WASHCost Share Guide

Analyse and share life-cycle costs

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in association with

IRC

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1 Introduction

This guide provides a step by step approach to analysing raw life-cycle costing data that you have and to transform data into the right format for WASHCost Share. The tool allows organisations to explore and share information on the cost of water and sanitation services with their key stakeholders.

Results from real data will increase the value people put into the cost estimates you are sharing. WASHCost Share reports are easy to read. They move your data from spreadsheets to an online format that anyone can use to compare and explore different life-cycle costing results.

This guide uses the example of BRAC WASH in Bangladesh, which collected household expenditure data to assess the cost of sanitation to the poor and the ultra-poor. The BRAC WASH programme has had a catalytic effect on latrine construction and the cost of a latrine is a crucial factor in the massive impact of this programme and future initiatives.

Note: The "www.ircwash.org/news/washcost-share-quick-start" is the best place to start to get registered to use the tool. The user should be comfortable with using Excel or another similar spreadsheet or analytical tool to capture and analyse the expenditure and service level information.

2 Collecting data

There are different sources of data that can be used to assess the full life-cycle costs of water and sanitation services.

Household surveys were used by BRAC WASH in order to understand how much households are spending on their latrines and associated services. Often households are paying for and building latrines on their own account in Bangladesh. However, for a complete picture of the real cost of sanitation services, the life-cycle costing approach has to take into account the expenditure of different stakeholders over time. Typical sources of information include:

- Household surveys to collect household expenditure (an example survey will be provided);
- Budgets, invoices and expenditure from the suppliers and implementing and support organisations working on sanitation and hygiene;
- Plans, budgets, invoices, and expenditure from public institutions playing key roles in sanitation.

Some costs are incorporated under general activities or budget lines that are not specifically water or sanitation related. For example, sometimes the cost of public servants or professionals working on water and sanitation may fall under general budgets and some estimates may have to be made. It is good practice to document the assumptions made when using estimates.

Table 1 Costing sustainable services

Cost Components		Definition
Capital expenditure The costs of providing a service where there was none before; or of substantially increasing the level of services	Capital expenditure hardware and software (CapEx)	One off capital investment in latrine hardware such as excavation, lining, slabs, superstructures as well as investment in work with stakeholders prior to construction or implementation, such as community education, demand creation and hygiene promotion.
Recurrent expenditures Service maintenance expenditure associated with sustaining an existing service at its intended level	Operational expenditure (OpEx)	Typically regular operating and minor maintenance expenditure, such as cleaning products.
	Capital maintenance expenditure (CapManEx)	Asset renewal and replacement cost; occasional costs that seek to restore the functionality of a system, such as replacing a slab or emptying a septic tank.
	Expenditure on direct support (ExDS)	Recurrent costs related to: the long-term IEC programmes and the costs of supporting community-based organisations such as sanitation and hygiene groups, as well as local and intermediate level government institutions.
	Expenditure on Indirect Support (ExIDS)	Expenditure on macro-level support, including planning and policy making, to decentralised district, municipal or local government.
	Cost of Capital (CoC)	Cost of interest payments on micro-finance and loans used to finance capital expenditure. Cost of any returns to shareholders by small scale private providers.

Source: Fonseca et al. 2014, adapted from Fonseca et al. 2011. WASHCost Briefing note 1a: Life-cycle costs approach – costing sustainable services. IRC: The Hague.

3 Household data

BRAC WASH and IRC developed a simple survey to collect all the categories of household expenditure. (An example survey is provided). Data was collected on ultra-poor, poor and non-poor households because expenditure can vary substantially per income group. The data is available in an Excel file.

The survey includes the following information:

- Type of facility;
- Service level information;
- Capital expenditure;
- Operational expenditure and minor maintenance;
- Capital maintenance expenditure;
- The cost of capital, e.g. loans, was not taken into account in this exercise but some example calculations are provided in the spreadsheet.

Please examine the example survey form and example data provided in the Excel file.

4 Preparing the household data

It is best to put data in a standard format where every row is an observation and the columns are the variables or answers to the questions that were posed. Excel and many statistical applications will easily use data formatted like this.

In the example below, each column of data in “Raw Data+Calculations” is clearly identified by a variable name that can also be found in the example survey form.

Table 2 Example of raw data calculations

	A	B	C	D	
1	toilet	household_anon_id	income_group	total_capex	cap
2	18	9	Ultrapoor	4400	
3	19	10	Ultrapoor	4400	
4	20	11	Ultrapoor	5100	
5	6	3	Ultrapoor	2500	
6	15	12	Ultrapoor	3000	
7	1	1	Ultrapoor	2050	
8	2	8	Ultrapoor	5000	
9	7	4	Ultrapoor	5500	
10	10	15	Ultrapoor	6600	
11	11	5	Ultrapoor	6800	
12	12	6	Ultrapoor	3500	
13	13	7	Ultrapoor	5000	
14	14	2	Ultrapoor	2600	
15	16	13	Ultrapoor	5500	
16	17	14	Ultrapoor	3200	
17	8	16	Poor	4400	
18	9	17	Poor	2500	

Instructions | Raw Data+Calculations | Results | Calculatior

Calculated columns are highlighted in green. The calculations are described in detail in the sheet “Calculations described”. Take some time to look at the survey and the data so that you become familiar with it.

Table 3 The sample data

Latrines per income group	Number of people	Number of latrines
Non-poor - Single pit offset latrine	24	6
Poor - Single pit	23	5
Poor - Single pit offset latrine	19	4
Ultra-poor - Double pit latrine	16	3
Ultra-poor - Single pit offset latrine	10	2
Ultra-poor - Twin pit offset latrine	46	10
Non-poor - Single pit offset latrine	138	30
Grand Total	24	6

An advanced WASHCost Share report will be created for each of the three income groups.

5 Analysing household data

5.1 Getting started: summing capital expenditure and operational expenditure

Most of the survey can be put into the spreadsheet as is. However, there are a few simple calculations which can be done at the start of the analysis or even during data entry. When a

range of values is provided for historical capital expenditure (question 5), e.g. “it costed somewhere between BDT 30 – 100”, then you must decide how to deal with this. For this example, we have taken the average of the minimum and the maximum.

Recurrent expenditure (questions 8 and 9) should be provided as an annual figure when reporting with WASHCost Share but some recurrent expenditure may take place either on a daily basis, weekly basis or yearly basis.

Per latrine, provide sums for each type of expenditure (per household per year). Add together:

- Sum of weekly expenditure * 52;
- Sum of monthly expenditure * 12;
- Sum of annual expenditure.

These calculations have already been done before the data was inserted into the example spreadsheet.

Table 4 Calculating the minor operational expenditure (spreadsheet column name: minor_opex)

What equipment do you use to clean your latrine regularly? [minor_opex]	**Amount spent (as applicable)**			
Type of equipment	**Per week**	**Per month**	**Per year**	**TOTAL**
a. Brush			10	**10**
b. Broom			20	**20**
c. Cleaning powder (Bleaching/Washing powder)		10		10 / month * 12 months = **120**
d. Cleaning liquid		10		10 / month * 12 months = **120**
e. Mug/scoop			5	**5**
f. Vessel			50	**50**
g. Bucket/pot/drum/Pitcher				
h. Soap	10			10 / week * 52 weeks = **520**
i. Others (Specify)				
				845

5.2 Making the expenditure comparable: using GDP deflators

Capital maintenance expenditure typically takes place in different years (questions 13 and 14). Households tend to build their latrines and incur capital expenditure in different years. Expenditure that takes place in different years need to be converted to net present value or reference year before they can be summed up.

5.2.1 Deflators

One way to convert values to a reference year is to apply a GDP deflator multiplier to correct for inflation. The sheet “deflator values” in the example workbook provides instructions and a

worked out example of calculating a deflator multiplier. The guide "WASHCost Share: put cost data in advanced reports" provides a simple helper spreadsheet for applying deflators in other currencies.

5.2.2 Correcting capital expenditure

First, the capital expenditure to construct each latrine needs to be converted to the reference year. Identify the deflator multiplier to convert the expenditure to the reference year (2013 in this case). For example, if the latrine was built and paid for in 2008 then use the deflator_2008_2013 multiplier in the spreadsheet, e.g.

total_capex_2013 = total_capex * deflator_2008_2013.

5.2.3 Correcting capital maintenance expenditure

Similarly, capital maintenance costs of a single household will need to be brought to the same year:

capmanex_total_2013 = ∑ capmanex_1985 * deflator_1985_2013 + capmanex_1986 * deflator_1986_2013 + … + capmanex_2014 * capmanex_2014_2013.

In order to bring capital maintenance expenditure to an idealised annual figure for entry into WASHCost Share reports, we will annualise the results using the age of the latrine. The data was collected in 2014, therefore:

capmanex_annualised_2013 = (∑ capmanex_1985 * deflator_1985_2013 + capmanex_1986 * deflator_1986_2013 + … + capmanex_2014 * capmanex_2014_2013) / (2014 - capex_year).

Note that if the latrine is built in the year of data collection then the capmanex_annualised cannot be calculated for that household. Historical capital maintenance expenditure may deviate greatly from expected future expenditure due to breakdowns as facilities age.

5.2.4 Calculating the service area life-cycle costs

After the capital expenditure and capital maintenance expenditure are calculated, there are just a few more variables required. The first variable is the number of people using the latrine in the household. For this example, we've made the simple assumption that this is equal to the household size divided by the number of latrines in the household. Finally, minor operation and minor maintenance expenditures should be added together. In summary:

- The actual number number people using latrine:
  n_served = household_size / n_latrines;
- Operational expenditure converted to the reference year (2013):
  opex_2013 = (minor_opex + minor_maintenance) * deflator_2014_2013.

Note: We do not cover the cost of capital as there were no loans found in the example data set. However, a simple idealised calculation is provided in the Excel workbook (see sheet "Calculations described"). In addition, capital expenditure software has not been captured independently of direct support (see next section).

Finally, on the basis of the data and the variables calculated and using a simple pivot table in Excel (see sheet "Results"), we can generate the following total life-cycle costs for the service areas in question:

Table 5 Summary per income group and technology of service area life-cycle costs

Income and technology	Sum of capex_2013	Sum of opex_2013	Sum of capmanex_annualised_2013	Sum of n_served	Sum of design_pop
Non-poor - Single pit offset latrine	৳ 401,043.57	৳ 5,795.16	৳ 79.05	24	54
Poor - Single pit	৳ 16,367.50	৳ 1,450.90	৳ 1,189.61	23	45
Poor - Single pit offset latrine	৳ 104,580.20	৳ 2,113.98	৳ 38.88	19	36
Ultra-poor - Double pit latrine	৳ 15,078.74	৳ 1,106.70	৳ 75.00	16	27
Ultra-poor - Single pit offset latrine	৳ 6,561.94	৳ 798.14	৳ 271.20	10	18
Ultra-poor - Twin pit offset latrine	৳ 47,723.01	৳ 4,759.74	৳ 512.22	46	90
Grand Total (৳*)	591,354.9584	16,024.63	2,165.966414	138	270

(*৳ = Bangladesh Taka)

In order to have some general information on the income groups and affordability, we also produce the following pivot table using the household income and household size:

Table 6 Household size and household income

	Average of household_size	Average of hh_expenditure (proxy for household income)
Non-poor	4.7	৳ 162,166.67
Poor	4.7	৳ 82,777.78
Ultra-poor	4.8	৳ 50,666.67
Grand Total	4.7	৳ 82,600.00
	Average of household_size	Average of hh_expenditure (proxy for household income)

6 Expenditure on direct support from secondary sources

Finally, some figures of expenditure on direct support and expenditure on indirect support costs cannot be calculated from household data. Expenditure on direct support is incurred in the programmatic work of BRAC to support the village WASH committees and the operations of BRAC WASH in each upazila. Based on Fonseca et al. 2014, direct support equalled ৳ 33 (2011) per person. Adjusting for inflation:

Expenditure on direct support = ৳ 33 (2011) * deflator_2011_2013
= approximately ৳ 38.5 (2013) per person per year.

7 Service level calculations

Each area has different service level standards. The advanced WASHCost Share tool will only require the user to indicate whether a standard has been met or not. For the purposes of this guide, we have used the same service level variables in the data as the WASHCost Share basic tool.

In order to define the service levels, it is necessary to know the proportion of the population that meets each service level standard. In the advanced tool, WASHCost Share users can sub-divide the service area population and define four different levels of service for each subdivision.

By examining the provided service level information, the service levels were relatively high in this small sample and only one household had a shared latrine in the ultra-poor group. The following pivot table was created by combining all the service level variables (access_1, access_2, use, reliability and env_protect) into a single service level variable.

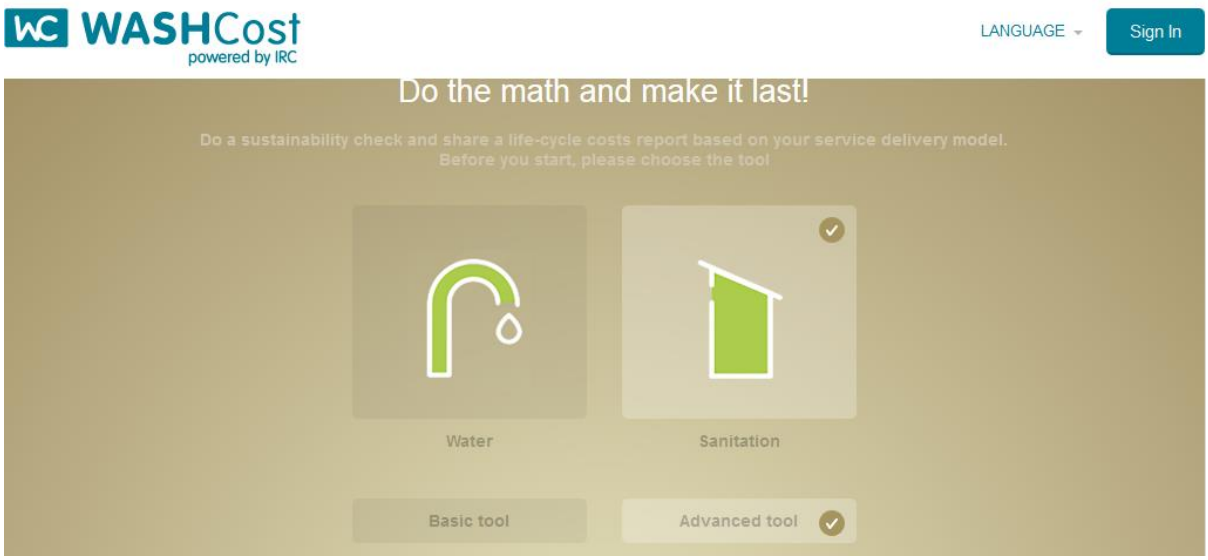
Table 7 Service levels per income group

	Concrete slab - Not shared - Everyone - Regularly cleaned - Emptied	Concrete slab - Shared - Everyone - Regularly cleaned - Emptied	Grand Total
Non-poor	100.00%	0.00%	100.00%
Poor	100.00%	0.00%	100.00%
Ultra-poor	93.33%	6.67%	100.00%
Grand Total	**96.67%**	**3.33%**	**100.00%**

As a result for the non-poor group and the poor group there is only one service level group and there are two service levels in the ultra-poor group.

8 Creating a WASHCost Share report

Before starting to input the data, please sign into the tool. Follow the "WASHCost Share: quick start guide" if it is your first time.



Screenshot: WASHCost Share.

It is now possible to fill in the advanced report using the steps in the tutorial "WASHCost Share: put cost data in advanced reports". You may first want to review that tutorial as it also provides another helper spreadsheet for applying deflators in other currencies.

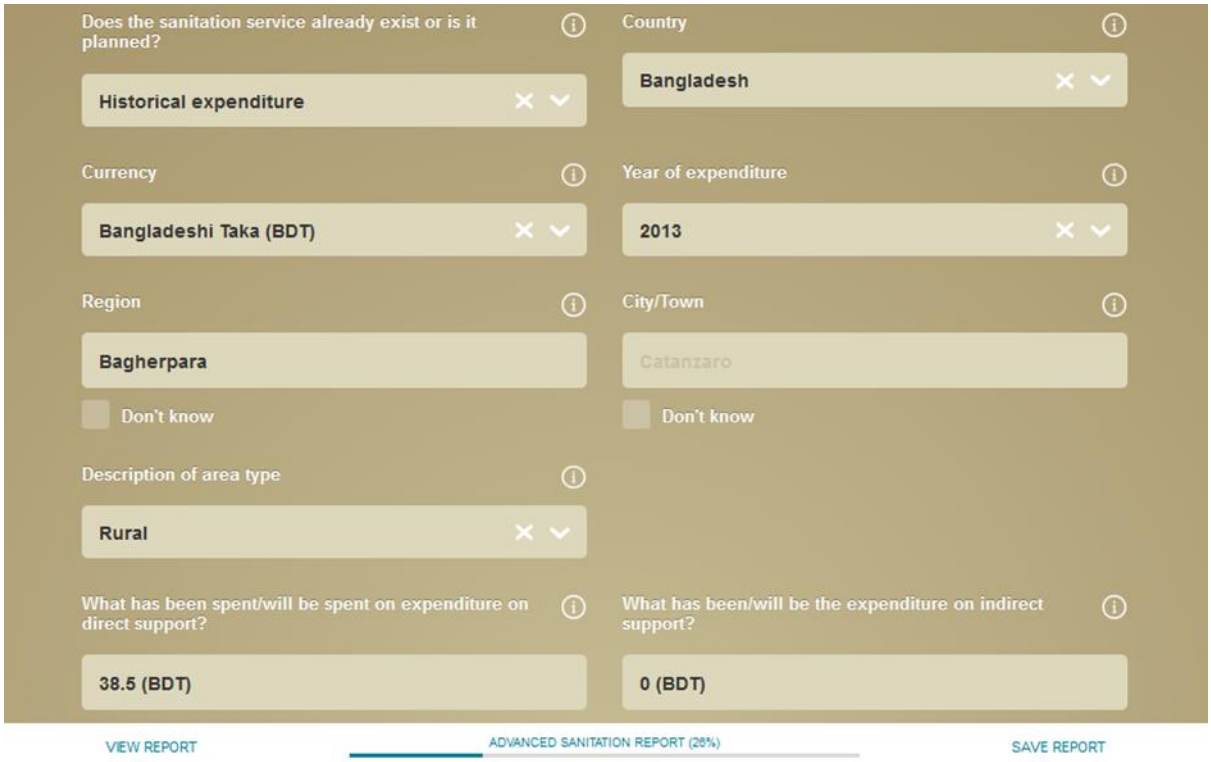
We will create an advanced WASHCost Share report for each income group, and save these reports to the dashboard to compare the results in US$ (2011). We will then use these figures to create basic reports that can be shared with non-technical wider audiences. To get started, select "Sanitation" and "Advanced tool" on the WASHCost Share home. Click on the WASHCost logo to go to this screen at any time and start over from the beginning.

Each report has the inputs split up into "service area", "technology" and "service level".

8.1 Service area

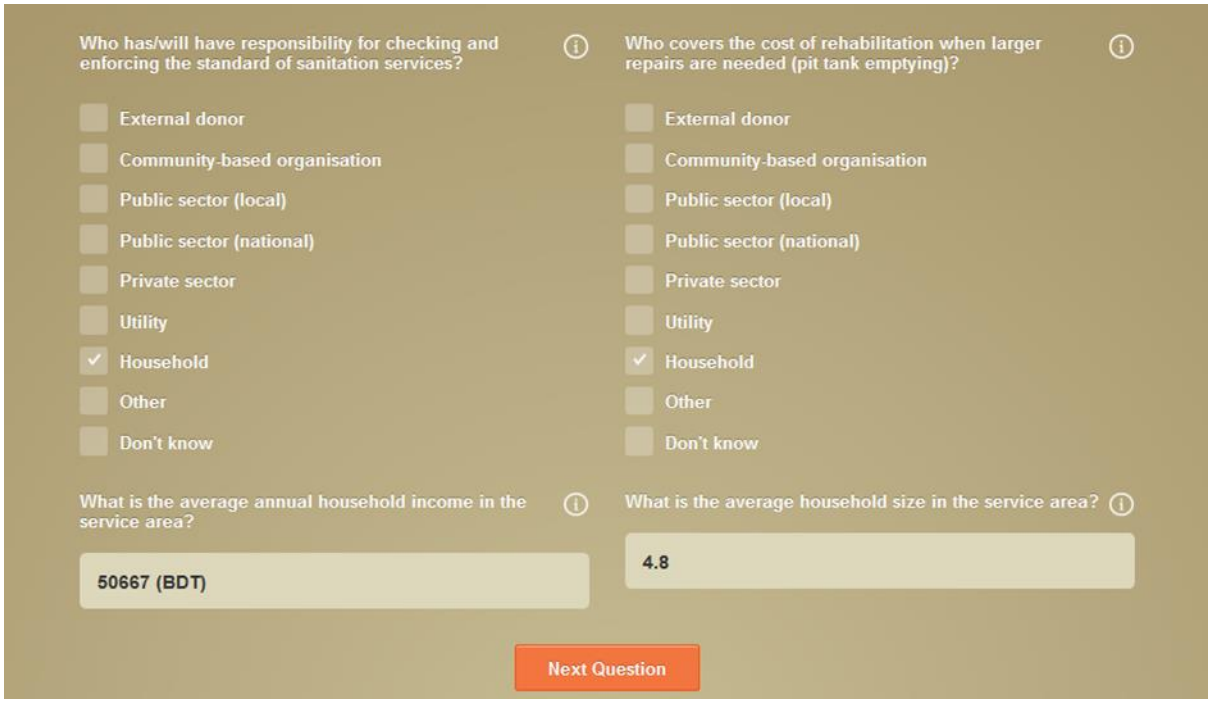
Under the service area tab, there are general inputs:

- Does the sanitation service already exist or is it planned?: Historical expenditure;
- Year of expenditure: 2013;
- Country: Bangladesh;
- Currency Bangladeshi Taka (BDT);
- Region: Bagherpara;
- Description of area: Rural;
- Expenditure on direct support: BDT 38.5.



Screenshot: service area.

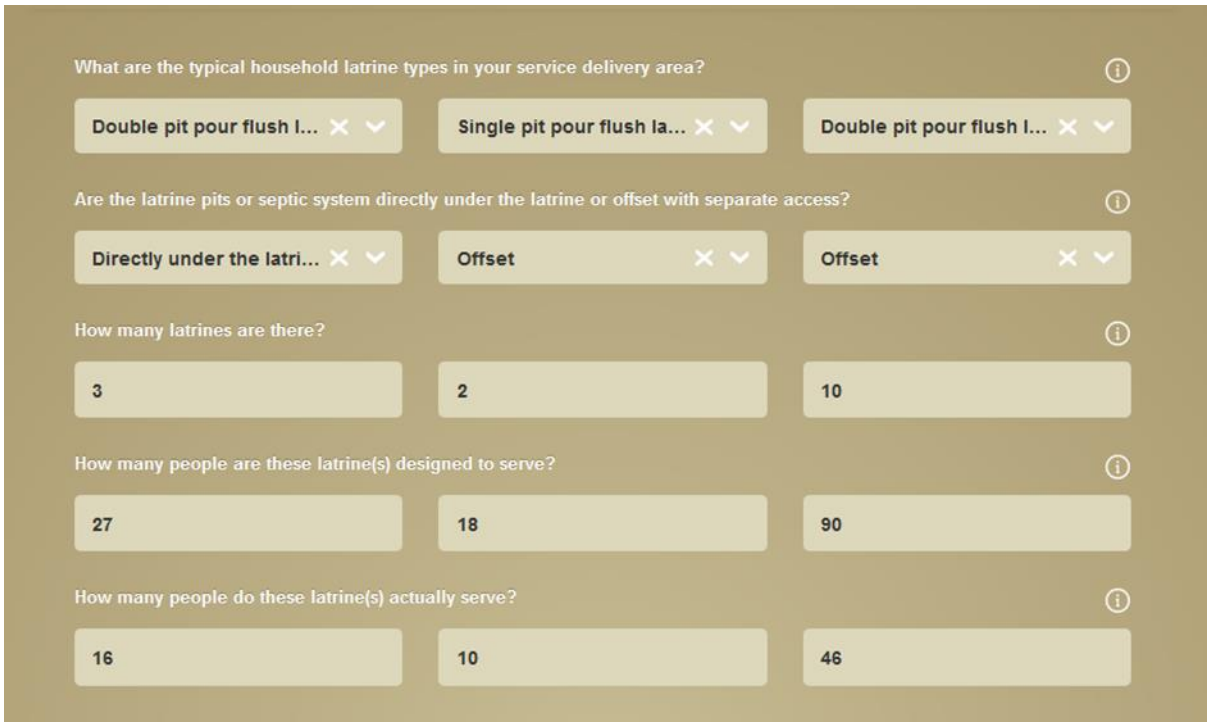
By examining the example data set, you can observe that the household is mostly responsible for the management, finance, minor and major maintenance of the sanitation facilities. BRAC also supported the finance of the facilities in eight out of fifteen households. The household size and the annual income will vary per income group. Use the results from Table 6.



Screenshot: WASHCost Share.

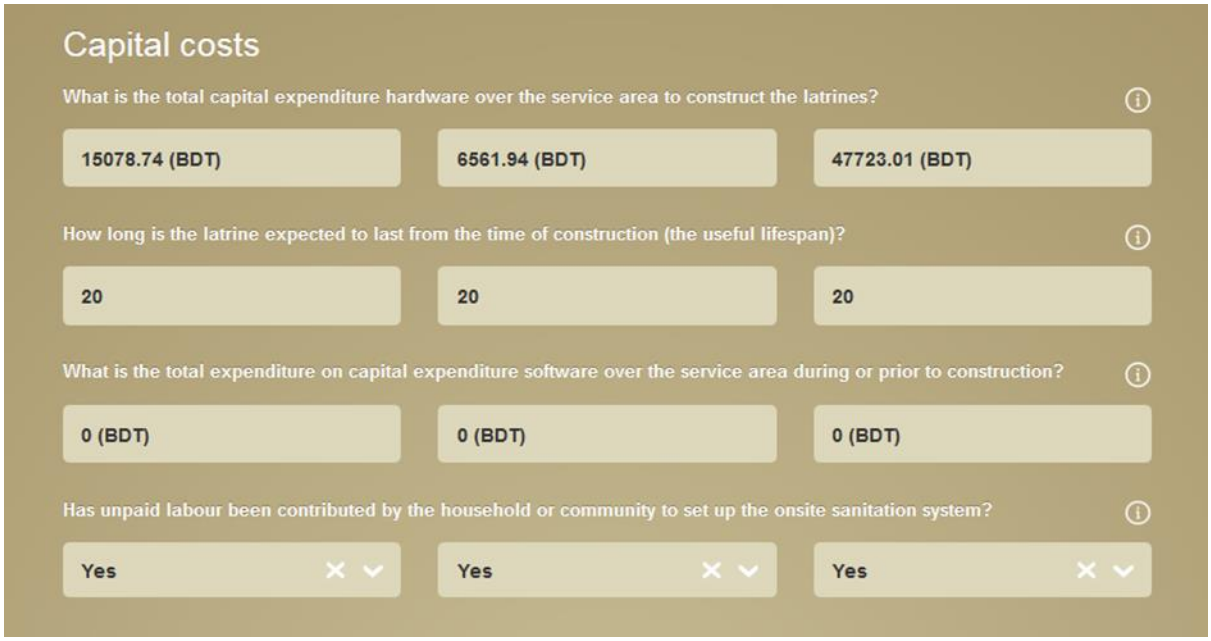
8.2 Technology

Under the technology tab, you can create a technology for each latrine type per income group. The non-poor only use single pit latrines (not offset), while the poor have both single pit offset and regular single pit latrines. The ultra-poor use three types of latrine. Ensure that you input values for each latrine type and indicate if the pits are offset or not. Refer to Table 5 to fill in these values.



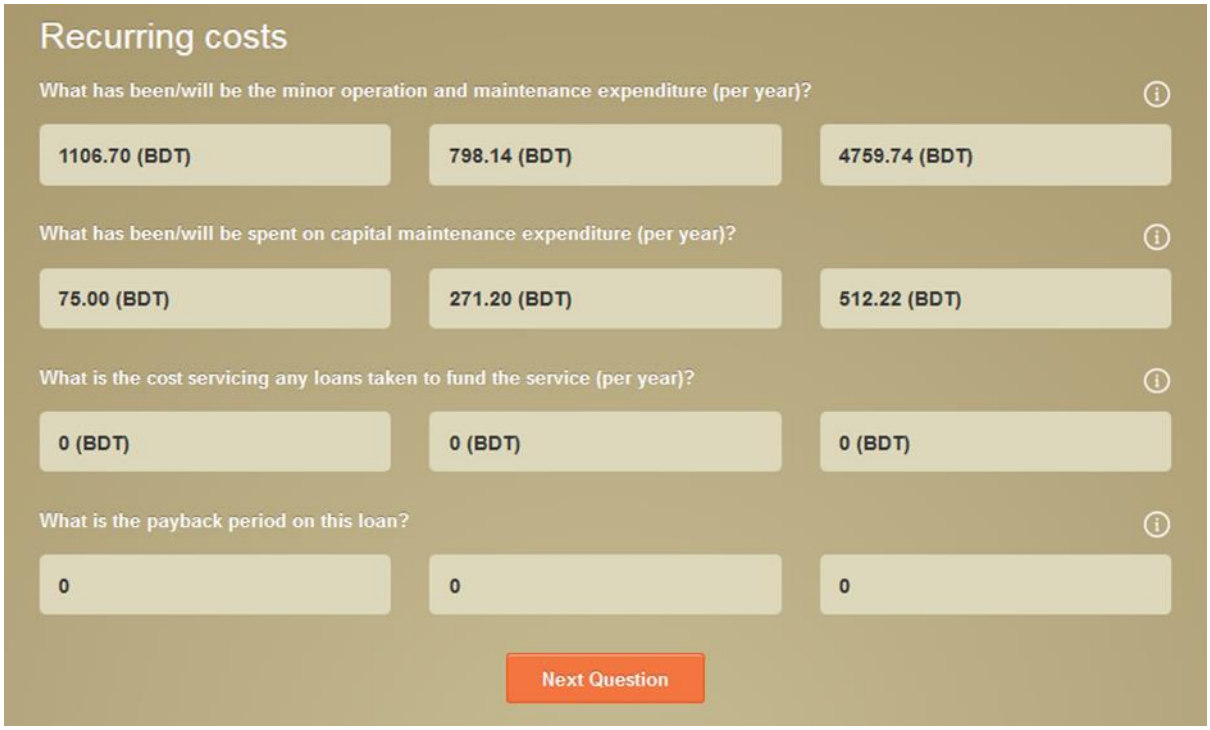
Screenshot: Types of latrine.

Capital expenditure from Table 5 only includes capital expenditure on hardware and 0 is provided for capital expenditure software. The latrine lifetime of 20 years is also supplied as an estimate of how long the latrine will last before having to be replaced.



Screenshot: Capital costs.

For the recurrent costs, please fill in a 0 for the cost of capital and for the payback period to ensure all values are calculated in the report.



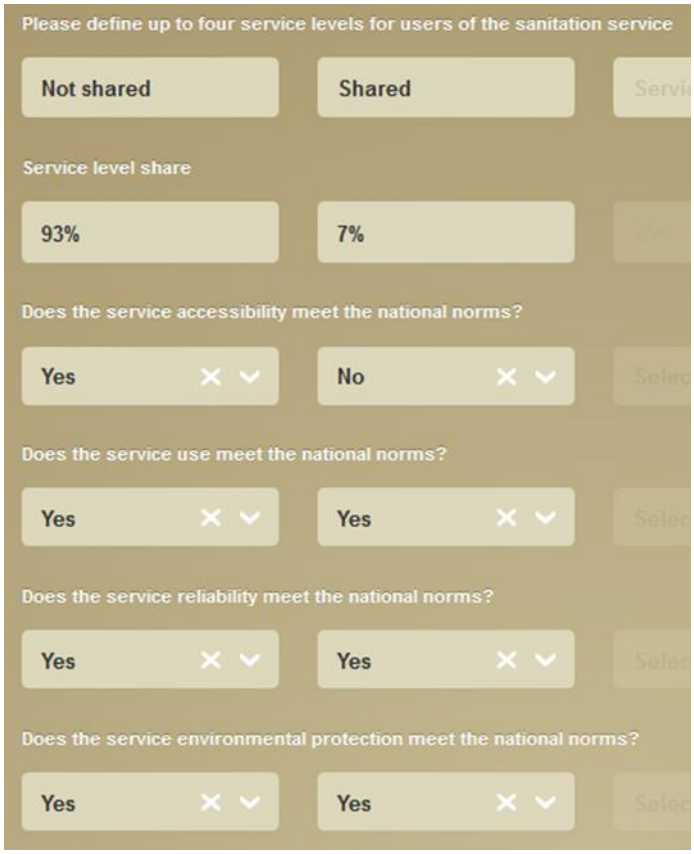
Screenshot: Recurring costs.

8.3 Service level

Finally, under the service level tab, you can create the service levels found and reported in Table 7. For the non-poor and poor, there is only a single service level with all indicators meeting the standard set by BRAC in Bangladesh. In the ultra-poor report, you will need to create two service levels with the population distributed as in Table 7. Shared latrines are

not considered to be accessible according to the standard so 6.7% of the population will fail the accessibility standard.

After all the inputs are finished you should be able to view a complete report. If any data is shown as missing, please check that you've filled in all of the fields.



Screenshot: Defining service levels.

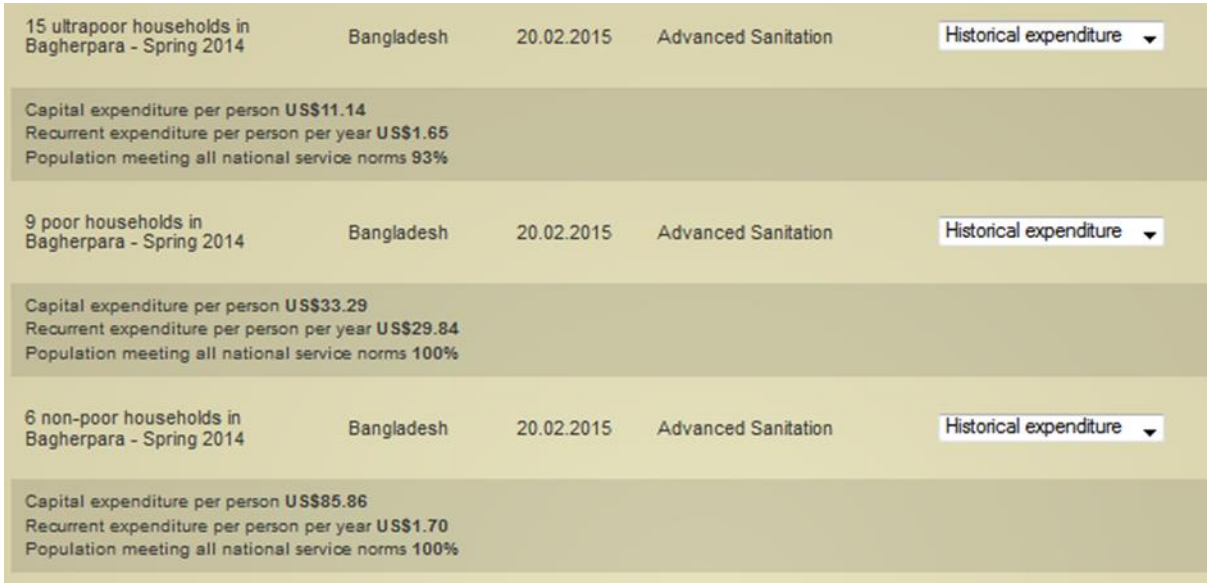
9 Using the results

After you have created a report, make sure you save it to the dashboard and give it a clear name.

Screenshot: Summary.

10 Comparing results on the dashboard

When you have created and saved each report, use the dashboard to compare their results:



Screenshot: Comparing results per household.

- 15 ultra-poor households in Bagherpara – Spring 2014: http://www.ircwash.org/projects/life-cycle-costing-tools?id=/en/report/54e704bf0bc829a52a000006;
- 9 poor households in Bagherpara – Spring 2014: http://www.ircwash.org/projects/life-cycle-costing-tools?id=/en/report/54e7076d0bc829a52a000007;
- 6 non-poor households in Bagherpara – Spring 2014:

http://www.ircwash.org/projects/life-cycle-costing-tools?id=/en/report/54e7078b0bc829a52a000008.

11 Exploring the findings

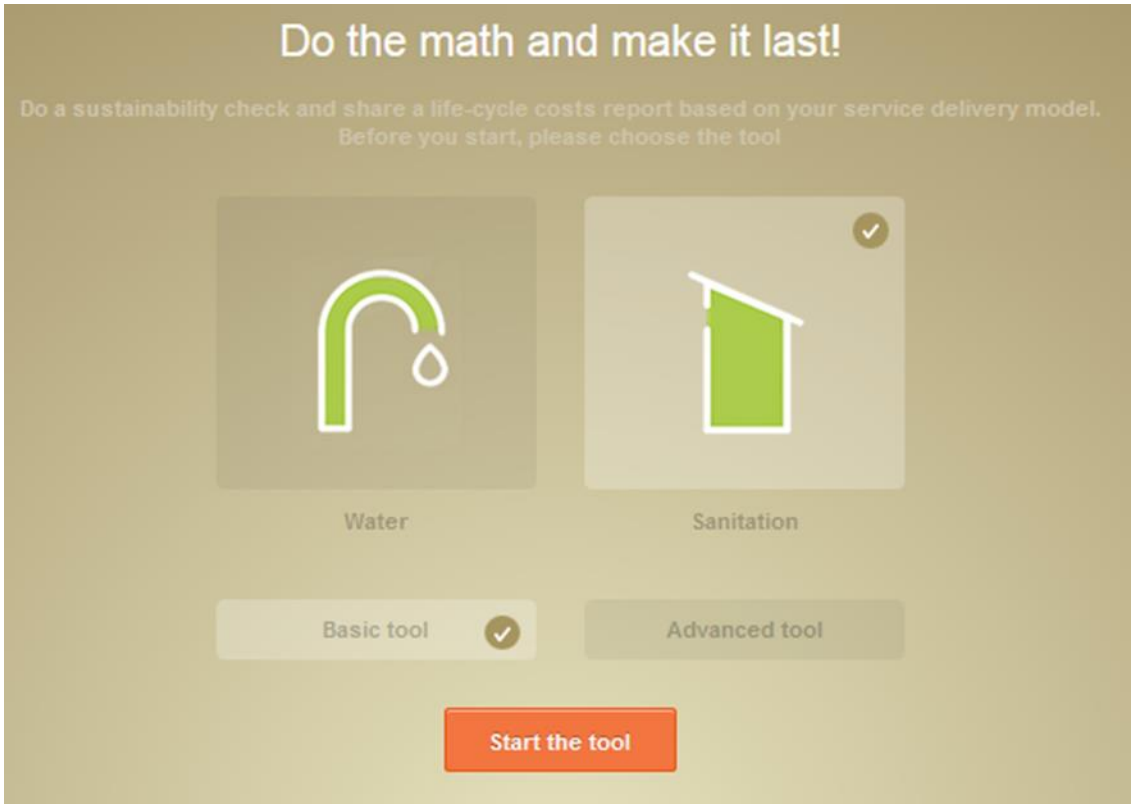
We can now clearly see that our data suggest that the cost of sanitation increases with the income of the household. Indeed, we found that higher income households typically had more expensive facilities and superstructures. Many non-poor families had a brick or concrete house for the latrine in contrast to the ultra-poor latrines. Not so for the poor families, who seemed to spend the most on annual recurrent expenditure.

What was the impact on affordability for each income group? Click on each report and browse down to the affordability for the actual number of users.

Do we expect capital maintenance expenditure to go up? How will that affect affordability? Try to change the life span of latrines from 20 years to 10 years and then 100 years and see how that affects the predicted capital maintenance expenditure.

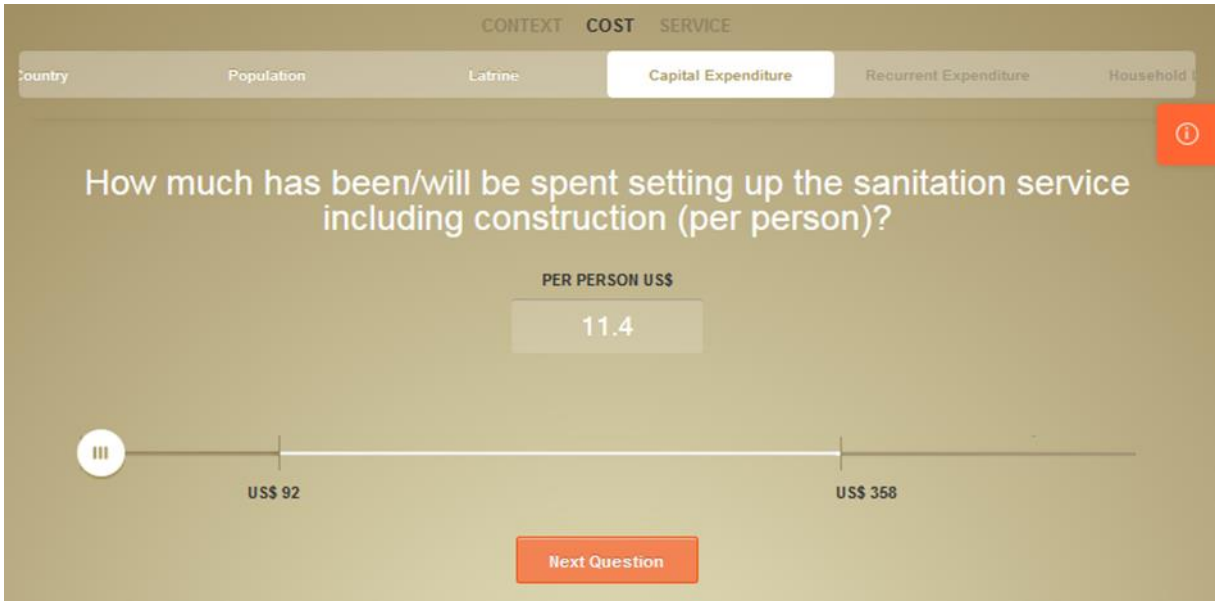
12 Creating a basic report for non-experts

You may use the figures in the dashboard and your service level information in order to fill in a basic report. Basic reports are simpler and easy to share with non-technical stakeholders who can then interact and change figures to examine the results.



Screenshot: Opening screen WASHCost Share.

The figures in the dashboard have all been brought to United States dollars (2011), which is the same reference currency as the WASHCost benchmarks.

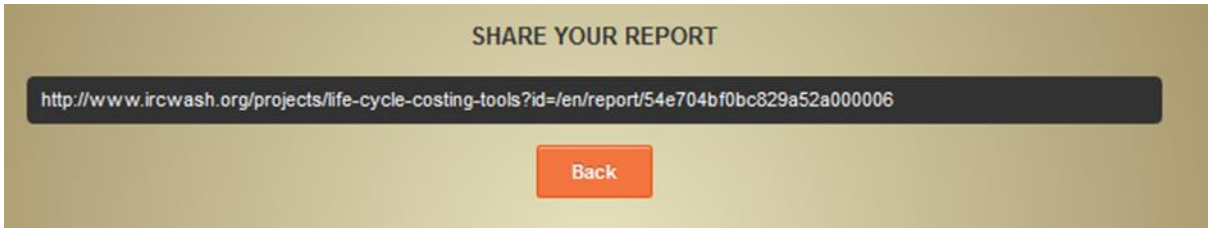


Screenshot: Cost page WASHCost Share.

Note: the basic reports have some limitations such as only allowing a single technology and having a simplified service ladder. You can either choose to simplify your findings or create a separate basic report for each technology for the income group.

13 Sharing the results

When viewing the advanced report, use the SHARE button at the bottom of the page to create a link that can be copied and sent to other stakeholders.



Screenshot: Sharing your report.

About BRAC

BRAC is a global leader in creating large-scale opportunities for the poor. Founded in Bangladesh in 1972, it is now the world's largest development organisation. Over 100,000 BRAC workers touch the lives of an estimated 135 million people in 11 countries, using a wide array of tools such as microfinance, education, healthcare, legal rights training and more.

About IRC

IRC is an international think-and-do tank that works with governments, NGOs, businesses and people around the world to find long-term solutions to the global crisis in water, sanitation and hygiene services. At the heart of its mission is the aim to move from short-term interventions to sustainable water, sanitation and hygiene services. With over 40 years of experience, IRC runs projects in more than 25 countries and large-scale programmes in seven focus countries in Africa, Asia and Latin America.