one season is dependent on the memory of the respondent. As the word "protected" is subject to interpretation, this was changed to the word "improved". The JMP (2012) definition was used: an improved source is considered protected when it is free from outside contamination, in particular, contamination from faecal matter. Improved water sources include borehole with handpump within/ outside the village, protected surface water with handpump, protected surface water with windlass, protected spring, and rain water. Unimproved sources include unprotected surface water, unprotected spring, lakes/ streams/ rivers/ ponds, and water vendors. Using the responses for both rainy and dry seasons, there were three possible answers to this question: (1) improved water sources are always used; (2) improved water sources are sometimes used (i.e., an improved source is available for only one season—rainy or dry); and (3) improved water sources are never used.

Q13 - Is the water collected safely?

The wording of this question was found to be vague and was therefore reformulated to **'Q11: Are water containers washed before water is collected?'**. Another proxy used was **'How do you usually wash water containers before water drawing?'**. The following answers were considered in the affirmative: "wash the container with soap/ detergent in the house", "wash the container with soap/ cleaning agent at the water point", and "wash with water and ash". While it is possible for clean water containers (washed with soap/detergent) to be contaminated by dirt during travel to the water source, this was not accounted for in the study. The following answers were considered in the negative: "containers are dusted and/ or wiped with a rag in the house, or at the water point", and "containers are not washed before use". Owing to WASHCost's emphasis on the use of soap or substitute, the answer of "rinse with water only" was also taken to mean that water containers were not being washed.

Q14 – **Q12 (new): Is water transported back in a container with a lid?**

A new question in WASHCost's survey questions for Indicator 3, Q12 (new) was added since data on the transportation of water was available in the household surveys conducted. Assessing whether water was transported in a container with or without a lid was included as the presence of a lid reduces the likelihood of water contamination. Another proxy used was 'What kind of container does your household use to fetch and carry water?'. The answers specified whether containers were with or without lids.

Q15 - Is the water stored safely?

To strike better clarity in what was meant by safe storage, this question was modified to answer the question **'Q13: Is water stored in a container with a lid?'**. Another proxy used was **'How does your household keep drinking water in your house?'**. The answers provided insight into whether containers were with or without lids.

Q16 - Is the water drawn safely?

This question sought to determine whether a clean ladle or spoon was being used to draw water from a storage container. However, there were no proxy questions available that referred to instruments being used to draw water. Instead, the proxy used was **'Q14: Do you (or household members in charge of fetching water) practice**

handwashing before drawing water?'. Answers in the affirmative ("Yes") covered responses that ranged from "always" to "sometimes"; while responses ranging from "rarely" to "never" corresponded to "No". No details were provided on whether handwashing was performed with soap or substitute. For Q14, it was assumed that: (1) water was removed from the storage container with the use of hands, and (2) hands with which water was drunk were not re-introduced to the water storage container, or hands were still clean after water was drunk.

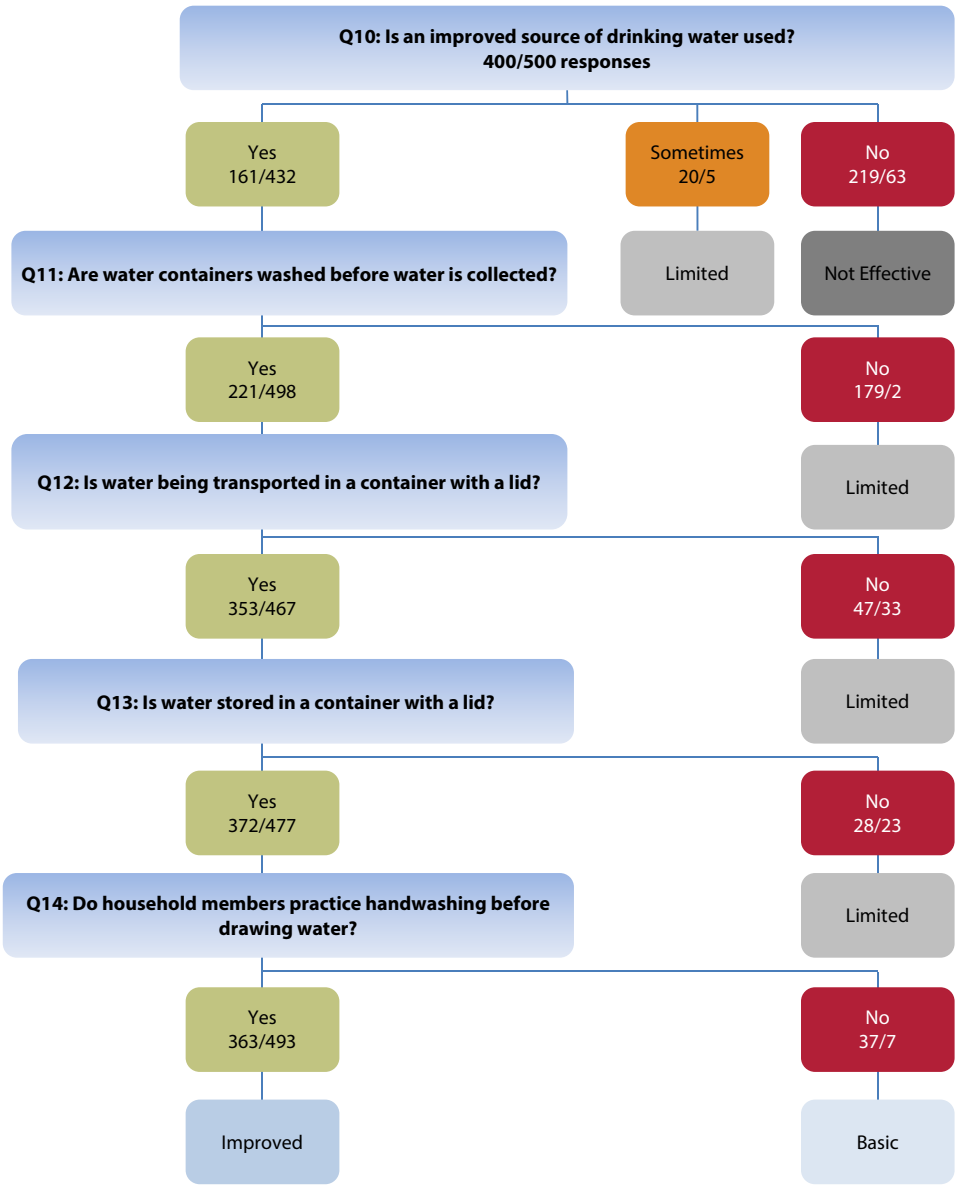

Figure 5 Flowchart for Indicator 3: safe water source and management[13]

[13] Figures represent the number of household responses, 2007/ 2011.

4.1.4 Distribution of the household responses into hygiene effectiveness levels

In figures 3-5, the number of household respondents for each of the sub-indicator questions is provided for the years 2007 and 2011 (e.g., 163/ 293). Combining all responses to the sub-indicators, a hygiene effectiveness level is assigned to each household for each of the three indicators. Table 3 presents the percentage of households in each effectiveness level for the baseline (2007) and endline (2011) surveys[14].

Table 3 Number and percentage of household respondents for all three indicators in 2007 (baseline survey) and 2011 (endline survey)

	2007 # respondents	2011 # respondents	2007 % respondents	2011 % respondents
Indicator 1 – faecal containment and latrine use				
Improved	1	24	0.3%	4.8%
Basic	0	0	0%	0%
Limited	182	444	45.5%	88.8%
Not Effective	217	32	54.3%	6.4%
Indicator 2 – handwashing with soap or substitute for adults (over 18 years old)				
Basic/ Improved	157	334	39.3%	66.8%
Limited	175	158	43.8%	31.6%
Not Effective	68	8	17.0%	1.6%
Indicator 2 – handwashing with soap or substitute for children (5-17 years old)				
Basic/ Improved	110	249	27.5%	49.8%
Limited	227	240	56.8%	48.0%
Not Effective	63	11	15.8%	2.2%
Indicator 3 – safe water source and management				
Improved	83	394	20.8%	78.8%
Basic	7	5	1.8%	1.0%
Limited	91	38	22.8%	7.6%
Not Effective	219	63	54.8%	12.6%

Across all indicators, the general observation was an increase in improved hygiene behaviour between 2007 and 2011.

For **Indicator 1** (faecal containment and latrine use) survey responses showed a decrease in number of households belonging to the 'Not Effective' level (from 54.3% to 6.4%), reflecting an increase from 45.5% to 88.8% in the 'Limited' level. To understand the basis of this change, the individual sub-indicator questions in figure 3 show that the greatest change occurred in two areas: (1) households with a latrine increased from 31% to 73%, and (2) actual use of latrines increased from 31% to 73%. The numbers suggest that it is likely that the actual use of latrines is linked to the increase of household latrines.

For **Indicator 2** (handwashing with soap or substitute), household data was available for adults (over 18 years) and school-age children (5-17 years). Results showed a decrease in respondents classified in the 'Not Effective' and

[14] Note that there were no control groups in this study, and all changes observed were assigned to the intervention.

'Limited' levels, corresponding to an increase in the 'Basic/ Improved' levels, for both adults and children. Adults were found to: (1) make up a higher percentage of respondents registered in the 'Basic/ Improved' level for both 2007 and 2011, and (2) have made greater progress in climbing the hygiene effectiveness ladder: a percentage change of 27.5% was observed between baseline and endline years for adults, while school-age children showed an increase of 22.3%. It should be noted that while the HPI was taking place, the bilateral programme also had school interventions occurring simultaneously. As a result, children would have participated in hygiene promotion activities at school, in addition to receiving secondary knowledge transferred by their adult household members. Despite the additional exposure to improved handwashing practices, only 49.8% of children were in the 'Basic/ Improved' level, as compared to 66.8% of adults. Using the respondent numbers from figure 4, the greatest change in handwashing behaviour in adults corresponded to: (1) the use of non-re-contaminated water for handwashing, which increased from 35% to 91%, and (2) the use of soap or substitute, which increased from 40% to 67%. Amongst children, the same two sub-indicators were observed to have witnessed the greatest increase, with the use of non-re-contaminated water increasing from 51% to 91%,, and the use of soap or substitute increasing from 28% to 50%.

For **Indicator 3** (safe water source and management), the study revealed a significant increase in the percentage of respondents reaching the Improved level (from 20.8% to 78.8%), corresponding to a decrease in the 'Not Effective' and 'Limited' levels. Based on respondent numbers in figure 5, there were minimal changes in behaviour related to the transport, storage, and drawing of water at the household. Instead, significant changes were observed for: (1) use of an improved drinking water source, which increased from 40.3% to 86.4%, and (2) washing containers before water is collected, which increased from 55.3% to 99.6%.

4.2 Implementer intervention costs and their classification

Costs related to the intervention incurred by the implementer were provided by the WASHCost team with descriptions for the type of work associated with each cost. All costs data were adjusted for inflation and provided in 2011 US$. Based on WASHCost's cost categories of general hygiene promotion interventions (table 2), four cost categories were identified in the HPI. Examples of capital expenditure (CapEx) included supporting the establishment of the linkage between target communities and local mechanics in the operation and maintenance of water supplies, disseminating materials to be used in each target community, supporting the training of water and sanitation committees, donor costs (from the bilateral programme) for the initiation of the project, and any type of training (whether it was training members of the water committee or local artisans). Only one type of capital maintenance expenditure (CapManEx) was costed: the re-training of local artisans. Expenditure on direct support (ExpDS) are district level costs and are not associated with the project/ implementation itself; only one cost type classified as ExpDS surfaced—the costs associated with district monitoring. Operating Expenditures (OpEx) are recurrent costs acquired during the actual intervention; these include promotion and demonstration of model latrines, hygiene and sanitation promotion, programme monitoring visits, and the baseline and endline surveys.

To calculate the total implementer cost of the HPI per person, several assumptions were made. All costs were assigned by the WASHCost team to a category of: (1) water, (2) sanitation, (3) hygiene, (4) water and sanitation, (5) water and hygiene, (6) sanitation and hygiene, and (7) water, sanitation, and hygiene. Depending on the water/ sanitation/ hygiene category used, a percentage of the costs were allocated for hygiene:

- 0% was allocated to hygiene for costs related solely to water, sanitation, and/ or water and sanitation;
- half of the costs of water and hygiene and/ or sanitation and hygiene interventions were allocated to hygiene; and
- a third of the costs of water, sanitation, and hygiene were considered hygiene-related.

In addition, costs were also classified according to target beneficiaries: communities/ schools/ communities and schools. As the focus of this study was on the cost effectiveness of community interventions, only costs related to the community were assessed. Where costs were assigned to communities and schools, a fraction of the cost was used for the assessment: the fraction of the cost was calculated according to the total number of beneficiaries in the target communities divided by the total number of beneficiaries in communities and schools.

To calculate the number of beneficiaries in communities and schools, the final report of the bilateral programme gave an estimate of 190,000 inhabitants for 200 communities, which resulted in 950 inhabitants per community[15]. Using this value, and the assumption provided by the WASHCost team that each school has 500 children, the number of beneficiaries was calculated and used to determine: (1) the fraction of costs associated with target communities, and (2) the number of beneficiaries for each cost. This was used to calculate the cost per person[16].

Table 4 presents the total cost for each cost category, as well as the overall cost per person per year. Costs were averaged over 4.75 years, which is the total duration of the intervention (57 months).

Table 4 Implementer intervention costs by cost category in 2011 US$

Cost type	Total cost (2011 US$)	Cost per person per Year (2011 US$)
Capital Expenditure Software (CapExS)	305,265	2.89
Capital Maintenance Expenditure (CapManEx)	0	0
Direct Support Expenditure (ExpDS)	148,923	0.81
Operating Expenditure (OpEx) – total	80,696	1.22
Total	534,884	4.92

The intervention cost for the implementer of US$ 4.92 (2011) per person per year is within the range of costs obtained in a previous study in Mozambique for four hygiene promotion community education programmes (van de Reep, 2010). The results showed that the average cost of four hygiene promotion interventions in Mozambique was US$ 4.00 (2008) per person per year, with a range of between 2.6 and 15.1, excluding household costs. The large variation in costs was due to the hygiene promotion approach used, some which required hardware improvements and were thus more costly.

4.3 Household costs

No household costs were collected in the baseline and endline surveys, although van de Reep's (2010) study used a cost of US$ 0.31 (2008) per person per year. Ideally, household costs are collected at the beginning and end of the intervention to determine whether any change occurs. As an example, if results from the handwashing indicator

[15] Available on request.

[16] Note that the cost data provided by the WASHCost team was divided into the three phases. Phase 1 had cost data for 2007, and represented the baseline study carried out in 30 communities and 20 schools. Phase 2 activities benefited 10 communities and 7 schools, and costs data were provided for the 2008 calendar year. Phase 3 costs were associated with 10 communities and 8 schools, and costs data were for 2010. Although the endline survey and Phase 3 activities ended in 2011, costs data were booked in 2010 with the signing of contracts. Similarly for Phase 2, all costs data were booked in 2008 on the signing of contracts.

show that a greater percentage of respondents use soap or substitute after the intervention, household expenditure on soap is likely to increase.

Household hardware costs such as construction of latrines was designated by the WASHCost team to be a sanitation cost, and would therefore not be included as a hygiene cost even if the cost data had been available. By classifying certain costs as only for water and/ or sanitation, these assumptions most likely led to an under-estimation of the hygiene intervention costs. As discussed in Section 4.1.4 for Indicator 1 – faecal containment and latrine use, the change in hygiene effectiveness levels was most likely due to the construction of household latrines. From 2007 to 2011, households with a latrine increased from 31% to 73%, but the cost of constructing these latrines was not accounted for in the intervention costs. While it is true that community members need to be educated and be willing to use a latrine, and that the presence of a latrine does not ensure that the latrine will be used, if a household does not have a latrine, there is no option of practicing the improved hygiene behaviours promoted by the intervention.

In addition to capital expenditure (hardware) and operating expenditures (soap for handwashing), the time spent by the community on intervention activities was not quantified. Without household or community time costs it is not possible to determine the total cost and, therefore, this report can only report on the costs associated with the implementer.

4.4 Determining cost effectiveness of the intervention

To determine cost effectiveness, the cost of the intervention and the change in hygiene effectiveness level due to the intervention need to be calculated. In this study, hygiene effectiveness level was not a single outcome, but was described by four possible hygiene effectiveness levels as previously discussed in table 3, which gives the percentage of household respondents in each of the four hygiene effectiveness levels before and after the intervention. Therefore, it was decided to define WASHCost's 'Basic' level as the target level, and to re-classify the household respondents as below or above 'Basic' level. The results are presented in table 5.

Table 5 Defining 'Basic' as the target level to obtain a single outcome indicator measured as a percentage change in households

	2007 % households	2011 % households	Change in % households
Indicator #1 – faecal containment and latrine use			
Basic/ Improved	0.3%	4.8%	+4.6%
Not Effective/ Limited	99.8%	95.2%	
Indicator #2 – handwashing with soap or substitute for adults (over 18 years old)			
Basic/ Improved	30.3%	66.8%	+27.6%
Not Effective/ Limited	60.8%	33.2%	
Indicator #2 – handwashing with soap or substitute for children (5-17 years old)			
Basic/ Improved	27.5%	49.8%	+22.3%
Not Effective/ Limited	72.5%	50.2%	
Indicator #3 – safe water source and management			
Basic/ Improved	22.5%	79.8%	+57.3%
Not Effective/ Limited	77.5%	20.2%	

From Section 4.2, the cost of the intervention was calculated to be approximately US$ 5 (2011) per person per year. However, there were difficulties in relating this intervention cost to the effectiveness outcomes because only one cost value was available while there were three different indicators. The question then became how should the total intervention cost be divided among the three indicators? With the data available, it was not possible to calculate the cost effectiveness of the intervention in a conventional manner. Instead, the conclusion sets out percentage change across the three core hygiene behaviours, aiming to provide a nuanced understanding of where change is happening in order to enable more detailed planning of subsequent hygiene promotion interventions to address gaps in behaviour changes in each of the three core hygiene behaviours.

For an investment of US$ 5 per person per year (2011), the conclusions drawn from the data are as follows:

5% increase in basic faecal containment and latrine use, defined as:

- All or some household members use a latrine some or most of the time.
- When there is no access to a latrine, faeces are generally buried.
- The latrine separates users from faecal waste.

28% increase in basic handwashing, defined as:

- Accessible designated handwashing facility.
- Sufficient water is available for handwashing.
- Water for handwashing is poured/ not re-contaminated by handwashing.
- Soap or substitute is available and used.
- All household members wash their hands with soap/ substitute at critical times.

57% increase in basic drinking water management, defined as:

- Protected water sources are always used.
- Collection vessel (if necessary) is regularly cleaned with soap or substitute.
- Water storage vessel (if necessary) is covered and/ or water is drawn in a safe manner.

5 Findings

Throughout this paper, limitations of the WASHCost methodology have been discussed. A summary of the methodology's key limitations are presented below:

- The sub-indicators (questions) used to determine the hygiene effectiveness level need to improved, particularly for Indicator 2 – handwashing with soap or substitute. Questions should be asked to determine whether water and soap were available and, if available, whether they were used.
- There are currently too many paths that lead to the same hygiene effectiveness level. For example, in Indicator 3 – safe water source and management, most paths lead to a 'Limited' level, yet they are clearly different. "Only sometimes using a protected drinking water source" is classified at the same level as "always using a protected drinking water source with a clean, washed container that is transported back with a lid, but not stored with a lid'. Thus, by looking at just the assigned hygiene effectiveness level, it is not possible to determine if behaviour in washing the container and transporting the container is different.
- Based on the flowchart for Indicator 2, "always washing your hands after critical moments with less than one cup of re-used water" is classified the same as "not washing your hands after critical moments". Both situations

lead to a level of 'Not Effective'. However, this is in direct contrast to studies and hygiene promotion that recognise that any type of handwashing is better than no handwashing.

- For combined water, sanitation, and hygiene interventions (as was the intervention studied here), specific activities such as the construction of latrines would result in changes to both sanitation service levels (Potter, et al., 2011), as well as changes in sanitation-related hygiene behavior. Specifically, Indicator 1 in this study – the use of latrines – focuses on sanitation-related hygiene behaviours related to access to and use of a latrine. However, the presence of a household latrine is considered the domain of sanitation services (Potter, et al., 2011), while the hygiene promotion effectiveness levels are used to determine changes in the hygienic use of a safe latrine. Therefore, the cost of latrine construction was not included in the calculation of the total cost of the hygiene promotion intervention. The sanitation service level methodology and hygiene effectiveness methodology is thus currently linked, but it is important to note that they will not necessarily be applied in concert unless specifically recommended; and hygiene cost effectiveness methodology needs to stand alone from sanitation service level assessment.
- There is an inherent tension in the tested methodology: on the one hand, in order to enable an overall cost effectiveness assessment, the present study tested ways to collapse the effectiveness levels within each of the three core indicators into a single outcome. On the other hand, important nuances in behaviour changes are lost when collapsing the effectiveness outcomes across the three core indicators.

6 Recommendations

Improvements to the WASHCost methodology should be made following the limitations described above (in section 5). The sub-indicators selected (particularly for Indicators 2 and 3), and the logic of the flowcharts in determining the levels of hygiene, should be carefully reviewed.

The methodology itself needs to be validated with respect to the relationship between hygiene effectiveness levels and health outcomes before use in future studies. This validation step is particularly important because the hygiene effectiveness levels and three indicators/ behaviours selected to assess changes in hygiene behaviour were initially chosen due to their positive impact on individual health.

Detailed documentation such as categorisation and collection of the intervention costs (year as well as value) and on the intervention itself (borehole number, community name, sampling strategy) is needed for future studies, and proper costing of an intervention requires household and community costs to be collected. As the intervention occurred in both communities and schools of the same area, and the intervention was a combined water, sanitation, and hygiene intervention, it is difficult to determine what changes in hygiene behaviour are attributable to the community hygiene promotion intervention only. Future studies should focus on hygiene interventions alone in only target communities.

7 Conclusions and next steps

The purpose of this Briefing note was to test the WASHCost methodology for one intervention in Mozambique.

The WASHCost methodology was based on the assumption that behavioural change could be measured by assessing the change in hygiene effectiveness level, where effectiveness levels were defined by the WASHCost team. Using this methodology and the data provided by WASHCost, this Briefing note showed that household

surveys can be used to determine effectiveness levels for the three hygiene behaviours of interest. A single value of cost can be calculated and used to determine a per person per year cost that corresponds to changes in effectiveness levels observed.

The findings from this study showed that for all three WASHCost indicators – faecal containment and latrine use, handwashing with soap or substitute, and safe water source and management – an improvement in hygiene effectiveness level as defined by the WASHCost methodology was observed after the intervention.

The intervention cost was calculated to be approximately US$ 5 (2011) per person per year, calculated by dividing total costs by the number of years of the intervention, and was found to be within the range of hygiene promotion intervention costs previously reported.

For the combined water, sanitation, and hygiene intervention studied here, for an investment of US$ 5 (2011) per person per year, the following was achieved:

5% increase in basic faecal containment and latrine use, defined as:

- All or some household members use a latrine some or most of the time.
- When there is no access to a latrine, faeces are generally buried.
- The latrine separates users from faecal waste.

28% increase in basic handwashing, defined as:

- Accessible designated handwashing facility.
- Sufficient water is available for handwashing.
- Water for handwashing is poured/ not re-contaminated by handwashing.
- Soap or substitute available and used.
- All household members wash their hands with soap/ substitute at critical times.

57% increase in basic drinking water management, defined as:

- Protected water sources are always used.
- Collection vessel (if necessary) is regularly cleaned with soap or substitute.
- Water storage vessel (if necessary) is covered and/ or water is drawn in a safe manner.

The study shows that a hygiene promotion intervention is more effective in the context of water and sanitation infrastructure improvement. Therefore, an integrated WASH approach is recommended.

The study provides useful insights on the effectiveness and costs of a large hygiene promotion intervention utilising a traditional Participatory Education and Communication (PEC) approach within the context of an integrated WASH improvement programme, and contains useful insights for the design of future hygiene cost effectiveness studies and instruments in Mozambique.

The conclusion sets out percentage change across three core hygiene behaviours, used as representative markers for the effectiveness of an hygiene promotion intervention. Findings with respect to percentage change across the three core hygiene behaviours enables the comparison of the relative effectiveness of different hygiene promotion approaches in facilitating three key hygiene behaviours:(i) faecal containment and latrine use, (ii) handwashing, and (iii) drinking water management. If different hygiene promotion approaches can be easily compared using harmonised indicators and monitoring systems, it will ease comparisons between countries and between interventions. If the methodology is developed further to link the results with health impacts (and, in particular, diarrhoea), the sector could move from monitoring cost effectiveness of hygiene promotion interventions to monitoring the health impact of hygiene services.

8 References

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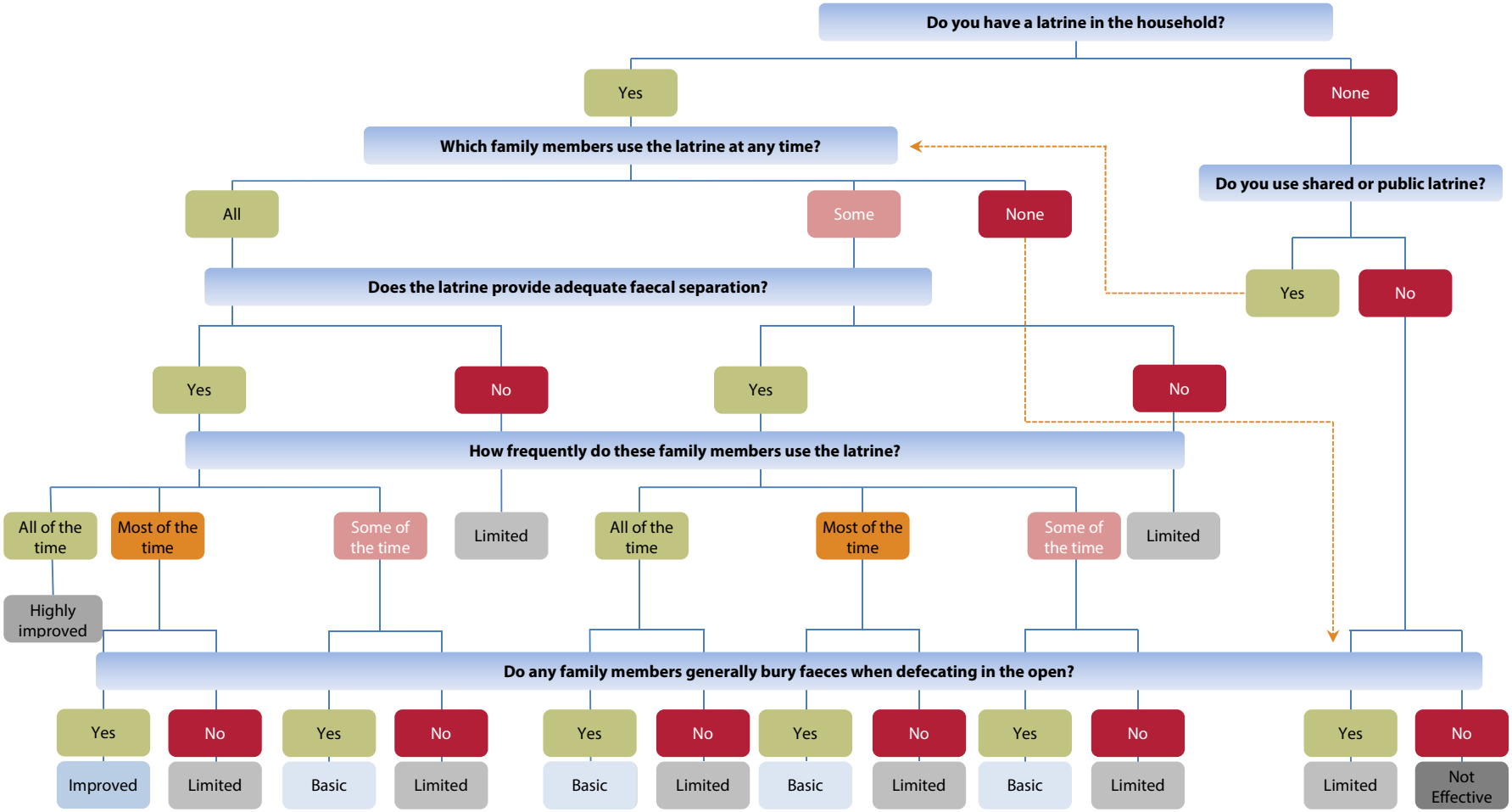
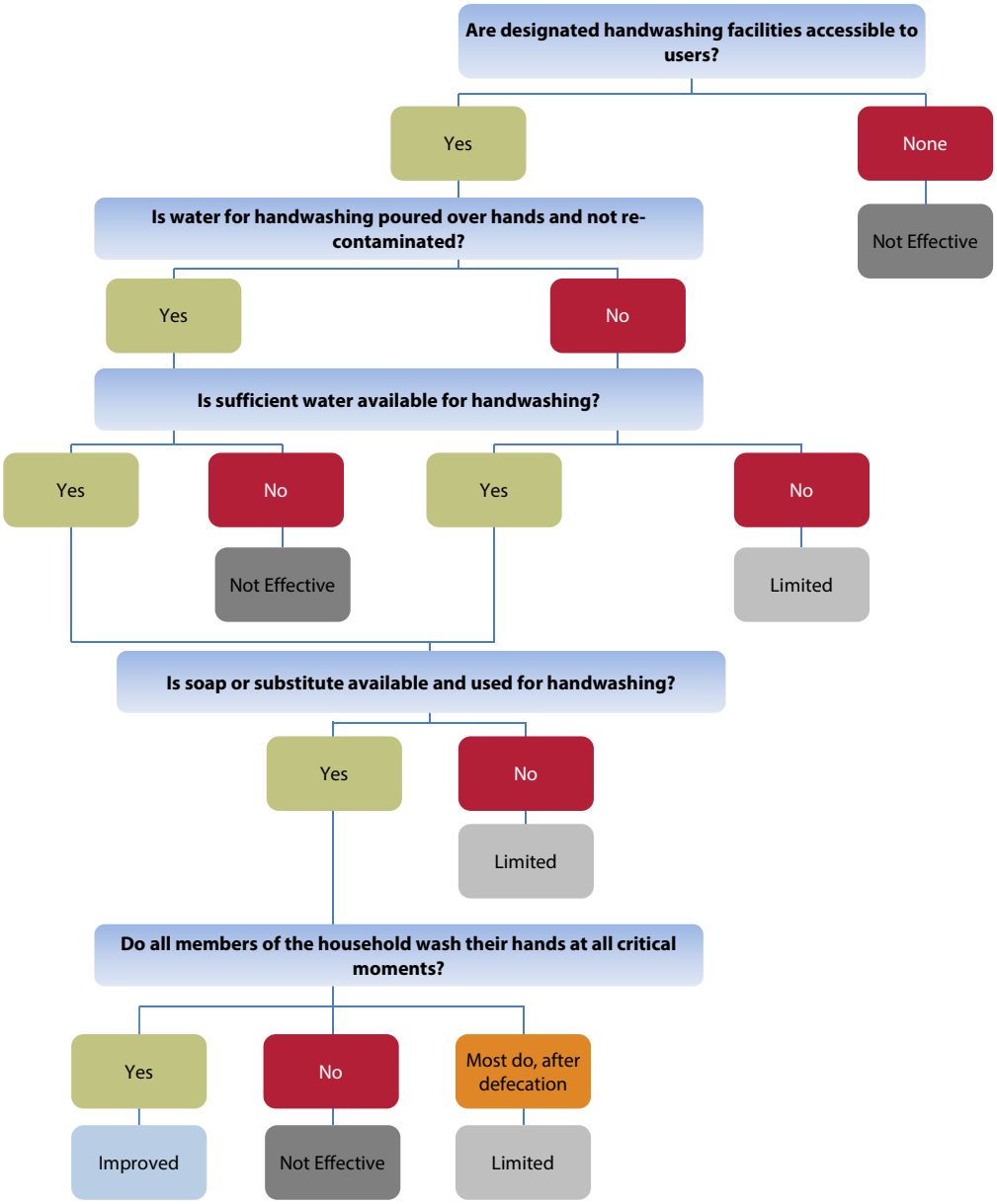
Annexes

Annex 1 Flowchart for Indicator 1 (original): faecal containment and latrine use



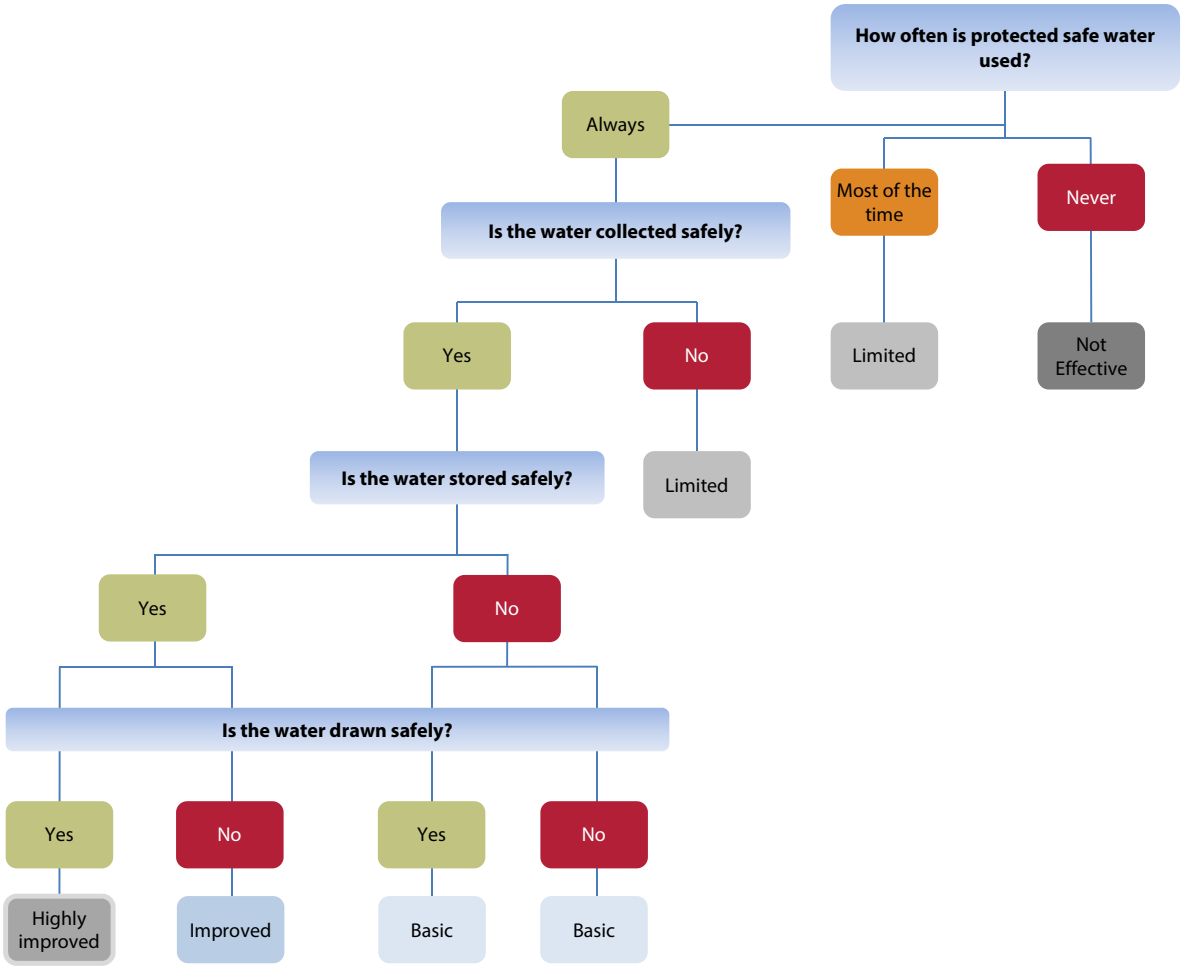
Source: Dubé, et al., 2012.

Annex 2 Flowchart for indicator 2 (original): handwashing with soap or substitute



Source: Dubé, et al., 2012, p. 14.

Annex 3 Flowchart for indicator 3 (original): safe water source and management



Source: Dubé, et al., 2012, p. 16.

Annex 4 Districts, target communities and schools, and borehole numbers for 2007 (baseline survey) and 2011 (intervention and endline survey)

BASELINE SURVEY			INTERVENTION AND ENDLINE SURVEY		
Borehole number	**Community**	**School**	**Borehole number**	**Community**	**School**
Alto-Molócuè					
45-1/45-2	Machilone	EPC de Vacha	45-1	Vacha	EPC de Vacha
48-1	Metupa	EP1 de Mohiua EPC de Inagu	48-1	Inago	EP1 de Mohiua EPC de Inago
48-2	Mugiwa		49-1	Guilerme	EPC de Guilerme
49-1 / 49-2	Guilherme	EP1 de Merreia EPC de Guiherme	58-1	Narice	
51-1	Opualo		60-1	Bairro Comercial	
51-2	Erequele		60-2	Namacatxo	
53-1	Nacungulo				
53-2	Retxua				
60-2	Namacatxo				
Mocuba					
132-1	Murramba	EP1 de Murramba EPC de Alto Benfica	132-1	Murramba	EP1 de Murramba
135-1	Mussaba-sede	EP1 de Muduala EPC de Namanjavira	135-1	Mussaba-sede	EP1 de Muduala EPC de Namanjavira
135-2	Muduala		139-1	Alto-Benfica	EPC de Alto Benfica
136-1	Mebudana		139-2	Manganha-1	
139-2	Manganha 2	EP1 de Manganha 2			
R-5	Posto Agricola 1				
Ile					
84-1	Muaquelia-Sede		84-2	Caneia	EP1 de Caneia EPC de Maccuelia
84-2	Napacone	EP1 de Caneia EPC de Maccuelia	86-1	Nampevo (nanela)	EPC de Nampevo
85-1	Namanda-Macugune		89-2	Muaziua-Sede	
85-2	Cuduria		95-1	Muquituna-Sede	
86-1	Nampevo (nanela)	EPC de Nampevo	95-2	Nonono	
95-2	Mucova		96-2	Nabala	
96-1	Neulane				
96-2	Neulane	EP1 de Nhanhane EPC de Tebo			
97-1	25 de Junho				
Gilé					
140-1	Inlepa	EP1 de Pacane	142-2	Nacune	EP1 de Nacune EPC de Pury
141-2	Nihane		145-2	Impariua	EP1 de Impariua
142-1	Pupe		148-1	Nanhope	EPC de Nanhope
142-2	Pury-Sede	EP1 de Nacune EPC de Pury	148-2	Nahuo	
145-2	Purula	EP1 de Impariua			
148-2	Nahuo	EPC de Nanhope			