

## A Cost Analysis of Hygiene Promotion Interventions in Mozambique

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### **Abstract**

*Lack of access to safe drinking water, inadequate sanitation and poor hygiene causes 2.2 million deaths each year in the developing world, mostly children. Reduction in poverty and improved health can only be achieved if water and sanitation facilities are used hygienically by all. One of the methods that aim to achieve this goal is hygiene promotion.*

*There seems to be a knowledge gap in the WASH sector when it comes to the costs of hygiene promotion interventions. The purpose of undertaking this study was to increase knowledge on this subject by collecting, analysing and reporting the costs of several hygiene promotion interventions in Mozambique. An understanding of the costs of hygiene promotion is a first step towards assessing its cost-effectiveness, or “value for money”.*

*The main question this study answers is: What are the full life cycle costs per capita of hygiene promotion interventions in Mozambique? To answer this question requires performing a type of analysis which is often referred to as a cost analysis.*

*This cost analysis was carried out using a societal perspective covering the five year period from 2005 to 2010. Cost data was obtained from organisations involved in supporting and providing hygiene promotion interventions and households. Cost data was collected through various means including: publically available project reports, internal project reports, financial statements, key informant interviews, and focus group discussions. Cost data from households was obtained through household questionnaires.*

*The cost per capita for implementing four Community Education Programmes (Programa de Educação Comunitaria-PEC) ranged from the equivalent of US\$ 1 to US\$ 15 per year, using a Purchasing-Power Parity (PPP) conversion. The average cost of these projects in 2008 US dollars was US\$ 4. Large differences in costs were found among the four different approaches to community education implementation. Expenditure on direct support by supporting organisations was calculated to cost the equivalent of US\$ 0.11 per capita per year. These support costs were on average 12% of the total implementation costs. Household costs of hygiene promotion, as time spent on hygiene promotion activities was US\$ 0.31 per capita per year. These costs, did however, only apply to the 19.5% of the people who actually reported to have attended a hygiene promotion intervention in the past year. Other household investments related to hygiene practices were also determined. The average*

*household investments on handwashing facilities was US\$ 0.97 per capita, with an additional US\$ 12.62 per capita per year spent on the purchase of soap. Current data does not permit direct allocation of these costs to a particular type of intervention, but they are considered relevant as they are potentially a direct consequence of hygiene promotion activities.*

*Cost analysis of the kind described in this paper will be especially valuable when combined with studies to show the effectiveness of different approaches to hygiene education.*

## **INTRODUCTION**

With the objective of achieving the Millennium Development Goal related to water, sanitation and hygiene considerable resources have been invested in increasing access to clean drinking water and basic sanitation in developing countries (WHO, 2008). It is clear that access to these facilities will only have the desired effect of reducing the spread of infectious diseases when used in an appropriate and effective manner (Boot & Cairncross, 1993). One of the methods used to achieve this goal is hygiene promotion.

Hygiene promotion can be defined as: “the planned approach to preventing diarrhoeal and other water and sanitation related diseases through the widespread adoption of safe hygiene practices” (adjusted from Curtis & Kanki, 1998, pp 10). Hygiene promotion is frequently used in combination with water and sanitation improvements such as the installation of improved latrines and water supply. This can be explained by the fact that practicing good hygiene, amongst other things, depends on access to adequate hardware facilities and water services. Interventions aimed at improving water supply or sanitation are often referred to as hardware; put simply, pumps, pipes and latrines. Hygiene promotion falls under what the Water Sanitation and Hygiene (WASH) sector refers to as software. Software includes hygiene education, hygiene promotion, demand stimulation, community mobilisation, institutional capacity building, and training at community, district, provincial and national levels.

Governments, non-governmental organisations and others engaged in trying to improve health indicators in developing countries are not able to invest in every possible intervention, and investment choices need to be made. Economic evaluations can provide these investment decision makers with relevant information on which to base their decisions. Water, sanitation and hygiene interventions need to prove they provide value for money to those wanting to invest in alleviating poverty and poor health in developing countries. Economic evaluations of hardware interventions have been done quite frequently in the past (Hutton & Haller, 2004) (Varley, Tarvid & Chao, 1998). Economic evaluations of the software component are far less frequently done. A possible explanation for this might be the relative ease with which cost information on hardware components can be gathered compared to determining the costs of the software components. An understanding of the costs of these software components is a first step towards assessing their cost-effectiveness, or value for money. Cost data will need to be combined with data on effectiveness to give a full picture and provide the basis for decision making.

## **Purpose and objectives**

Hygiene promotion is often mentioned in water supply and sanitation project budgets as a single line item without further specification. There seems to be a knowledge gap in the WASH sector when it comes to the costs of the software components of WASH interventions such as hygiene promotion. The purpose of this study is to increase knowledge on this subject by collecting and analysing the costs of several hygiene promotion interventions in Mozambique. It is hoped that the cost analysis used here will be tested and replicated in future research. It is also hoped that increased scientific knowledge on the costs of hygiene promotion will contribute towards better budgeting and planning for hygiene promotion, which will contribute to more effective interventions with increased impact on health. This study is also meant to provide decision makers with accurate information regarding the costs of hygiene promotion thus facilitating evidence-based policy decision making in the field of public health in Mozambique.

The main question this study addressed was: What are the full life-cycle costs per capita of hygiene promotion interventions in Mozambique? To answer this question requires performing a type of analysis which is often referred to as a cost analysis

This study has been commissioned by WASHCost Mozambique and is supported by the IRC International Water and Sanitation Centre. WASHCost “researches the life-cycle costs of water, sanitation and hygiene (WASH) services in Mozambique, Ghana, Burkina Faso and Andhra Pradesh, India” (Fonseca et al., 2010).

## **Approaches to hygiene promotion in Mozambique**

Hygiene promotion is a part of what is referred to as Programa de Educação Comunitaria (Community Education Programme, PEC). Four different approaches to PEC implementation were identified; in 2009 a new, government sanctioned approach, was adopted which is referred to as PEC-Zonal. The government sanctioned approach before 2009 is referred to as ‘traditional PEC’. Besides these approaches, two projects were identified that adopted an implementation approach as designed by the funding agencies financing the projects. From the interviews a total of thirteen project budgets and various progress reports were obtained. Nine of the budgets included were categorised as PEC-Zonal, one as traditional PEC and three were implemented according to two funding agencies’ implementation design. The distinguishing characteristics of each of these approaches are as follows:

### ***Approach 1 – CLTS and SLTS***

The PEC implementation of funding agency 1 used the Community-Led Total Sanitation (CLTS) approach to hygiene promotion. Aside from work in the communities using CLTS the programme also included school based activities using a similar methodology which can be referred to as School-Led Total Sanitation. CLTS and SLTS approaches include community or school activities such as; focus group discussions, transect walks, mapping of open defecation sites and ‘shit’ calculation (calculations of total quantity of excrement produced by a particular community or school) (WSSCC, 2010). The programme also established a

demonstration centre where different type of latrines can be seen. The purpose was to ensure people make an informed decision when choosing a type sanitation technology. The programme's target population was based on census data of the communities and schools. The budget used for this study was the project's 2010 annual budget.

***Approach 2 – PEC linked with latrine hardware improvements***

Funding agency 2's implementation of PEC was linked to water and sanitation hardware improvements that were executed in the programme area simultaneously. Hygiene promotion was implemented through public theatre performances, and the training of local activists who are meant to promote hygiene behaviour change in their communities. The target population of the programme was coupled to sanitation hardware improvements, stating that the PEC implementation target population was equal to the number of people served by newly built latrines. The calculation assumes each newly built latrine serves 5 people. The programme's 2010 annual budget was used for this study.

***Approach 3- PEC linked with water hardware improvements (traditional PEC)***

This PEC implementation was supplementary to the establishment of water points. The programme ran for five years; from 2003 till 2007. The total budget was averaged to establish a per annum budget for 2007. With regard to hygiene promotion the programme trained activists and local Community Based Organisation (CBO) members to promote hygiene practices in their communities. In target communities gender sensitive committees were established that focused on the Operation and Maintenance (O&M) of water points. Animators were trained and employed to promote hygiene practices in several communities. No specific method of hygiene promotion was used. The target population for this intervention was the entire population of the districts in which the programme was implemented.

***Approach 4 – PEC for the whole district (PEC-Zonal)***

The PEC-Zonal approach to PEC implementation is also linked to water and sanitation hardware improvements. PEC-Zonal implementer contracts contain a number of performance indicators, which are used to reward the implementer according to performance. Indicators are clustered in into 5 areas; access to water supply, sustainability of water sources, community sanitation education, community hygiene education and preparedness for a cholera outbreak. The indicator regarding access to a water supply focuses on the establishment of gender sensitive water committees and the identification of suitable water points. The sustainability indicator deals with water supply Operation and Maintenance (O&M). The implementer needs to establish that target communities are aware of the importance of-, and have a plan for maintenance of their water supply. Indicators for sanitation and hygiene education focus on the number of schools and communities that have become open defecation free (ODF), the number of communities that received and acted on CLTS intervention, the number of schools and communities that have and use handwashing facilities, and the use and maintenance of latrines. Cholera outbreak preparedness is evaluated according to the presence of district contingency plans. Target populations for PEC interventions implemented according to the PEC-Zonal approach are always the entire district's population of the district where the PEC intervention is

implemented. All PEC-zonal budgets analysed in this study were 2009 or 2010 annual project budgets.

## Methods

The research design for this study can be classified as a cost analysis. According to Drummond et al. a cost analysis is the analysis of comparative costs of alternative interventions or programmes (Drummond et al., 2005, p.55).

This study identified resources used in hygiene promotion from a societal perspective using a life cycle costing approach. This makes a comparison between the costs of hygiene promotion and other interventions in public health more relevant, as shifting costs from one actor to another will not affect the final outcome, as it does when a more narrow perspective is chosen. For example, if a programme starts by funding costs centrally, but later on, costs are shared with local government or households, this will not alter the overall picture for purposes of comparison. The study collected and analysed data on the costs of hygiene promotion interventions carried out by several service providers operating in Mozambique. Data was also collected from households situated in the areas where participating service providers have implemented hygiene promotion interventions. Service providers participating in this study are:

At national level:

- DNA; Direcção Nacional de Águas / National Directorate of Water
- DES; Departamento de Saneamento / Sanitation Department (department of DNA)
- 4 funding agencies

At provincial level:

- DPOPH; Direcção Provincial de Obras Públicas e Habitação / Provincial Directorate of Public Works and Housing:
- DAS; Departamento de Água e Saneamento / Water and Sanitation Department (department of DPOPH)
- 7 implementing organisations<sup>1</sup>

The resources used for hygiene promotion by the organisations participating in this study and government departments represent the **costs of service provision**. The organisations and government departments participating in this study are referred to as **service providers**.

Limiting the analyses to only the resources used by organisations would misrepresent the true cost to society as communities and households also use resources when participating in hygiene promotion intervention related activities. To ensure the societal perspective of the cost analysis household costs related to hygiene promotion interventions were included.

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<sup>1</sup> For reasons of confidentiality implementing organisations are not identified in this report

The selected timeframe for the cost analysis is 2005 to 2010. This five year period is sufficient time for the main phases of typical water and sanitation infrastructure improvement related hygiene promotion interventions to be completed. In addition, it is anticipated that longer historical records are more difficult to obtain.

## Research Questions

The first main research question was: “Which resources are used in hygiene promotion interventions carried out by the service providers and households participating in this study?”

To answer this question the study made use of the WASHCost project research protocol V8.0 “a multi-dimensional framework for costing sustainable services” (Fonseca et al., 2010). This research protocol describes the minimum standards for the collection and comparison of life-cycle costs of WASH services. The protocol identifies six main cost components four of which are relevant to the cost analysis of hygiene promotion, they are:

- Capital expenditure – software (CapEx)
- Cost of capital (CoC)
- Operating and minor maintenance expenditure (OpEx)
- Expenditure on direct support (ExpDS)

The second main research question was: “What is the quantity of resources used in hygiene promotion interventions carried out by the service providers and households participating in this study”?

Data on resources used in hygiene promotion by service providers was obtained through:

- Publically available project reports and budgets
- Internal project reports and budgets
- Key informant interviews
- Focus group discussions

Interviews with all the participating service providers were conducted. The objective of these interviews was to identify all costs of hygiene promotion incurred by the service provider for one or two particular project cycles, of projects of their choosing.

WASHCost Mozambique has developed a household questionnaire which contains more information than is actually required for the purpose of this study. 1688 questionnaires were analysed. This study only utilises certain sections of the household questionnaire, specifically, data on:

1. Household composition and income
2. Time spent on hygiene promotion related activities
3. Preferred methods and costs of handwashing with soap

The third main question addressed in the research question was: “What is the value of these resources?”

Resources identified and quantified in the previous two steps are valued according to the reported actual expenditure at the time of use or purchase. An important methodological issue with regard to the valuation of resource use by the local actors in hygiene promotion is the value of time itself. Time spent on hygiene promotion related activities by the local actors in hygiene promotion will be valued in a similar way as the human capital approach commonly used in health economics (Drummond et al, 2005).

	Key informant interviews	project reports, financial statements, etc.	household questionnaires
<b>Service providers:</b>			
International development organisations	x	x	
Local NGO's	x	x	
Governmental Organisations	x	x	
<b>Local actors in hygiene promotion:</b>			
Households	x		x

**Table 1 Summary of various data sources used in this study**

Data was collected from 9-29 August 2010. The provinces and organisations included were selected in such a way that different approaches of hygiene promotion implementation were included in the sample.

## Costs and budget lines

Analysis of the implementing organisations’ project budgets shows that budget line items can be classified in several categories divided over three lifecycle cost components, they are:

### **Capital expenditure – hardware (CapEx)**

- Building of demonstration centre; e.g. building materials used for construction, different types of sanitation technologies for demonstration
- Purchase of equipment; e.g. vehicles, motorcycles, bicycles, GPS

### **Operating and minor maintenance expenditure (OpEx)**

- Accommodation; e.g. accommodation used during field visits.
- Administrative costs; e.g. bookkeeping, compiling and printing progress reports.
- Road transportation costs; e.g. fuel, maintenance, vehicle insurance;
- Materials; e.g. general teaching and training materials, specific CLTS related materials
- Office running costs; e.g. telecommunication costs, office rent, utility bills, office consumables
- Salaries and per diems; e.g. supervisor, trainers, animators and activists payments
- Travel expenses; e.g. airfares

- 17% Value Added Tax

### **Expenditure on direct support (ExpDs)**

- Awareness raising; e.g. radio campaigns, hygiene promotion theatre
- Capacity building; e.g. training of staff, training of animators and activists

No budget line items were found that could be classified as one of the other life-cycle cost component, i.e.; cost of capital (CoC).

## **ANALYSIS**

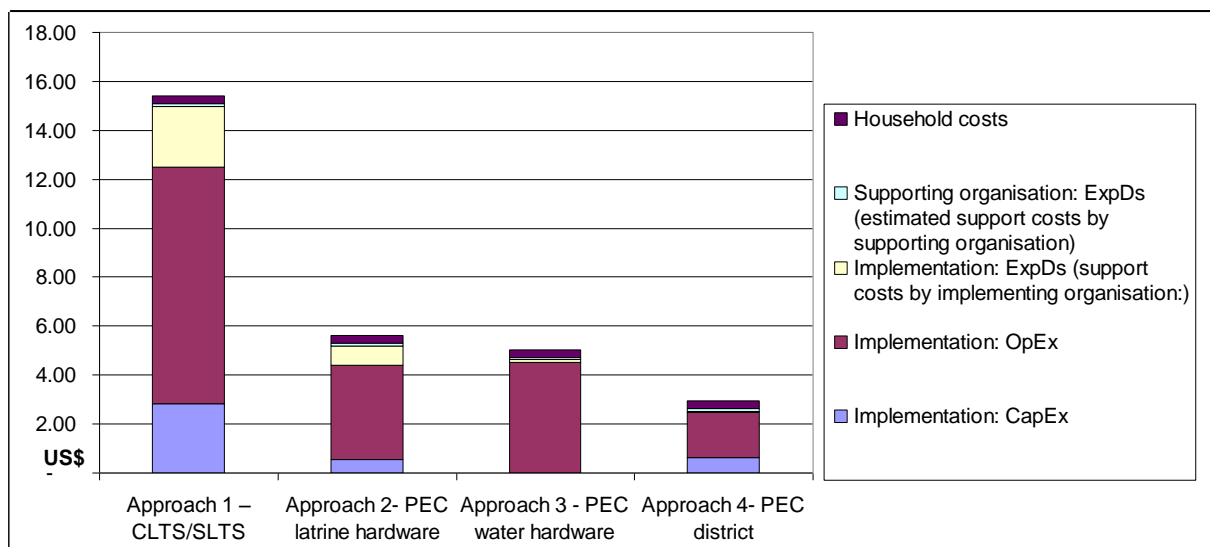
Data analysis shows that there is considerable variation in costs between the four approaches to PEC implementation. Table 2 and Figure 1 summarise the data. The least costly approach to PEC implementation was approach 4- 'PEC district' with US\$ 0.63 capital expenditure (CapEx) and US\$ 1.83 operational expenditure<sup>2</sup> (OpEx) and US\$ 0.06 direct support costs (ExpDs). Expenditure on direct support by a supporting organisation (ExpDS) and household costs were estimated and assumed to be equal for all four approaches, with ExpDS costing US\$ 0.11 and Household cost averaging US\$ 0.31 per capita per year. Data on expenditure on direct support was made available by only one of the organisations included in this study. It has been assumed for the purposes of this paper that the other three approaches have similar support costs, although it is fully realised that the actual direct support costs by organisations supporting the other three approaches to PEC implementation are likely to have been different (see next section for details).

average per capita per year	Implementation: CapEx	Implementation: OpEx	Implementation: ExpDs (support costs by implementing organisation)	Supporting organisation: ExpDs (estimated support costs by supporting organisation)	Household costs
Approach 1 – CLTS/SLTS	2.82	9.68	2.46	0.11	0.31
Approach 2- PEC latrine hardware	0.53	3.87	0.78	0.11	0.31
Approach 3 - PEC water hardware	0.00	4.52	0.10	0.11	0.31
Approach 4- PEC district	0.63	1.83	0.06	0.11	0.31

**Table 2** Life-cycle cost components per capita per year (2008 US\$ current prices) per implementation approach

<sup>2</sup> All cost data collected in local currency (LCU) was converted twice. The first conversion inflated / deflated the LCU value to the 2008 equivalent using GDP-deflators. The second conversion converted 2008 LCU into 2008 US\$ using a Purchasing Power Parity (PPP) conversion rate of 12.7541526151, i.e. 1 unit LCU in 2008 equals 0.078 2008 US\$. Source: <http://databank.worldbank.org/ddp/home.do?Step=1&id=4>





**Figure 1** Life-cycle cost components per capita per year (2008 US\$ current prices) per implementation approach

### Implementers: CapEx, OpEx and ExpDs

Analysis of budgets of implementers shows that total budget values in 2008 US dollars varied from US\$ 55,465 to US\$ 2,464,530 with an average of US\$ 354,902. The differences in budget values are partly explained by the differences in target population. When budget values are divided by the target population, the cost per capita can be determined. The cost per capita values shows less dispersion than the total budget values, ranging from US\$ 1 to US\$ 15 per person per year. The average cost of PEC project implementation per capita was US\$ 4. The total costs of all 13 projects was US\$ 4,613,721 and the projects had a combined target population of 1,500,238 people. Dividing the total costs by the total target population yields a US\$ 3 implementation cost per capita per year. Table 3 summarises this data.

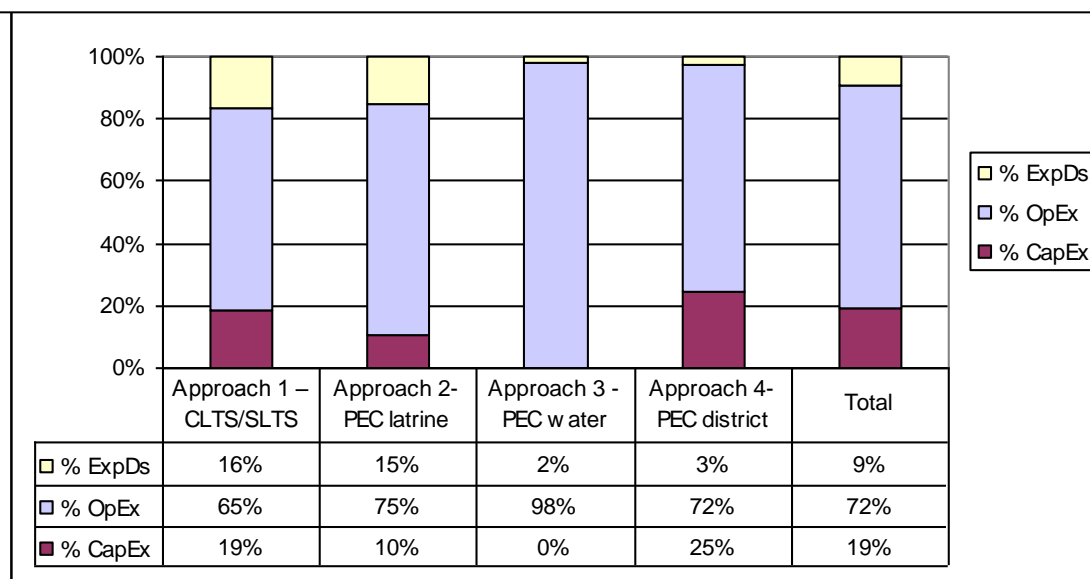
Type of PEC implementation	District:	US\$ total budget value per year	US\$ per capita
Approach 1 – CLTS/SLTS	Gile, Alto-Molocue, Mocuba, Ile	561,249	15
Approach 2- PEC latrine hardware	Maua	71,467	6
	Nipepe	55,465	4
Approach 3 - PEC water hardware	Inharrime, Homoine, Panda, Zavala, Jangamo	2,464,530	4
Approach 4- PEC district	Gondola	206,382	1
	Gorongosa	149,181	1
	Guro	128,850	2
	Machaze	234,582	2
	Maravia	94,275	1
	Maringue	153,298	2
	Marromeu	63,356	1
	Muanze	196,636	8

Zumbo	234,451	4
Minimum	55,465	1
Maximum	2,464,530	15
Average of budgets	354,902	4
Average of totals (costs/total target population)	4,613,721	3

Note: The per capita average shown in penultimate row differs from the overall per capita average (last row) because it is an average of the per capita figures in different programmes, without weighting them for size (i.e. it shows the per capita cost you are likely to get in the average programme). The final row shows the average per capita figure of all the costs divided by all the total target populations (i.e. the average per capita cost if all the programmes were pooled together).

**Table 3 Community Education Programme (PEC) cost per district**

The relative magnitude of the cost components CapEx, OpEx and ExpDs were also analysed. The analysis shows that across all 13 contracts 72% of all costs were OpEx, 19% were CapEx and 9% of all costs were classified as ExpDs. Generally all projects, regardless of implementation approach, allocate between 65% and 90% of the project funds to operational expenses (OpEx). This ratio is in line with expectations as hygiene promotion is a labour intensive intervention that does not require major capital investments. An exception to this was 'Approach 4- PEC district' where capital costs were just under a quarter of the total costs. This was heavily influenced by implementation in one district (Zumbo) where 64% of costs were classified as CapEx and only 36% as OpEx. This deviation was caused by the purchase of one very expensive motor vehicle and four motorcycles, which together make up more than 60% of the total budget. The 'Approach 3 - PEC water hardware' implementation approach shows a very small proportion of expenditure as capital expenditure. This deviation from the norm is possibly because the implementer of this programme was a very well established WASH programme implementer which already had all necessary equipment and capital intensive requirements in their possession. Figure 2 shows the relative magnitude of the cost components per district and per implementation approach.



**Figure 2 Relative magnitude of life-cycle cost components**

## Supporting / monitoring organisations: expenditure on direct support

Through interviews and budget analysis from a supporting organisation the cost of supporting and monitoring PEC projects under one (multi-project) PEC programme was determined. These costs fall under the life-cycle cost component; expenditure on direct support (ExpDS).

Monitoring and support activities from this organisation are carried out from a field office and a national office. Analysis is based on data from 2009 when the INGO funded a total of 19 PEC projects with a total target population of 2,622,575 people. Lump sum values for these contracts were used in the calculation of ExpDS cost per contract. The field office has five staff members; two technicians, one accountant and two drivers. Only one of the technicians is dedicated to PEC projects, while both the drivers and the accountant allocate approximately 50% of their time to PEC related activities. The national office has one full-time employee 100% of whose time is allocated to PEC. In addition, 50% of field office running costs are allocated to PEC. Overall staff costs for monitoring PEC projects at the provincial office were US\$ 122,018 per year. The provincial office running costs allocated to PEC for this INGO were US\$ 46,394 per year. The annual costs of the full-time staff member at the national office were US\$ 124,100 per year. This brings total expenditure on direct support to US\$ 292,513 per year. These costs need to be divided across the 19 contracts the organisation monitored in 2009, which had a combined total value of US\$ 2,406,805. The support costs were therefore 12% of the total costs. Support costs per capita were determined by dividing the sum of all support costs by the total target population of all 19 PEC projects. This calculation results in an ExpDS cost of US\$ 0.11 per capita.

### ***Limitations of existing data on direct support expenditures***

As noted above, in the absence of data regarding support costs for all four approaches to PEC implementation, this study has assumed the other PEC implementation approaches had the same per capita value of support costs. This assumption is made purely for practical considerations; in reality it is likely that the actual support costs of the other approaches to PEC implementation were different. Furthermore, even the calculations for this supporting organisation are based on data which do not include all support costs. Specifically; overhead costs for the organisation's national office allocated to PEC interventions are not known. Consequently the estimated percentage of 12.15% of total costs allocated to support costs might an underestimation of what the implementation- support costs ratio is. Table 4 summarises the estimated support costs for; provincial staff, field office running costs and the national staff for this supporting organisation.

Estimated Support cost	Cost in 2008 US\$	% of total cost all projects	Estimated Cost per capita – see disclaimer above
Provincial staff	122,0189	5%	0.05
Field office running costs	46,3949	2%	0.02
National staff	124,100	5%	0.05
Total	292,513	12%	0.11

**Table 4** Estimated monitoring and support expenditures (ExpDS) total as percentage of total costs and per capita for one programme

### Household costs

The household questionnaire was used to determine average household size, household income and time spent on hygiene promotion activities. Household size and income were used to determine the average monetary value of a person's time. This value was then used to calculate the cost of hygiene promotion activities by multiplying the average person's income by the average time spent on hygiene promotion related activities. The outcome of this calculation represents the cost of hygiene promotion borne by households that are part of the target population of a hygiene promotion intervention. Besides the cost of time attending hygiene promotion intervention other costs associated with hygiene promotion were also determined. Household expenditure on soap and handwashing facilities were determined. Even though these costs are not directly attributable to a specific interventions they are reported here as they are relevant costs borne by households that are a potential consequence of hygiene promotion interventions. Indeed, successful hygiene interventions would, almost by definition, result in increased household expenditure on soap.

### Household size and estimated per capita income

The average household size was 5.03 among the 1688 households comprising 8485 people in all.

The household questionnaire question on household income required the respondents to classify their household's income in one of five income groups. Calculation of the average household and per capita income is based on the 1013 respondents that did report their household income. The total reported monthly income of all respondents was US\$ 143,126.16, which divided by the 1013 respondents, yields an average of US\$ 141.29 per household per month. With an average of 5.03 persons per household, this implies an average income of US\$ 28.11 per capita per month. Assuming 22 working days in a month and 8 working hours in a day results in a; US\$ 1.28 per capita per day and US\$ 0.16 per capita per hour value of time.

### Time spent on hygiene promotion

The calculations of how much time households have spent attending hygiene promotion activities from the project is based upon 609 respondents answers. Hygiene promotion activities, in this case, mean community meetings lasting at least one hour. Time spent by household members during household visits by animators, activists or other project staff are not included here. Responses regarding time spent on hygiene promotion related activities show that a large majority of respondents never participated in hygiene promotion activities. 257 (84%) out of 306 respondents in Manica did not spend any time on hygiene promotion. A similar number and percentage was found in Tete; 234 (77%) out of 304 respondents did not spend any time on hygiene promotion. In Manica 16% of all respondents spent at least one hour on hygiene promotion, in Tete this was 23%, creating an average hygiene promotion attendance of at least one hour on the total number of respondents of 19,5%.

The average amount of time spent on hygiene promotion by those who spent at least one hour was calculated by dividing the total number of hours spent (231) by the total number of respondents that spent at least one hour on hygiene promotion activities (119). The result

shows that 19.5% of all respondents spent on average 1.94 hours on hygiene promotion in a year while about 80% spent no time, implying little or no contact with a PEC programme. The low yearly attendance rates suggest that achieving hygiene practice changes by the entire target population require a longer implementation time than a single year, even if it were possible for hygiene behaviour to be altered by a single intervention. Data on time spent by households on hygiene promotion activities is shown in Table 5.

Hours spent on hygiene promotion	Manica		Tete		Manica	Tete	Overall total	% of total
	# respondents	% of respondents	# respondents	% of respondents	total hours	total hours		
0	257	84%	234	77%	0	0	0	0%
1	17	6%	21	7%	17	21	38	16%
2	26	8%	43	14%	52	86	138	60%
3	1	0%	3	1%	3	9	12	5%
4	0	0%	1	0%	0	4	4	2%
5	3	1%	2	1%	15	10	25	11%
6	1	0%	0	0%	6	0	6	3%
7	0	0%	0	0%	0	0	0	0%
8	1	0%	0	0%	8	0	8	3%
Total	306	100%	304	100%	101	130	231	100%
% at least 1 hour		16%	% at least 1 hour		Average # hours spent on Hygiene Promotion by those that spent at least 1 hour		<b>1.94</b>	<b>Hours per year</b>

**Table 5 Time spent on hygiene promotion**

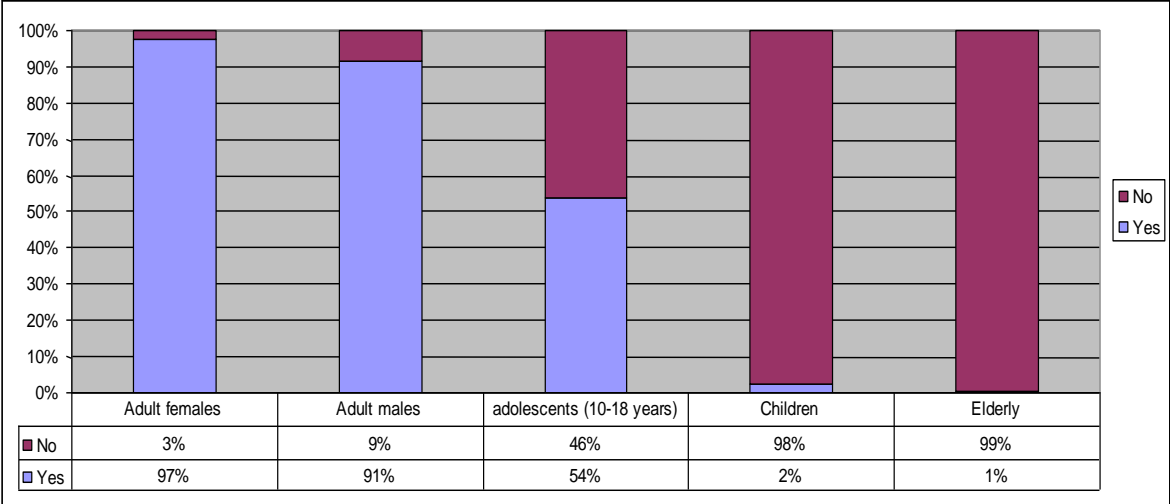
#### Household costs of hygiene promotion

For calculating the cost of hygiene promotion interventions for households the average time spent on hygiene promotion by the respondents (1.94 hours) per year, the average attendance at hygiene promotion interventions (19.5%), the average per capita income per hour (US\$ 0.16) were used. The calculation assumes that when a person spends 1.94 hours on hygiene promotion this will 'cost' that person;  $1.94 \text{ hours} \times \text{US\$ } 0.16 = \text{US\$ } 0.31$ . Average hygiene promotion attendance is 19.5%, meaning that only 19.5% of people in the target population actually spent this US\$ 0.31 per year on hygiene promotion.

#### Household costs of hygiene practices

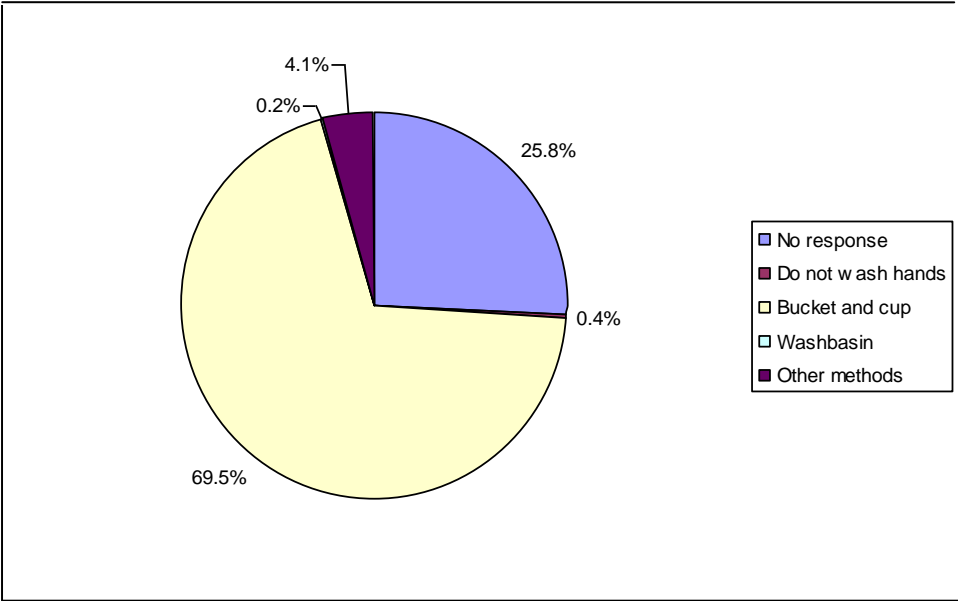
Handwashing after latrine use, which is a key message of hygiene promotion, requires resources such as; water, soap and a handwashing facility. The household questionnaire was used to determine current prevalence of handwashing after latrine use in several age groups. The preferred methods of washing hands and the associated costs of these methods were also determined.

The household questionnaire asked respondents about the hygiene behaviours of themselves and other household members. 385 out 1688 respondents reported handwashing practices after latrine use. Handwashing after latrine use is most common among adult females and males with 97% and 91% reporting they practice this behaviour. For adolescents the percentage of persons washing their hands drops to 54%, while children and elderly hardly practise this behaviour with 2% and 1% reporting they do so respectively. Figure 3 shows these results.



**Figure 3 Self-reported hand washing behaviour after latrine use**

The preferred method of washing hands is by using a bucket and a cup, 69.5% of all respondents reported using this method. 4.1% of respondents reported using another method such as; a clay pot and cup or a used empty bottle. Only 0.2% of respondents reported have access to washbasin. Only 4.1% of respondents reported not to have any method of washing their hands while 25.8% of respondents did not provide an answer to the question. Figure 4 shows these results graphically.



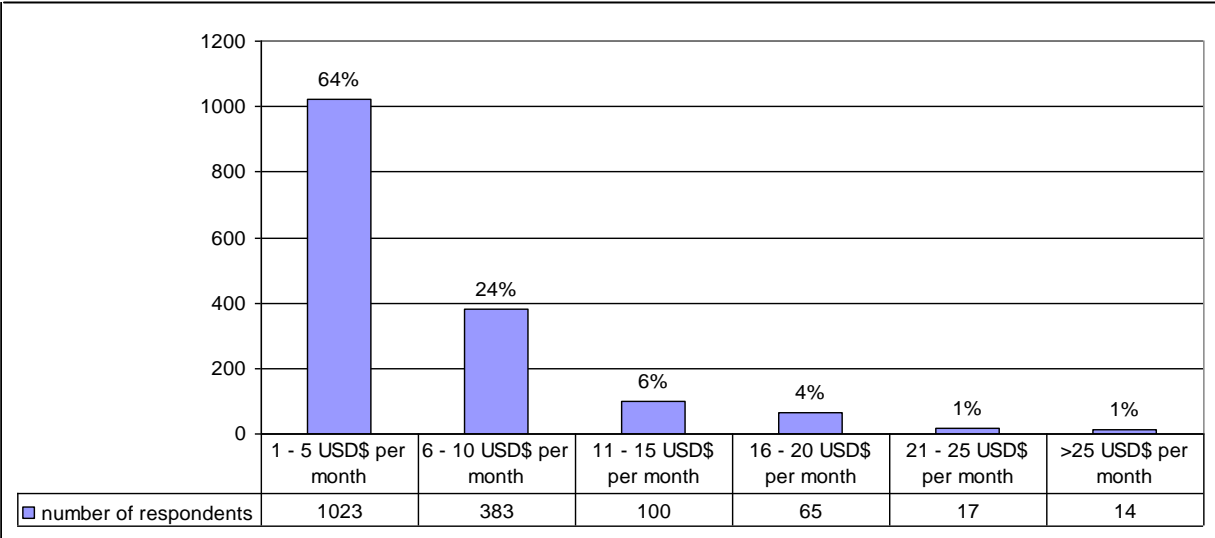
**Figure 4 Preferred method of handwashing**

Acquiring and using a handwashing facility, such as a bucket, a cup and soap requires the household to invest in these items, the required investment in these items can be classified as a capital investment (CapEx). The average investment to acquire a bucket and a cup was US\$ 3.97 per household. Using a clay pot and a cup or a used bottle was less expensive at US\$ 2.00. Most expensive was the investment required to acquire a washbasin, costing US\$ 76.65, but only 3 of 1,240 respondents had a washbasin. Cost per capita for each of these methods was determined by dividing the average cost per method by the average household size of 5.03 members. The result shows that the preferred method of washing hands using a bucket and a cup used by 69.5% of all respondents has an average per capita cost of US\$ 0.97. Table 6 summarises this data.

Method used for washing hands	number of respondents	Average cost per household in 2008 US\$	Average cost per capita in 2008 US\$
Bucket and cup	1111	3.97	0.97
Washbasin	3	76.65	15.24
Other methods	126	2.00	0.40

**Table 6 Household investments in handwashing facilities**

A recurrent cost when washing hands with soap is practised is the cost of purchasing soap, which can be classified as an operating expenditure (OpEx). The average expenditure on soap per month per household was US\$ 5.29 which, divided by the average household size (5.03), yields a US\$ 1.05 cost of soap per month per capita. On an annual basis the per capita cost of soap would be US\$ 12.62. 64% of respondents reported spending between US\$ 1 and US\$ 5 per month. Another 24% reported to spend between US\$ 6 and US\$ 10 on soap each month. 12% of the respondents reported spending more than US\$ 10 per month on soap. *Expenditure on soap should not be allocated 100% to hygiene promotion as soap is also used for other purposes such as washing clothes. The household questionnaire used for this study did not specifically ask respondents about expenditure on soap for handwashing purposes, hence the exact expenditure on soap used for washing hands is unknown.* The number of respondents and relative magnitude per cost strata are summarised in Figure 5.



**Figure 5 Household expenditure on soap per month**

Despite the current data not allowing the allocation of these household investments in hygiene practices to a specific hygiene promotion intervention they are relevant costs of which funders and implementers of hygiene promotion intervention need to be aware, especially since per capita expenditure on soap seems to be a relatively large cost component.

## RESULTS AND DISCUSSION

### Cost of different approaches

The analysis has shown that there is considerable variation in the costs of implementing PEC projects. Some of the differences found can be explained by difference in timing of expenditure and the differences in size of the project's target population. However even after correcting for these, large differences remained. Table 7 summarises the operation expenditure (OpEx) while Table 8 provides the summary of capital expenditure (CapEx) for each of the four approaches to PEC implementation.

Average implementation costs per capita per year in 2008 US\$	<i>Household OpEx (soap) data does not permit direct allocation to intervention (not only used for washing hands)</i>	Estimated Household OpEx (time spent on hygiene promotion)	Implementation: OpEx	Implementation: ExpDs (support costs by implementing organisation)	Supporting organisation : ExpDs (estimated support costs by supporting organisation )	Total (excluding cost of soap)
Approach 1 – CLTS/SLTS	12.62	0.31	9.68	2.46	0.11	12.56
Approach 2- PEC latrine hardware	12.62	0.31	3.87	0.78	0.11	5.07
Approach 3 - PEC water hardware	12.62	0.31	4.52	0.10	0.11	5.04
Approach 4- PEC district	12.62	0.31	1.83	0.06	0.11	2.31

**Table 7 Operational expenditure (OpEx) of PEC per implementation approach**

average implementation costs per capita per year in 2008 US\$	<i>Household CapEx (handwashing facility) data does not permit direct allocation to intervention</i>	Implementation: CapEx hardware
Approach 1 – CLTS/SLTS	0.97	2.82
Approach 2- PEC latrine hardware	0.97	0.53
Approach 3 - PEC water hardware	0.97	0.00
Approach 4- PEC district	0.97	0.63

**Table 8 Capital expenditure (CapEx) of PEC per implementation approach**



The implementation approach of 'Approach 1 – CLTS/SLTS' was considerably more expensive than the other three approaches analysed. This difference could be partially explained by the involvement of expatriate consultants as a condition for implementation from the agency funding the programme. Implementation also included the construction of two sanitation technology demonstration centres, which required substantial capital investments and explains the proportionally large CapEx costs of this programme compared to the other approaches analysed. 'Approach 2- PEC latrine hardware' implemented a PEC programme in two districts. Analysis of their programme budget shows that implementation was fairly labour intensive with nearly 48% of the total implementation costs being taken up by the payment of salaries. As mentioned before the very small CapEx costs of 'Approach 3 - PEC water hardware' could have been due to the choice of implementing organisation, which was very experienced and which, presumably, had already acquired some of the capital intensive items, such as cars and motorbikes, during earlier programmes. This is a striking difference compared to the implementation budgets analysed with regard to 'Approach 4- PEC district' implementations, which were commonly executed by smaller organisations that still needed to acquire most of these capital intensive items.

When determining the cost per capita of an intervention, the size of the target population is of crucial importance. The four approaches to PEC implementation had different methods of establishing the target population of their programmes. 'Approach 2- PEC latrine hardware' defined the target population by linking PEC to a sanitation hardware improvement programme. In their calculation each newly built latrine serves five people, the target population for PEC was determined by the number of newly built latrines multiplied by the number of people served by these latrines. The other three approaches used census data to determine their target populations. Both 'Approach 3 - PEC water hardware' and 'Approach 4- PEC district' identified the entire district population where the PEC programmes were implemented as the target population. However, in 'Approach 4- PEC district' not all PEC activities targeted the entire district population; notably CLTS interventions were targeted in priority areas within the district. 'Approach 1 – CLTS/SLTS' also used census data for the calculation of the target population, however they too did not include the entire district population, but instead used the population figures from the communities their implementation specifically targeted. *These differences in determination of the size of the target population need to be kept in mind when comparing per capita costs of the four approaches to PEC implementation.*

### ***Areas of further research***

Despite the apparently low household cost of time spent on hygiene promotion on a per capita basis, it is important to note that the total costs for all households combined become considerable when projects have large target populations. Another issue of concern is that only one in five (19.5%) of the adults questioned in two districts had attended a hygiene promotion activity in the preceding year. It seems unlikely a hygiene promotion intervention will achieve its full potential when only a fifth of the target population experiences the actual intervention. Further data could be collected from other areas and projects and districts on attendance which can be taken as an indicator of the project intensity. It seems reasonable to conclude that, if sustainable behavioural change of hygiene practices in the entire target

population is a goal, longer project implementation times are needed, or innovative methods of increasing attendance rates of attendance at hygiene promotion interventions need to be found.

The current data did not permit the allocation of household costs incurred to purchase soap and handwashing facilities to a particular intervention. These costs do, however, seem sufficiently large to warrant careful consideration of cost-consequences for households when implementing PEC. Particularly the expenditure on soap can be large. Household data has shown that the average per capita monthly income is US\$ 28.11, and the average monthly per capita expenditure on soap is US\$ 1.05. This means that the average per capita expenditure on soap is 3.7% of the per capita monthly income. More specific data collection is needed to determine the change in household expenditure on these items following PEC interventions.

The current cost analysis of PEC implementation alone will not provide policy makers with a solid scientific basis for making informed policy decision; the effectiveness of the intervention is of crucial importance. This study has not attempted to include any analysis of the various approaches' effectiveness in bringing about behavioural change in the targeted population. However, such a study would, alongside a cost analysis, prove a valuable tool for policy makers and other decision makers to use when making investment decisions in the public health domain in Mozambique.

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