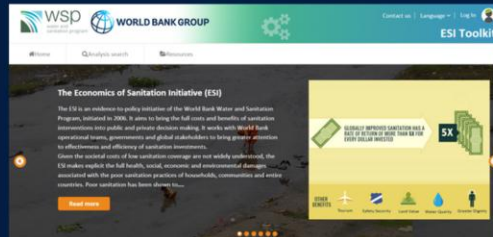


Economics of Sanitation Initiative (ESI) Online Toolkit

Application for Fecal Sludge Management

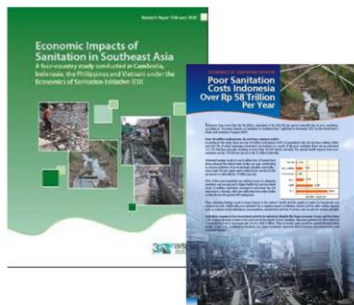
Guy Hutton, Senior Economist
3rd International Fecal Sludge Management, Hanoi, 18-21 January 2015



www.wsp.org | www.worldbank.org/water | www.blogs.worldbank.org/water | [@WorldBankWater](https://twitter.com/WorldBankWater)

Today I am going to present to you the ESI Online Toolkit which enables simple and rapid economic assessment of sanitation & hygiene interventions, and given the theme of this conference, I will illustrate how it can be applied to compare Fecal Sludge Management interventions with other sanitation options.

The Economics of Sanitation Initiative: A Global Research to Policy Initiative



Overall Goal: Advocate for increased investments and provide evidence for efficient planning and implementation of sustainable sanitation services

Motivating factors

- Low priority
- Lack of evidence

Two phases:

- Phase 1: Economic Impacts
- Phase 2: Economic Efficiency

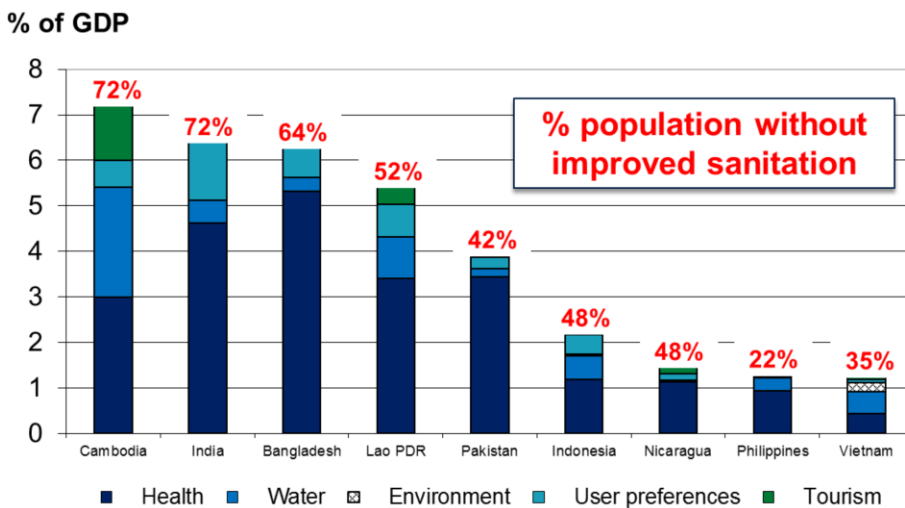


Economic analysis puts the full price on the costs and benefits of actions - it explicitly assesses impacts, and linkages with other sectors and development goals



Slide 1. First, a few words about the ESI, which is a global research to policy initiative, started in 2006. The overall goal of the ESI is to advocate for increased investments for sanitation and to provide evidence for efficient planning and implementation of sustainable sanitation services. The motivating factors for the ESI were the low priority traditionally given to the sanitation sub-sector in many low and middle-income countries, and the lack of economic evidence that enables the sanitation sub-sector to attract funds and direct investments to the most cost-effective interventions in different socio-economic, geophysical and climatic contexts. ESI has been implemented in two phases, first starting with an estimation of the economic impacts of poor sanitation – to get the attention of decision makers – and then when they are listening, a comparison of the economic efficiency of alternative investment options to increase value-for-money in the sector. What economic analysis offers is to put a full price on the costs and benefits of different choices, to enable aggregation across sectors to enable the right choice for society or an economy as a whole. Sanitation impacts many other development sectors, such as water, childhood disease, education, gender equality, nutritional status and child height.

Phase 1 Results in Asia and Latin America: (1) Health dominates impacts; (2) Low access = higher impact



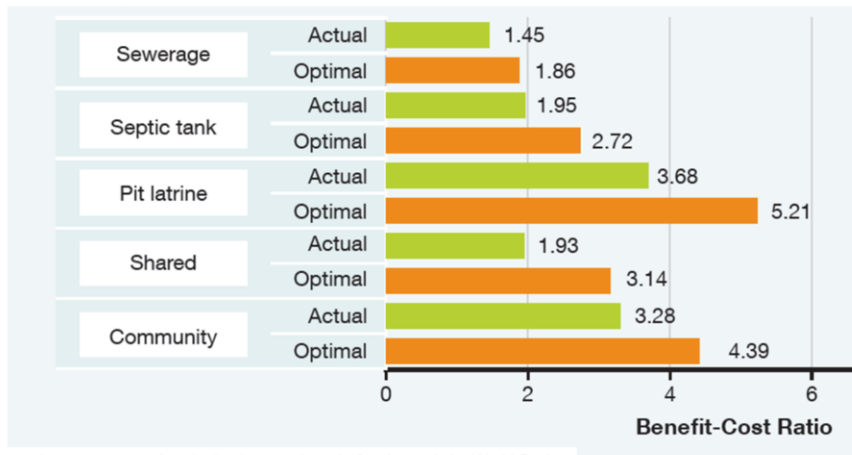
Source: See ESI Phase 1 reports at www.wsp.org/esi



Slide 2. ESI Phase 1 was first implemented in Asia, and later in Africa and Latin America. The graphic shows the economic impacts of poor sanitation as a proportion of GDP (on the y axis) for a selection of countries, and compares with the percentage of population without improved sanitation. One can see from the dark blue parts of the columns that health impacts dominate other measured impacts in most countries, and that higher unserved population is associated with greater impact. Note that a number of environmental and social impacts were not fully reflected in these figures, due to lack of underlying data and also difficulties expressing these impacts in monetary terms.

Phase 2: Costs and Benefits Varies Among Different Technology Options

Example of Urban China (Yunnan Province)



- Economic assessment of sanitation interventions in Southeast Asia. World Bank, Water and Sanitation Program. 2014.
- "Economic efficiency of sanitation interventions in Southeast Asia" Hutton G, Rodriguez U-P, Winara A, Nguyen VA, Kov P, Chuan L, Blackett I, Weitz A. Journal of Water, Sanitation and Hygiene in Development 4(1): 23-26. 2014.



WORLD BANK GROUP



Slide 3. In the phase 2 study, the costs and benefits of different technologies were compared in a range of rural and urban settings. This graphic, for the case of urban China, shows in the orange bars that pit latrines had the highest economic return per unit of local currency invested with over five times return on investment. However, the costs of FSM were not fully accounted for in the pit latrine option, and hence higher ladder options such as sewerage and septic tanks – have higher costs but not fully quantified environmental benefits, and therefore their economic performance suffers. However, the returns for all options are well above the threshold of one. Note that the green bars show the economic returns when taking into account both non-use of sanitation facilities by family members and sub-optimal use of capacity in extraction and off-site treatment facilities.

ESI's Comprehensive Dissemination in >35 countries & globally

WHAT'S A TOILET WORTH?
 2.5 billion people lack access to basic sanitation
 1 billion people lack access to basic water supply

GLOBAL OVERVIEW ECONOMIC IMPACT OF WATER SUPPLY AND SANITATION
 INVESTMENT IN WATER SUPPLY AND SANITATION MAKES GOOD ECONOMIC SENSE
 Investing in water and sanitation makes good economic sense. Investing in water and sanitation makes good economic sense. Investing in water and sanitation makes good economic sense.

Economic Impacts of Sanitation in Southeast Asia
 A new country study conducted in Cambodia, Indonesia, Sri Lanka and Timor-Leste under the Economic Impact of Sanitation Initiative (ESI)

Economic Assessment of Sanitation Interventions in Indonesia
 A six-country study conducted in Cambodia, Indonesia, Sri Lanka, Timor-Leste, Viet Nam and Zambia

BBC WORLD SERVICE

The World Bank Newsletter
 Sanitation: If We...
 2015 is the International Year of Sanitation. It's a year of action, and a year of opportunity. It's a year of action, and a year of opportunity. It's a year of action, and a year of opportunity.

The Past 2015 Water Thematic Consultation
 The economic case for increased investment in improved sanitation and water supply: Quantifying the Costs and Benefits of Water Supply and Sanitation

Poor Sanitation Costs Indonesia Over Rp 58 Trillion

Economic Impact of Poor Sanitation

Motivating investments and promoting

Slide 4 with animation. The ESI has been disseminated widely inside and outside the sector – in thematic consultations of the UN, for the S.W.A.. High Level Meetings, through research reports, policy briefings, newsletters, conferences, the medium of cartoons, and the global media. Its key findings have been used in the headlines of many hundreds of newspaper articles around the world.

BUT: To support decisions, we need to generate economic evidence more simply and more often

Despite this contribution to the evidence base:

1. There is not enough economic evidence
 - It is not available in all countries
 - It is not specific to many local decision making contexts
2. The results from research become outdated because prices, technologies and populations change
3. The evidence is rarely generated with decision makers themselves involved in the research
4. High quality economic evidence requires considerable research efforts with high costs

SOLUTION: A Flexible, Easy-to-Use Computer-Based Toolkit

5



Slide 5. Despite the evidence generated so far and the wide dissemination and use of the results, looking towards the future we need to generate economic evidence more simply and more often in order to better support decision making in the global sector.

First, there is still not enough economic evidence. **It is not yet available in all countries, and it is not specific to many local decision making contexts.** Second, the results from research become outdated because prices, technologies and populations change. Many results from 2008 prices continue to be quoted, but seven years later the statistics in some countries will have changed quite considerably. Third, the evidence is rarely generated with decision makers themselves involved in the research – hence decision makers remain wary of using results that they do not fully understand or endorse. Fourth, high quality economic evidence requires considerable research efforts with high costs – is there a way to generate the same evidence more quickly and more cost-effectively? For these reasons, the Water and Sanitation Program has created the ESI Toolkit, a flexible, easy-to-use computer-based model that can be used by any team of sector experts with the required minimum expertise.

The Toolkit

The screenshot shows the homepage of the 'ESI Toolkit' website. At the top, there is a navigation bar with the 'wsp' logo (water and sanitation program) and the 'WORLD BANK GROUP' logo on the left. On the right, there are links for 'Contact us', 'Language', and 'Log In', along with a user profile icon. Below the navigation bar, there are three main menu items: 'Home', 'Analysis search', and 'Resources'. The main content area features a large background image of a rural landscape. On the left, there is a text block titled 'The Economics of Sanitation Initiative (ESI)' with a 'Read more' button. On the right, there is a yellow infographic box with the text 'GLOBALLY IMPROVED SANITATION HAS A RATE OF RETURN OF MORE THAN 5X FOR EVERY DOLLAR INVESTED' and a '5X' multiplier. Below this, there is a section titled 'OTHER BENEFITS' with icons for Tourism, Safety Security, Land Value, Water Quality, and Greater Dignity. At the bottom of the page, there are logos for 'WORLD BANK GROUP' and 'wsp'.

Slide 6. Before showing the Toolkit itself, first a few words of introduction about the scope of the Toolkit, the opportunities it offers, and the contexts it can be applied in.

Scope of Economic Assessments Included

1. **“Damage” costs** of inadequate sanitation and hygiene (i.e. costs of inaction)
2. **Costs** of various interventions – unit costs and costs to meet targets (under variety of scenarios)
3. **Financing** of interventions – financing available, gap, options and affordability
4. **Market** analytics (market size and profitability)
5. **Benefits** of sanitation & hygiene interventions
6. **Economic evaluation: cost-benefit** analysis (\$ rates of return) and **cost-effectiveness** analysis (health rates of return) of interventions

7



Slide 7. The following six types of analysis can be conducted, either one alone or a selection. First, damage cost analysis enables you to assess the costs of inadequate sanitation and hygiene. Second, cost analysis enables you to estimate and compare the unit costs of various interventions and the costs of meeting targets under variety of scenarios. Third, financial analysis enables you to assess the financing available, the financing gap, the options for future finance to cover the costs, and the affordability to households of different cost sharing arrangements. Fourth, market analytics enables you to assess the market size and likely profitability from different product lines. Fifth, one can assess the economic damages that can be averted from implementing different sanitation & hygiene interventions. And lastly, a combination of the cost and damages averted analyses enables you to assess the benefits versus costs of the interventions either in monetary terms or units of health gain.

The Opportunity & Potential of a Toolkit

- **Simplicity in generating required economic numbers** to decide whether a project is economically justified
- **Transparency in generation** – it is clear what is ‘in’ and ‘out’ - explicit choices are made upfront, and users can interpret results accordingly
- **Learning approach** built into the Toolkit – analysts and decision makers understand the methodology and how results can be used in decision making
- **Public Tool** – available for all sector partners and can be used in loan or project preparation, or evaluation
- **Languages:** English, French, Spanish and Portuguese
- **Database of sharable results** will be developed

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Slide 8. The Toolkit has several added values. First, required economic numbers can be simply generated to decide whether a project is justified by objectively comparing the costs and economic returns of alternative options for improving sanitation & hygiene. Second, a standardized Toolkit increases transparency – it is clear what is ‘in’ and ‘out’ - explicit choices are made upfront, and users can interpret results accordingly. The methods and values can more easily be peer reviewed. Third, analysts not fully familiar with economic rationale and methods can learn as they implement the Toolkit. Fourth, the Toolkit will become Public – available for all sector partners and can be used in loan or project preparation, or evaluation. It will be available initially in English, French, Spanish and Portuguese. Over time, a database of sharable results will be developed – so that future users can use or adapt results generated.

What the Toolkit Enables You To Do

- User selects the **level of the analysis**, from a specific village, to city, district, province, state or country level
 - Rural, urban and 'other' area breakdown can be made within a single application of the Toolkit
- **Online and offline** applications make it easy to use anywhere
- Users can **share** with each other, or update their own results over time ('save as')
- User can easily test impact of uncertainty on the results by changing the assumptions or data inputs in sensitivity analysis
- Anything from **rapid appraisal** to **detailed scientific study**
- **Default values** are provided for some variables which the user can choose to accept or change
- User is **guided** by navigation features, instructions and help boxes throughout – WSP will also maintain a Helpdesk function

9



Slide 9. Briefly a few essential functions and features of the Toolkit. The Toolkit can be applied at any level, from a specific village, to city, district, province, state or country level, and rural, urban or 'other' area breakdowns can be made within a single application of the Toolkit. Online and offline applications make it easy to use anywhere – so the user can upload data entered while offline. Users can share with each other, or update their own results over time, using the 'save as' function, and can keep earlier versions of a particular application. Given the uncertainty likely in many input variables, the user can easily test impact of uncertainty on the results by changing the assumptions or data inputs in sensitivity analysis. These include one-way, multi-way and probabilistic monte-carlo simulations. Depending on which parts of the Toolit is applied, which variables included and the efforts made to collect primary data, anything from a rapid appraisal to detailed scientific study is possible in the Toolkit. To support first-time users and the rapid appraisers, default values are provided for some variables which the user can choose to accept or change. The user is guided by navigation features, instructions and help boxes throughout. To help support users, WSP will also maintain a Helpdesk and peer review function.

A Rapid Step-by-Step Tour

The screenshot displays the 'ESI Toolkit' website interface. At the top, there is a navigation bar with the WSP (Water and Sanitation Program) and World Bank Group logos, along with links for 'Contact us', 'Language', and 'Log In'. Below the navigation bar, there are tabs for 'Home', 'Analysis search', and 'Resources'. The main content area features a slide titled 'The Economics of Sanitation Initiative (ESI)'. The slide text states: 'The ESI is an evidence-to-policy initiative of the World Bank Water and Sanitation Program, initiated in 2006. It aims to bring the full costs and benefits of sanitation interventions into public and private decision making. It works with World Bank operational teams, governments and global stakeholders to bring greater attention to effectiveness and efficiency of sanitation investments. Given the societal costs of low sanitation coverage are not widely understood, the ESI makes explicit the full health, social, economic and environmental damages associated with the poor sanitation practices of households, communities and entire countries. Poor sanitation has been shown to....' Below the text is a 'Read more' button. To the right of the text is a graphic showing a stack of money with an arrow pointing to a '5X' multiplier, indicating that globally improved sanitation has a rate of return of more than 5x for every dollar invested. Below this graphic are icons representing 'OTHER BENEFITS': Tourism, Safety Security, Land Value, Water Quality, and Greater Dignity. The footer of the slide contains the World Bank Group and WSP logos.

Slide 10. Given the many types of analysis on offer and extensive data entry screens, one could spend hours exploring the Toolkit. I will try to give you an overview in just a few minutes, showing you the essential features for you – in the near future – to be able to start using it.

1. First, Register & Sign Into Your Account

WSP water and sanitation program WORLD BANK GROUP Contact us | Language | Log In ESI Toolkit

Home Analysis search Resources

Sign in to your account

Please enter your User ID & Password to login

User Id
Enter user name

Password
Enter password

Keep me signed in **Log In**

Don't have an account yet? [Create an account](#)

11 WORLD BANK GROUP WSP water and sanitation program

Slide 11. First, once you have visited the ESI website, you will register for an account, and once confirmed, you will sign in.

2. Open a New or Existing Package

The screenshot displays the 'My Packages' interface. At the top, there are logos for WSP (water and sanitation program) and the World Bank Group, along with navigation links for 'Contact us', 'Language', and 'Guy'. Below the navigation bar, there are tabs for 'Home', 'Analysis search', 'Resources', and 'My Packages'. The left sidebar contains a menu with 'All packages', 'Recent Packages', and 'Shared packages'. The main content area is titled 'My Packages' and includes a description: 'A package represent a group of related economic analysis performed for a specific context (geography, location etc). You can create a new package or view/manage an existing package listed below.' Below this is a prominent orange 'NEW PACKAGE' button with a right-pointing arrow. To the right of the button, it says 'Create a new package by entering basic inputs, and choosing required analyses.' Below the button and text is a table with the following data:

Package	Country	Share
Dec 29_test Year of analysis: 2001 Last modified: 29 Dec, 2014 Analyst: Guy	India Test (Rural)	✕
New Year of analysis: 2013	India	✕

At the bottom left of the page is the number '12'. At the bottom right are the logos for the World Bank Group and WSP.

Slide 12. The first option you have is to open a new or an existing package. Your existing packages are shown in chronological order of last saving, with most recent listed first.

3. Select Year & Location of Analysis

The screenshot shows the 'Setup' page in the WSP World Bank Group interface. The page is titled 'Setup' and includes a sub-header 'Set the context for the analysis to be performed under this package.' The main content area contains several input fields for configuration:

- Package title***: Jan 2 FSM Test
- Country***: India
- Level of application***: State
- Sub-national location**: Test
- Location classification***: Rural
- Year of analysis***: 2001

The left sidebar lists various analysis options, including Analysis selection, Package summary, Program performance analysis, Technology cost analysis, Affordability analysis, Financing source analysis, Cost target analysis, Market size analysis, Profitability analysis, Financial analysis (FIRR), Damage cost analysis, and Cost benefit analysis. The page number '13' is visible in the bottom left corner, and the logos for 'WORLD BANK GROUP' and 'wsp water and sanitation program' are in the bottom right corner.

Slide 13. When opening a new package, there is an initial setup page where you enter the country, year and specific level where your analysis will be conducted. If you want to apply combined rural and urban analysis / for example at national or provincial level – you can select both together.

3. ...and Population & Economic Details

Rural

Average household size*	4.76	?
Proportion of population living below poverty line (%)	40.00	?
Proportion of households using improved sanitation facility (%)	50.00	?
Proportion of households practicing hand washing after defecation (%)	50.00	?

Currency name*	Indian Rupee	?
Currency abbreviation	INR	?
GDP per capita* <small>(in Local currency units)</small>	90000	?
International currency	US Dollar	?
Average exchange rate <small>For the selected year of analysis (data)</small>	62.00	?
Discount rate(%)*	5.00	?

< Prev Save Next >

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 **WORLD BANK GROUP**
Water

 **wsp**
Water Sanitation Program

Slide 14. Still on the set up page, you enter key information for the rural or urban sites on household size, poverty and sanitation and hygiene coverage. Here you also decide which currency data will be entered in, and an international currency can be selected for presenting the results.

Note at the bottom of each data entry screen, you should first save your data, and then you can proceed to the next data entry screen.

4. Select the Type of Analysis to Conduct

The screenshot displays the 'Analysis selection' screen. On the left is a vertical menu with 17 items, each with a small icon. The 'Analysis selection' item is highlighted in blue. On the right, under the heading 'Analysis selection', there is a sub-heading 'Select the types of analyses you would like to perform. Get information about input, our' followed by a list of 11 analysis types, each with a checked checkbox. The analysis types are: Program performance analysis, Technology cost analysis, Affordability analysis, Financing source analysis, Cost target analysis, Market size analysis, Profitability analysis, Financial analysis (FIRR), Damage cost analysis, Cost benefit analysis, and Cost effectiveness analysis. The bottom left corner shows the number '15'. The bottom right corner features the logos for 'WORLD BANK GROUP' and 'wsp'.

Slide 15. A key moment in the Toolkit application is when selecting the type of analysis to conduct. You check here which analyses you wish to conduct. For those analyses not checked, these will be hidden from you throughout the rest of the Toolkit. If you want to go back later and add an analysis, this can be done at any time.

4. Understand More About Each Analysis

The screenshot shows a web application interface for 'Analysis selection'. At the top right, there are three buttons: '< Prev', 'Save', and 'Next >'. Below these, a callout box contains the text: 'Hovering mouse over the links below analysis name. Expand all and learn more about each analysis | Collapse all'. The main content area is titled 'Analysis selection' and includes a sub-header 'Select the types of analyses you would like to perform'. A list of analysis types is shown on the left, with checkboxes on the right. The selected items are 'Program performance analysis', 'Technology cost analysis', and 'Affordability analysis'. Each selected item has a brief description and three links: 'What are the outputs?', 'How can it be used?', and 'What data are needed?'. The 'Program performance analysis' description reads: 'This analysis will help you compare costs and population uptake of different sanitation and hand-washing programs targets'. The 'Technology cost analysis' description reads: 'Technology cost analysis will allow you to compare different technology options, each comprising a particular combination of handwashing technologies'. The 'Affordability analysis' description reads: 'This analysis will help you assess the ability of your targeted beneficiaries to pay for different technology options'. The page number '16' is in the bottom left corner. The logos for 'WORLD BANK GROUP Water' and 'wsp water & sanitation program' are in the bottom right corner.

< Prev Save Next >

Hovering mouse over the links below analysis name.

Expand all and learn more about each analysis | Collapse all

Home > My Packages > Analysis selection

Analysis selection

Select the types of analyses you would like to perform

- Program performance analysis**
This analysis will help you compare costs and population uptake of different sanitation and hand-washing programs targets.
[What are the outputs?](#) | [How can it be used?](#) | [What data are needed?](#)
- Technology cost analysis**
Technology cost analysis will allow you to compare different technology options, each comprising a particular combination of handwashing technologies.
[What are the outputs?](#) | [How can it be used?](#) | [What data are needed?](#)
- Affordability analysis**
This analysis will help you assess the ability of your targeted beneficiaries to pay for different technology options.
[What are the outputs?](#) | [How can it be used?](#) | [What data are needed?](#)

16

WORLD BANK GROUP Water

4. Understand More About Each Analysis

Program performance

This analysis will help you compare the performance of your program against other programs.

What are the outputs?

Technology cost

Technology cost analysis will allow you to compare the costs of different technologies used in handwashing.

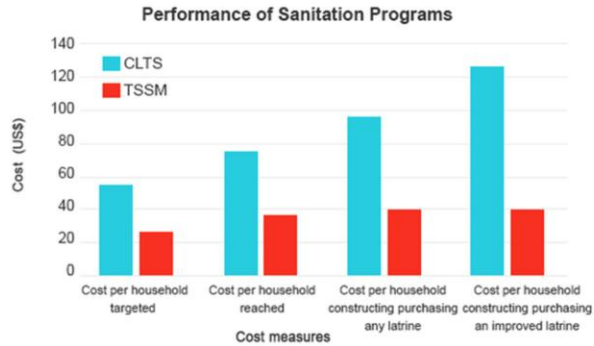
What are the outputs?

Affordability

This analysis will help you compare the affordability of different technologies used in handwashing.

What are the outputs?

The output of the analysis will include a presentation of the costs per household targeted, reached and engaged for each sanitation and handwashing program you enter data for. If required by you in the setup sheet, these results will also be converted to an international currency of your choice. The results will also be presented graphically as shown in the example below:



5. Package Summary Tells You About the Locations & How Much of the Toolkit Has been Implemented

The screenshot shows a web application interface. At the top, there is a navigation bar with 'Home', 'Analysis search', 'Resources', and 'My Packages'. A left-hand menu is open, showing options like 'Setup', 'Analysis selection', 'Package summary' (highlighted), 'Program performance analysis', 'Technology cost analysis', 'Affordability analysis', 'Financing source analysis', 'Cost target analysis', 'Market size analysis', 'Profitability analysis', and 'Financial analysis (FIRR)'. The main content area is titled 'Package summary' and includes a breadcrumb trail 'Home > My Packages > Package summary'. Below the title, it says 'View the context for the analysis to be performed under this package.' A table lists the following details:

Package title	Jan 2 FSM Test
Country	India
Level of application	State
Sub-national location	Test
Location classification	Rural
Year of analysis	2001

At the bottom right, there are logos for 'WORLD BANK GROUP' and 'wsp'. The number '18' is visible in the bottom left corner of the slide frame.

Slide 17. On the left panel is Package Summary – which shows a summary of the choices made, and shows how much data entry has been completed (percentage of variables with data entered) to enable you to keep tabs on the data entry process.

6. Program Performance Analysis Enables You to Compare the Cost Per Population Reached

The screenshot shows a web application interface with a navigation menu on the left and a main content area. The navigation menu includes 'Package summary', 'Program selection' (highlighted), 'Program cost performance', and 'Work offline'. The main content area has a breadcrumb trail: 'Home > My Packages > Jan 2 FSM Test > Program performance analysis > Program selection'. Below the breadcrumb is the title 'Program selection' and a subtitle 'Manage program options by adding new program or editing existing program.' There is a prominent orange button labeled 'NEW PROGRAM' with a right-pointing arrow. To the right of this button is the text 'Create a new program by providing few basic inputs.' Below this is a table with three columns: 'Program', 'Inputs', and 'Action'. The table contains two rows: 'CLTS' and 'CATS'. Each row has 'Program cost' and 'Program performance criteria' listed under the 'Inputs' column, and 'Edit | Delete' under the 'Action' column.

Program	Inputs	Action
CLTS	Program cost Program performance criteria	Edit Delete
CATS	Program cost Program performance criteria	Edit Delete

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WORLD BANK GROUP
Water

wsp
WATER & SANITATION PROGRAM

Slide 18. When you do not want to evaluate the outcomes of sanitation and hygiene interventions in monetary or health terms, but instead assess the cost per infrastructure installed or per population with behavior changed – program performance analysis allows you to compare the performance of different approaches. You enter separately the costs of the programs (to different implementing partners) and the coverage levels achieved to get cost per output. If the user wants to use a metric of success not captured by the Toolkit, this can be entered.

7. Technology Costs: Technology Selection

The screenshot displays the 'Technology selection' module. It features a navigation sidebar on the left with options: 'Package summary', 'Technology selection' (highlighted), 'Technology cost performance', and 'Work offline'. The main content area has a breadcrumb trail: 'Home > My Packages > Dec 29_test > Technology cost analysis'. Below the breadcrumb, there's a sub-header 'Technology selection' and a description: 'Manage technology options by adding new technology or editing existing technology.' An orange 'NEW TECHNOLOGY' button with a play icon is present, followed by the text 'Create a new technology by providing few basic inputs.' Below this is a table with the following data:

Technology	Technology cost	Edit technology details	Delete technology
Cistern flush connected to septic tank	Enter cost data	Edit technology details	Delete technology
Pour flush to single pit	Enter cost data	Edit technology details	Delete technology
Cistern flush to single pit	Enter cost data	Edit technology details	Delete technology
Cistern flush to double pit	Enter cost data	Edit technology details	Delete technology
Pour flush to septic tank	Enter cost data	Edit technology details	Delete technology
Pour flush to double pit	Enter cost data	Edit technology details	Delete technology

At the bottom of the slide, there is a footer with the number '20' on the left and logos for 'WORLD BANK GROUP Water' and 'wsp' on the right.

Slide 19. The technology costs module enables one initially to enter the costs of each sanitation or hygiene option – either at household or system level – to calculate costs per household reached. Based on these cost data, later sub-modules assess financing, affordability, costs of reaching targets, and market size. Up to six technology options can be entered for each application of the Toolkit, each varying with respect to the onsite, conveyance and/or treatment options.

7. Technology Costs: Cost Data Entry (overall)









Home > My Packages > Dec 29_test > Technology cost analysis > Technology selection > Cistern flush connected to septic tank > Technology cost

Technology cost



Include Non-Financial Costs

Onsite Conveyance **Treatment** Disposal & reuse Hand washing Software

Financial cost

Capital initial costs	21000	?	 
Expected average lifespan of capital <small>Items (years)</small>	15	?	
Capital maintenance costs	6950	?	 
Expected average lifespan of capital maintenance <small>Items (years)</small>	7.5	?	
Annual recurrent costs	1200	?	 

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Slide 20. Costs are mainly financial in nature, but if the user wants to enter non-financial costs such as volunteer labor for software or construction activities, they just need to check the box and they will have data entry screens for these costs. Costs can be entered separately for onsite, conveyance, treatment, disposal & reuse, handwashing and software components. For each one, costs are entered separately for capital, capital maintenance and annual recurrent costs, and for the first two of these, the estimated regularity with which they are required. On the right of the help box is a calculator icon for entering more detailed costs based on the ingredients or activities, and a notepad icon for making notes on methodology or data sources for later reference.

7. Technology Costs: Cost Data Entry (details)

×

Capital initial costs

Enter the per household initial capital cost incurred at each part of the sanitation value chain.

Item	Unit cost <i>(Per year)</i>	Number of staff <i>(Full-time equivalents)</i>	Number of years	Total costs	Action
Staff					
Enter staff name/ type, annual recurrent cost incurred per staff, and number of staff.					
<input style="width: 80%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input type="button" value="Delete"/>
<input type="button" value="Add more"/>					
Vehicles					
Enter vehicle name/ type, annual recurrent cost per vehicle, and number of vehicles.					
<input style="width: 80%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input type="button" value="Delete"/>
<input type="button" value="Add more"/>					
Equipment					
Enter name of equipment, annual recurrent cost per equipment unit, and number of equipment's.					
<input style="width: 80%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input type="button" value="Delete"/>
<input type="button" value="Add more"/>					
Per diems					
Enter per diem cost head, per unit annual recurrent cost under this head, and number of units to be costed under this head.					
<input style="width: 80%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input style="width: 10%;" type="text"/>	<input type="button" value="Delete"/>
<input type="button" value="Add more"/>					

22

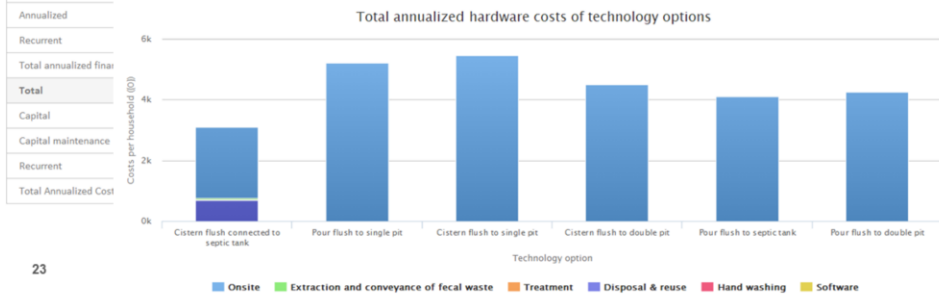
Slide 21. The calculator icon takes you to this screen where you can aggregate the various ingredients of a cost category separately for staff, vehicles, equipment, per diem and other items entered by the user.

7. Technology Costs: Cost Outputs

Cistern flush connected to septic tank



Urban	Sanitation Hardware				Handwashing	Total Hardware	Software
	Onsite	Extraction and conveyance of fecal waste	Treatment	Disposal & reuse	Hand washing		No software
	Toilet with septic tank	Manual extraction	Mechanical system primary treatment	Disposal in community	No handwashing		
Financial							
Capital	0.00	500.80	80.60	512.80	0.00	1,094.20	0.00
Annualized	0.00	40.20	6.50	33.40	0.00	80.10	0.00
Capital maintenance	6,950.00	51.50	18.70	51.60	0.00	7,071.80	0.00
Annualized							



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Slide 22. Cost outputs show in tables the type of cost for each part of the sanitation service chain, and graphics compare the (up to six) technology options by part of the service chain. All outputs in the Toolkit can be saved as PDF or can be copied by hand over to a Word or Excel file.

7. Technology Costs: Affordability

Affordability of capital cost of technology paid by household

Technology option	Total financial price expected to be paid by household					
	Income Q1	Income Q2	Income Q3	Income Q4	Income Q5	Mean
Cistern flush connected to septic tank	22.72	25.46	27.91	30.00	31.90	27.62
Pour flush to single pit	20.00	22.21	23.98	25.00	25.90	23.42
Cistern flush to single pit	15.00	16.67	17.91	18.00	18.90	17.30
Cistern flush to double pit	15.00	16.67	17.91	18.00	18.90	17.30
Pour flush to septic tank	14.00	15.43	16.58	17.00	17.80	16.24
Pour flush to double pit	15.00	16.67	17.91	18.00	18.90	17.30

Affordability of recurrent cost of technology paid by household

Technology option	Total financial price expected to be paid by household					
	Income Q1	Income Q2	Income Q3	Income Q4	Income Q5	Mean
Cistern flush connected to septic tank	1.85	2.08	2.31	2.53	2.69	2.29
Cistern flush connected to septic tank	1.83	2.05	2.27	2.49	2.65	2.27
Pour flush to single pit	1.00	1.11	1.25	1.43	1.67	1.31
Cistern flush to single pit	1.00	1.11	1.25	1.43	1.67	1.31
Pour flush to septic tank	1.00	1.11	1.25	1.43	1.67	1.31
Pour flush to septic tank	1.00	1.11	1.25	1.43	1.67	1.31

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Slide 23. If you enter benchmarks for affordability – defined as percentage of annual income spent on capital, recurrent or total sanitation costs – tables are automatically generated showing which services are below the lower threshold and definitely affordable, which are above the upper threshold and definitely unaffordable, and which lie in-between the two (potentially affordable), with color coding green, orange and red. If you have entered income data for the five quintiles, these data are shown for each quintile, as in this graphic.

8. Damage Cost Analysis: Impact Selection

The screenshot displays the 'Damage selection' interface. On the left, a sidebar lists various impact categories, with 'Damage cost selection' highlighted. The main content area shows the following selected categories:

- Health Impact: Costs associated with sickness and ill-health caused by...
What are the outputs? |> What data are needed?
- Water Resource Impact: This analysis assesses damage costs of water resource...
What are the outputs? |> What data are needed?
- Drinking and domestic: Impacts of water pollution due to poor sanitation o...
What are the outputs? |> What data are needed?
- Agriculture: Damage costs related to agricultural use of water from resources polluted by poor sanitation are assessed under this sub-impact.
What are the outputs? |> What data are needed?
- Fisheries: Loss of fish life due to water pollution caused by poor sanitation is valued under this sub-impact.
What are the outputs? |> What data are needed?

A tooltip for 'Health Impact' provides additional information:

To include health impacts in the assessment of damages, data related to the following are needed:

- Disease incidence/ prevalence, probability of premature mortality, attribution of disease incidence to poor sanitation and handwashing, health seeking behavior and related costs of treatment, and days off productive activities due to sickness, for each of the following:
 - Mild diarrheal disease.
 - Severe diarrheal disease.
 - Helminths infection.
 - Enteropathy.
 - Malnutrition.
 - Hepatitis A & Hepatitis E.
 - Malaria.
 - Acute lower respiratory infection.
 - Measles.
 - Scabies.
 - Trachoma.
- Benefit value of life for estimating value of statistical life.
- Per capita GDP values for location/ country where the benefit value is sourced from, and for location/ country where tool is being applied.

Slide 24. A number of damage cost categories are available to evaluate, including negative impacts on health, water resources, time use, environment and tourism, as well as resource reuse opportunities not exploited. While all of these are linked with poor sanitation and hygiene, the scientific evidence showing causality and extent of impact varies between each one. Some level of expertise is needed for assessment of attribution, especially when moving between different parts of the sanitation ladder – such as between managed and unmanaged fecal waste on top of a basic onsite sanitation option. Other tools and evidence are available to determine appropriate attribution levels. An Expand all option is offered for the user to see what are the outputs and the data needed for each impact.

8. Damage Cost Analysis: Population/Economic Variables

Package summary
Damage cost selection
Impact Areas
Value of Time
Health Impact
Health Impact CEA
Health Impact Output
Water Resource Impact
Water Resource Impact Output
Time Impact
Time Impact output
Environmental Impact
Environmental Impact Output
Resource Reuse
Resource Reuse Output
Tourism Impact
Tourism Impact Output
Damage cost table
Avertible damage
Benefits output

Home > My Packages > Jan 2 FSM Test > Damage cost analysis > Impact Areas and Population

Impact Areas and Population

Enter the population area, distribution of population across the three age groups: 0-4, 5-14 and 15+ years (in %) and number of me

Rural

Population size: 560000

Population distribution(%)

0-4 Years	12
5-14 Years	22
15+ Years	66

Average members per family (?)

0-4 Years	1
5-14 Years	2
15+ Years	6
Total	9.00

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Slide 25. To calculate damages, the user should enter the population size, age composition and average household size. Many impacts require a value for the opportunity cost of time lost, whether it is for lost work or school due to illness or from accessing sanitation facilities or open defecation sites that require travel or waiting time.

8. Damage Cost Analysis: Population/Economic Variables

- Damage cost selection
- Impact Areas
- Value of Time**
- Health Impact
- Health Impact CEA
- Health Impact Output
- Water Resource Impact
- Water Resource Impact Output
- Time Impact
- Time Impact output
- Environmental Impact
- Environmental Impact Output
- Resource Reuse
- Resource Reuse Output
- Tourism Impact
- Tourism Impact Output
- Damage cost table
- Avetible damage
- Benefits output
- Work offline

Value of Time

Provide details of value of time. Get information about inputs by moving mouse over the Tooltip icon (?).

Choice of unit value

- National gross domestic product (GDP) per capita ^(?)
- Gross regional / state product per capita ^(?)
- Minimum wage ^(?)
- Agricultural wage ^(?)
- Average wage ^(?)
- Other ^(?)

Annual value of selected unit value (in local currency units) ?

Average long-term annual growth in unit value(%) ?

Time value as a proportion of the unit value(%)

Working adult: individuals ?



Non-working adult: individuals ?

Children of school age ?

Young children (cared for by caregiver) ?

Working days per year (work days - annual leave - public holidays) ?

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Slide 25. On this page, you are given options for valuing time of differently aged beneficiaries.

8. Damage Cost Analysis: Data Entry (e.g. Health)

- Package summary
- Damage cost selection
- Health Impact
- Health Impact CEA
- Health Impact Output

Home > My Packages > Jan 2 FSM Test > Damage cost analysis > Health Impact

Health Impact

Enter financial cost for various sections of health impact for an age groups "0-4yrs", "5-14 yrs" and "15+ yrs" for Urban, Rural or Other location classification based on selection under the setup page.

< Prev
Save
Next >

Rural

Disease incidence / prevalence ▲

Variable	0-4 years	5-14 years Copy from 0-4 yrs.	15+ years Copy from 0-4 yrs.
Sanitation and Handwashing-related diseases			
Unit: New cases per person per year			
Diarrheal disease mild	0.02	0.02	0.02
Diarrheal disease severe	0.01	0.0001	0.001
Hepatitis A & E	<input type="text"/>	<input type="text"/>	<input type="text"/>

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Slide 26. As an example of an impact data entry screen, here are the disease incidence rates from poor sanitation and hygiene, where data can be entered separately for three age categories: young children, children, and adults. Below this are a number of data entry variables relating to health care costs, lost productivity and premature death.

8. Damage Cost Analysis: Output (e.g. Health)

Package summary
 Damage cost selection
 Health Impact
 Health Impact CEA
Health Impact Output

Home > My Packages > Jan 2 FSM Test > Damage cost analysis > Health Impact Output


Health Impact Output


Rural [Download PDF](#)

Damage costs

Variable	Cost per person in an age group			Total	Costs per household			Total
	0-4 years	5-14 years	15+ years		0-4 years	5-14 years	15+ years	
Health care cost								
Sanitation and Handwashing-related diseases								
Diarrheal disease mild	0.96	0.53	0.96	2.45	0.00	0.00	0.00	0.00
Diarrheal disease severe	0.90	0.00	0.09	0.99	0.00	0.00	0.00	0.00
Helminths	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteropathy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Malnutrition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hepatitis A & Hepatitis E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indirect: malaria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Slide 27. Health outputs are providing per disease, per age group and at the total household level based on average household size.

9. Avertible Damages - % Reduction in Impact

- Package summary
- Damage cost selection
- Avertible damage
- Benefits output

Home > My Packages > Jan 2 FSM Test > Damage cost analysis > Avertible damage

Avertible damage

Enter value of sub impacts of all damage cost impacts for each technology option for both interventions, Sanitation only and Sanitation and Handwashing.

Sanitation only
Sanitation and Handwashing

Impact	Sub-impact	Cistern flush connected to septic tank	Pour flush to single pit	Cistern flush to single pit	Cistern flush to double pit	Pour flush to septic tank	Pour flush to double pit
Health	Fecal-oral related diseases ^(?)	30	30	30	30	30	30
	Helminths ^(?)	50	50	50	50	50	50
	Other Handwashing-related diseases ^(?)	0	0	0	0	0	0
Water	Household access to clean water ^(?)	20	20	20	20	20	20
	Agricultural uses of water ^(?)						
	Fish losses ^(?)						
	Wildlife and aquatic resources ^(?)						

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Slide 28. Once all the damage costs are entered for all the selected impacts, the user is asked to enter how much of these damages are averted for each of the (up to six) sanitation and hygiene options, separately for each impact.

10. Combining Cs & Bs in Cost-Benefit Analysis

Returns		Cost benefit analysis										
Benefit cost ration (BCR)		Rural										
Economic Internal Rate of Return (EIRR)		Baseline: no sanitation	Technology option									
Net present value (NPV)		Intervention: Sanitation only	Cistern flush connected to septic tank		Pour flush to single pit		Cistern flush to single pit		Cistern flush to double pit		Pour flush to septic tank	
Payback period (PBP)		Technical measure:	Design	Actual	Design	Actual	Design	Actual	Design	Actual	Design	Actual
Cost per death averted		Returns										
Cost per case of illness averted		Benefit cost ration (BCR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cost per DALY averted		Economic Internal Rate of Return (EIRR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Net present value (NPV)	-733.57	-795.86	-395.73	-395.73	-395.73	-395.73	-712.32	-712.32	-395.73	-395.73
		Payback period (PBP)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Cost per death averted	34,164.60	34,611.70	22,687.70	22,687.70	24,074.70	24,074.70	28,443.40	28,443.40	31,264.30	31,264.30
		Cost per case of illness averted	34,611.70	0.00	22,687.70	0.00	24,074.70	0.00	28,443.40	0.00	31,264.30	0.00
		Cost per DALY averted	34,611.70	0.00	22,687.70	0.00	24,074.70	0.00	28,443.40	0.00	31,264.30	0.00

Slide 29. With technology costs, damage costs and damages averted, economic performance measures are presented for each technology, at both full capacity use as well as actual use. As well as benefit-cost ratios, other common Cost-Benefit Analysis outputs are produced such as annual rates or return, net present value and payback period. Cost per disease case and death averted is also tabulated automatically. If the required health impact data have been entered, including life expectancy and disability weights, then cost per disability-adjusted life year can be tabulated, for comparison with other health interventions.

11. Sensitivity Analysis

Home Analysis search Resources My Packages

Package summary Home > My Packages > Jan 2 FSM Test > Sensitivity analysis

Edit Sensitivity Analysis

Enter name of scenario and financial values for any one of the analysis type selected.

Select analysis type Probabilistic sensitivity analysis

Scenario name Test2

Select variable

Discount rate(%)

Lower Value Higher Value Distribution choice

0.00000 0.00000 Normal

Selected unit of value (whether wage rate or GDP per capita, etc)

Opportunity cost of time (proportion of the selected unit of value)

Working Adults Lower Value Working Adults Higher Value Distribution choice

0.00000 0.00000 Normal

Non-Working Adults Lower Value Non-Working Adults Higher Value Distribution choice

0.00000 0.00000 Normal

Slide 30. Sensitivity analysis is a core feature of the toolkit, and any number can be conducted on a single Package. Sensitivity analysis enables improved interpretation of baseline results through examining the impacts on the results of changes in assumptions, variables included and key data inputs. For example, the impact of different interest rates for discounting future costs and benefits can be assessed, as well as different assumptions about the value of time, disease rates, travel time to site of defecation and so on. These can be changed one at a time, several together, as well as using probabilistic sensitivity analysis.

12. Sharing and Review

Share

This is Photoshop's version of Lorem Ipsum. Proin gravida nibh vel velit auctor aliquet. Aenean sollicitudin, lorem quis.

Share complete package

Jan 2 FSM Test



Or

Share specific modules

- Program performance analysis
- Technology cost analysis
- Affordability analysis
- Financing source analysis
- Cost target analysis
- Market size analysis
- Profitability analysis
- Financial analysis (FIRR)
- Damage cost analysis
- Cost benefit analysis
- Cost effectiveness analysis


Share with


Q

<input type="checkbox"/>	 Guy Indonesia	guy@esi.org
<input type="checkbox"/>	 ravi xavier India	ravi@esi.org

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- Offer of quality control (& official endorsement) by World Bank Helpdesk
- Analyst asked permission to make data available on ESI website

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Slide 31. During the analysis or once completed, the Package can be shared either in part or in full with colleagues or peer reviewers. A peer review will be offered by the World Bank which provides a quality control of economic evaluation experts, and potentially an endorsement for the analysis (if the users address the issues raised by the experts). Applications of the Toolkit going through this process will have the opportunity to be shared publicly to other users of the ESI website.

Closing Remarks

- Results are only as solid as the methodology and assumptions of the model, & the data being entered
- The Toolkit does not capture all impacts – social impacts and some environmental impacts cannot easily be evaluated in monetary terms
- The overall purpose is to make decision makers and financiers/advisers to the sector more aware of the relative costs and benefits of different sanitation & hygiene options:– to increase transparency and to spark a healthy debate on spending & program design
- The Toolkit will be extended and improved over time

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Slide 32. There are obviously some risks of a Toolkit, where users may not fully understand what they are supposed to enter, where some data inputs are poor quality, and where the opportunity is provided to ‘game’ the Toolkit to get the desired results. Hence the results are only as solid as the methodology and assumptions of the model, & the data being entered. Second, users of the results should be aware that the Toolkit does not capture all impacts of poor sanitation and hygiene – for example, social impacts and some environmental impacts cannot easily be evaluated in monetary terms.

That said, the main purpose of the Toolkit is to make decision makers and financiers/advisers to the sector more aware of the relative costs and benefits of different sanitation & hygiene options, and as long as it is responsibly used and with plenty of dialogue, it should easily achieve that aim. Of course, we will be open to comments and ways to improve the Toolkit, and it can be extended over time to incorporate other types of analysis or deepen the existing analyses.

THANK YOU



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