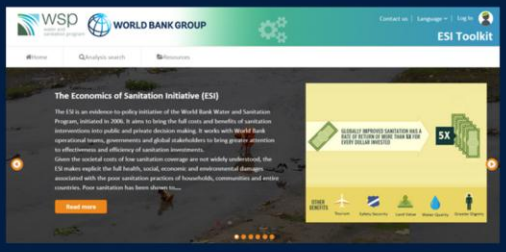
Economics of Sanitation Initiative (ESI) Online Toolkit

Application for Fecal Sludge Management



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3rd International Fecal Sludge Management, Hanoi, 18-21 January 2015

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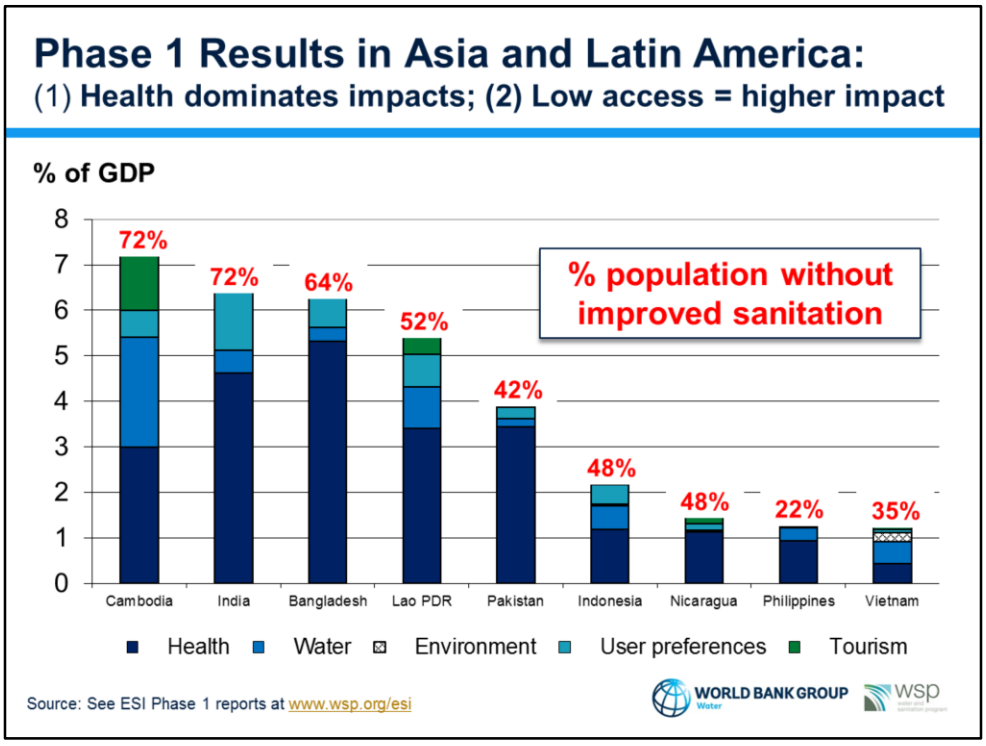
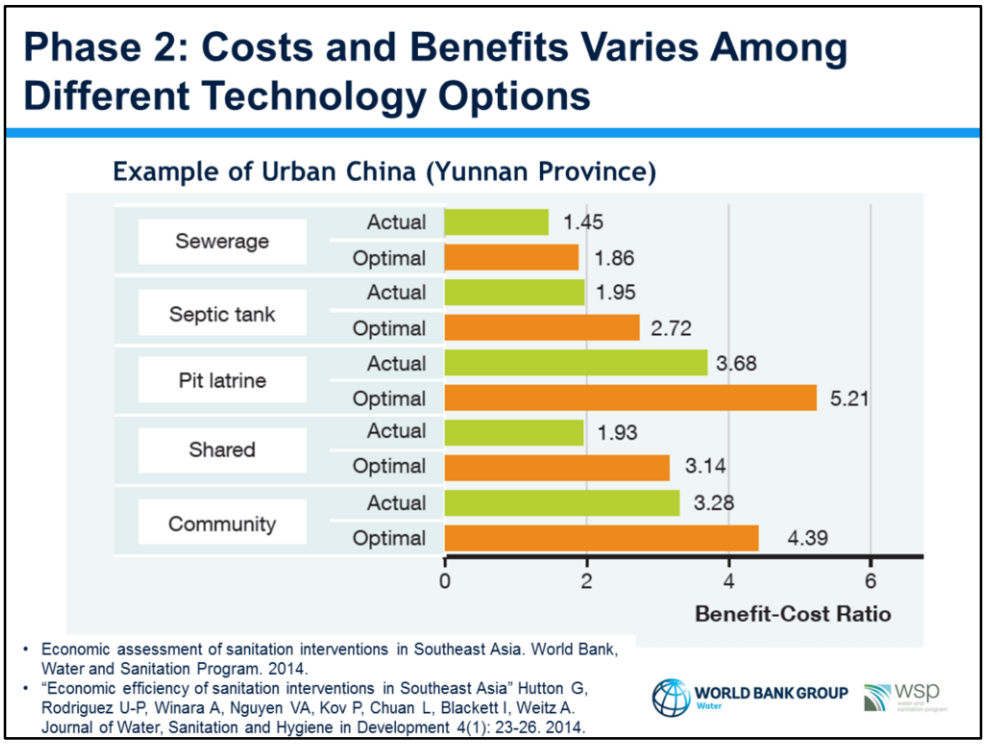
Today I am going to present to you the ESI Online Toolkit which enables simple and rapid economic assessment of sanitation & hygiene interventions, and given the theme of this conference, I will illustrate how it can be applied to compare Fecal Sludge Management interventions with other sanitation options.

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.

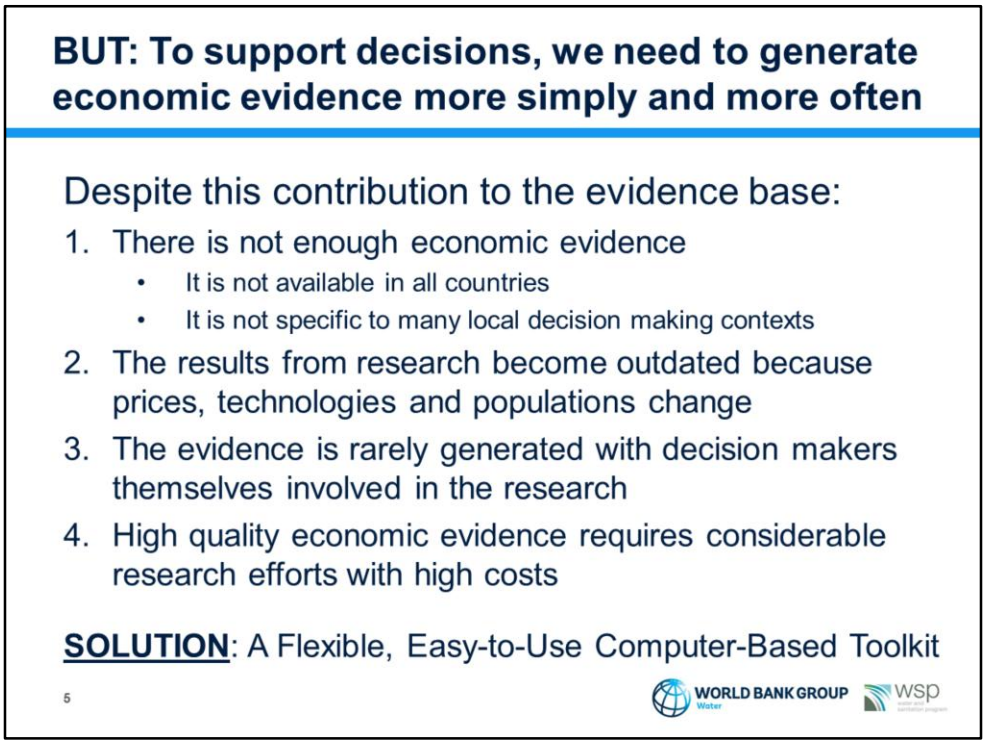


Slide 2. ESI Phase 1 was first implemented in Asia, and later in Africa and Latin America. The graphic shows the economic impacts of poor sanitation as a proportion of GDP (on the y axis) for a selection of countries, and compares with the percentage of population without improved sanitation. One can 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.



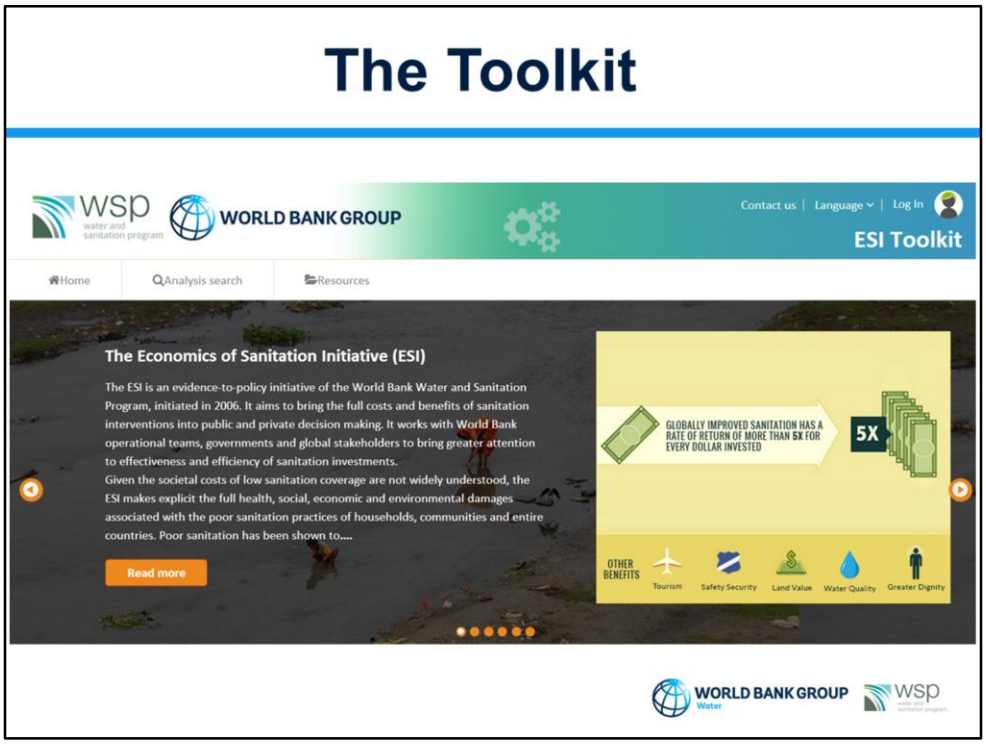
Slide 3. In the phase 2 study, the costs and benefits of different technologies were compared in a range of rural and urban settings. This graphic, for the case of urban China, shows in the orange bars that pit latrines had the highest economic return per unit of local currency invested with over five 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.

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.

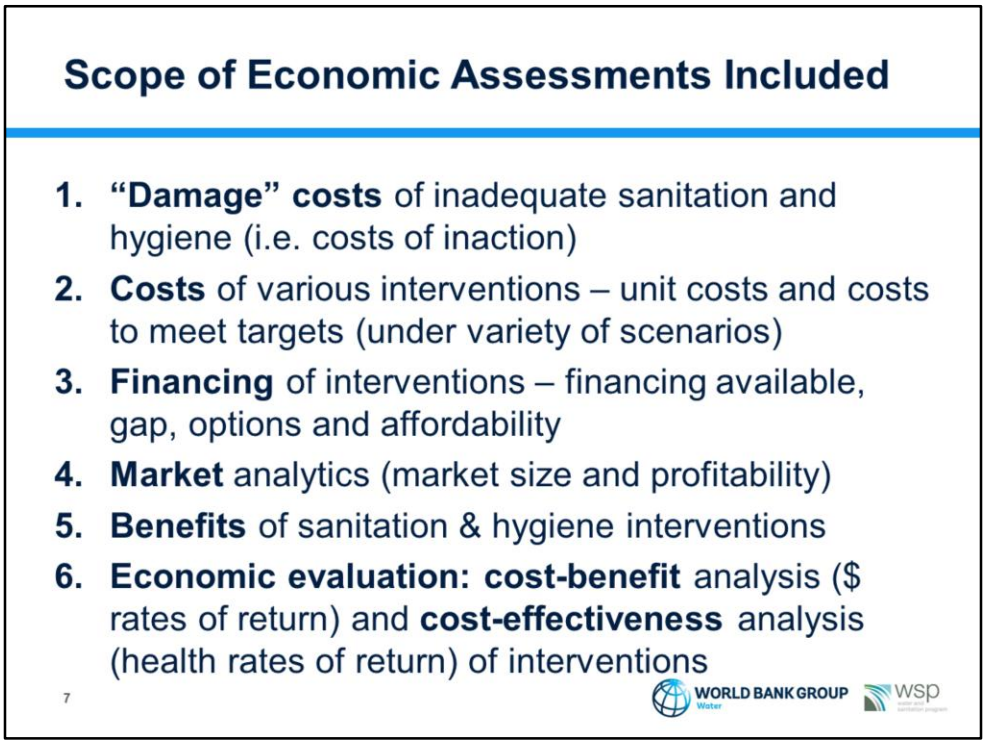


Slide 5. Despite the evidence generated so far and the wide dissemination and use of the results, looking towards the future we need to generate economic evidence more simply and more often in order to better support decision making in the global sector.

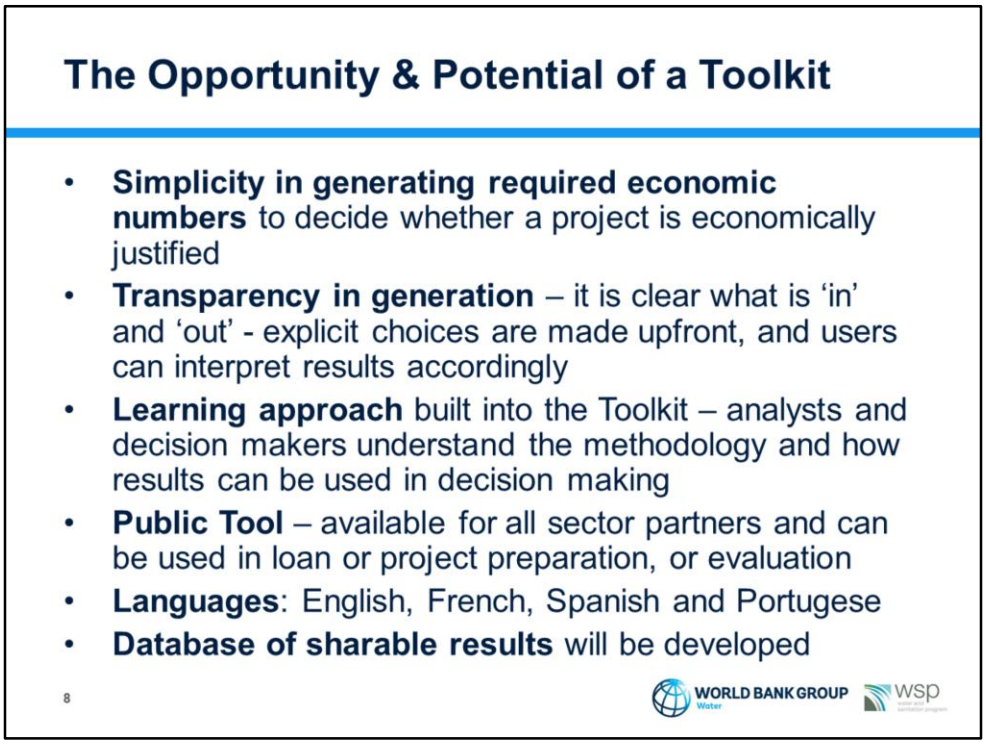
First, there is still not enough economic evidence. It is not yet available in all countries, and it is not specific to many local decision making contexts. Second, the results from research become outdated because prices, technologies and populations change. Many results from 2008 prices continue to 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.



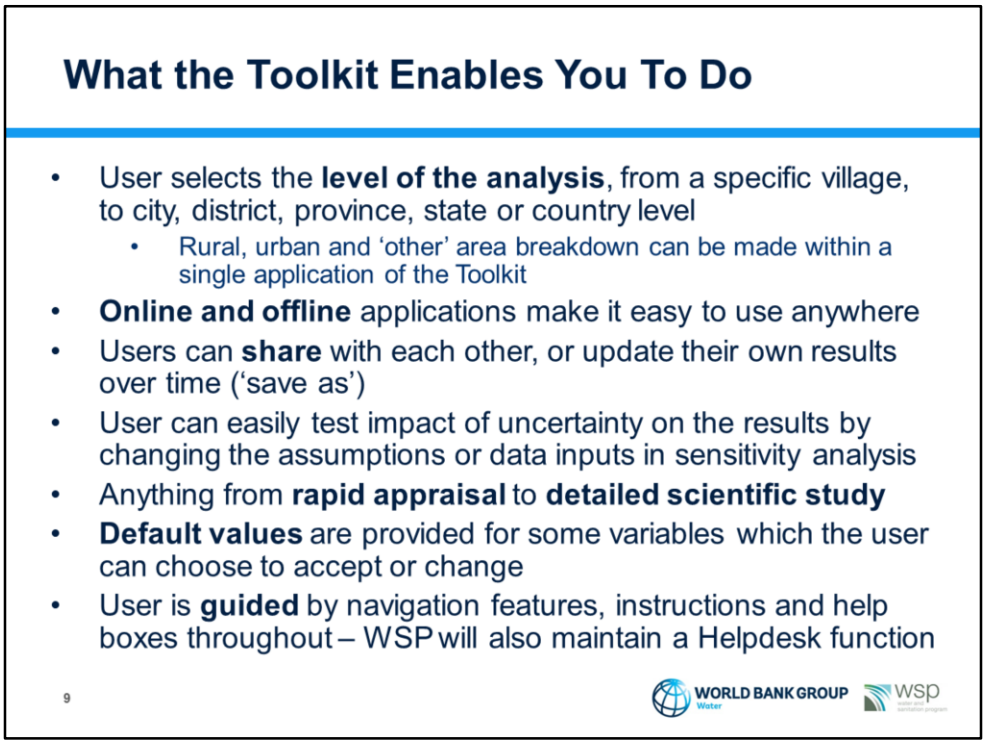
Slide 6. Before showing the Toolkit itself, first a few words of introduction about the scope of the Toolkit, the opportunities it offers, and the contexts it can be applied in.



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.

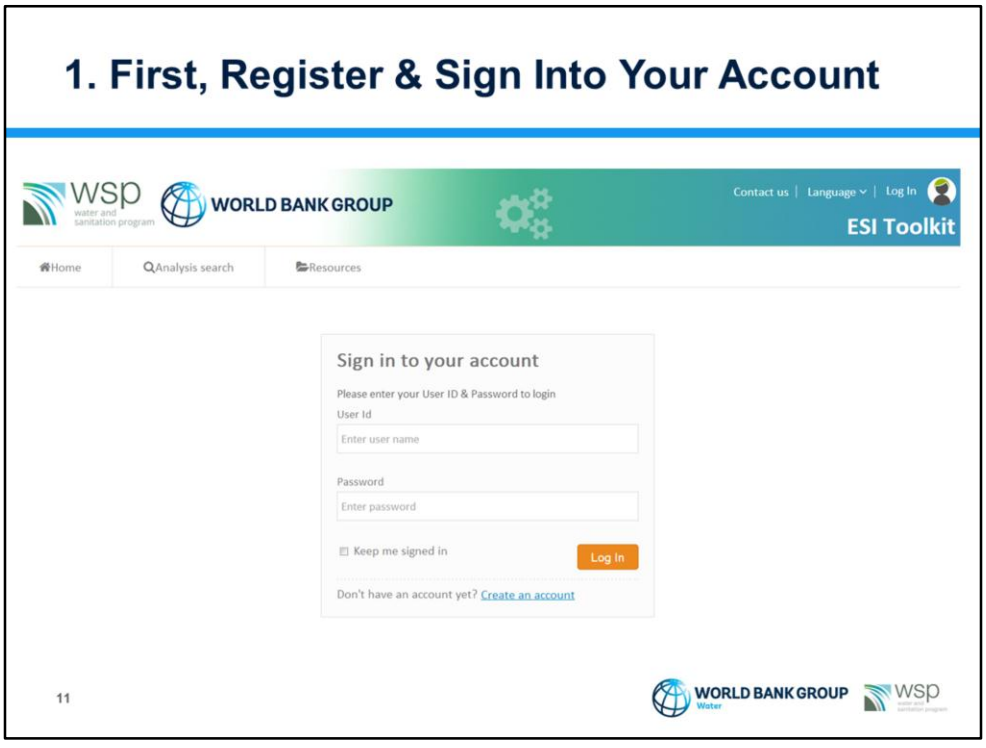


Slide 8. The Toolkit has several added values. First, required economic numbers can be simply generated to decide whether a project is justified by objectively comparing the costs and economic returns of alternative options for improving sanitation & hygiene. Second, a standardized Toolkit increases 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 Portugese. Over time, a database of sharable results will be developed – so that future users can use or adapt results generated.

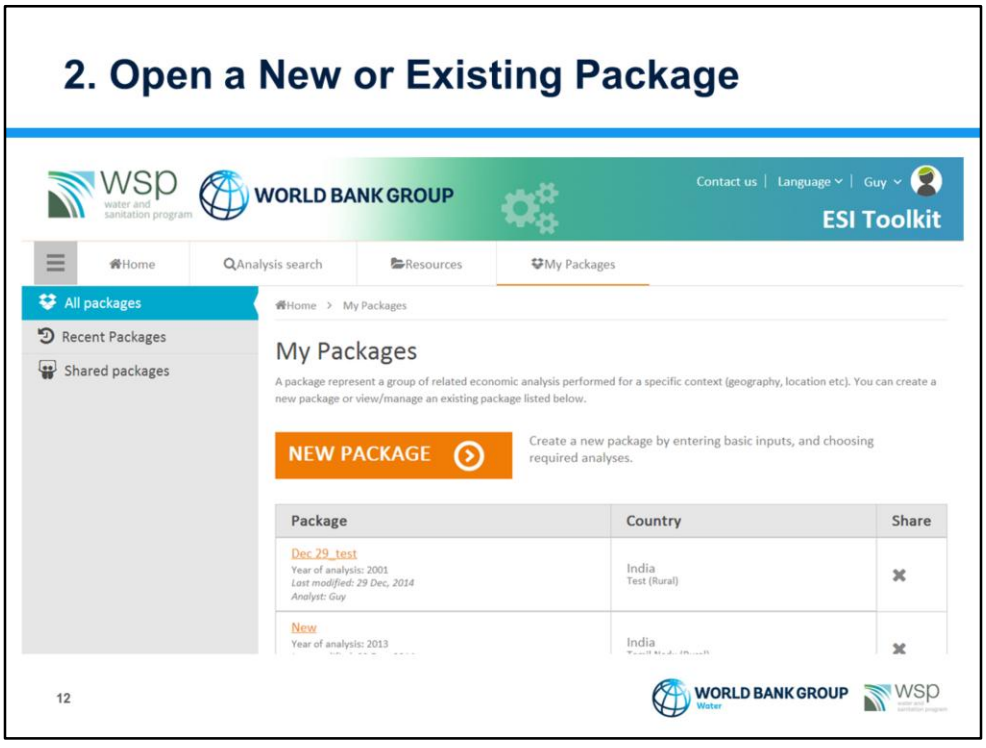


Slide 9. Briefly a few essential functions and features of the Toolkit. The Toolkit can be applied at any level, from a specific village, to city, district, province, state or country level, and rural, urban or 'other' area breakdowns can be made within a single application of the Toolkit. Online and 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.

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.

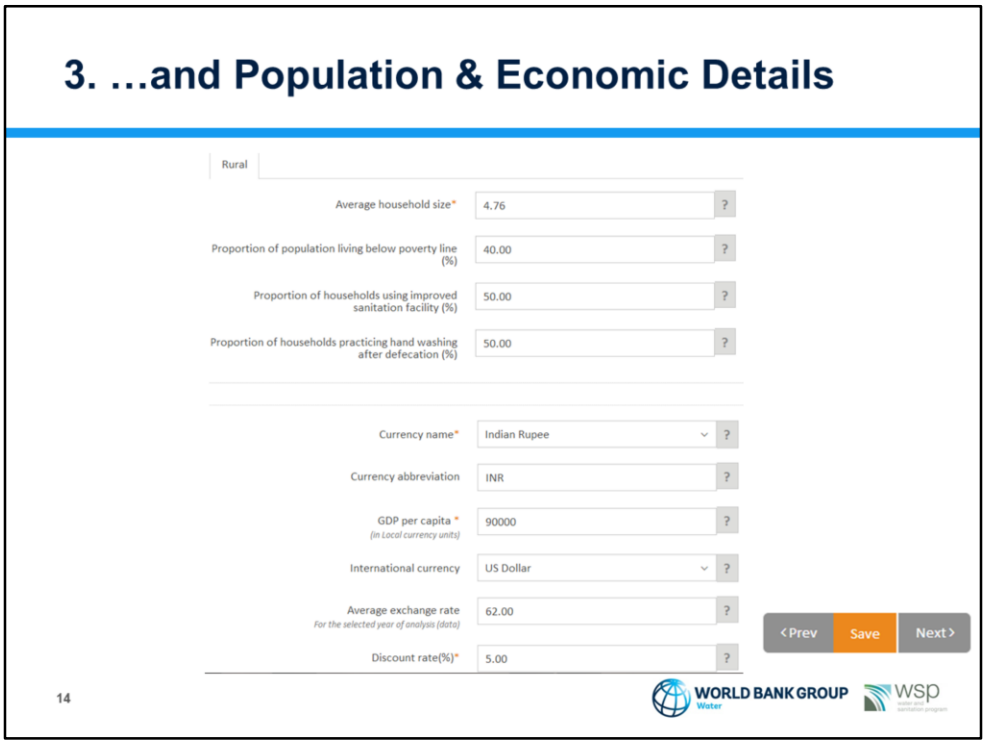


Slide 11. First, once you have visited the ESI website, you will register for an account, and once confirmed, you will sign in.



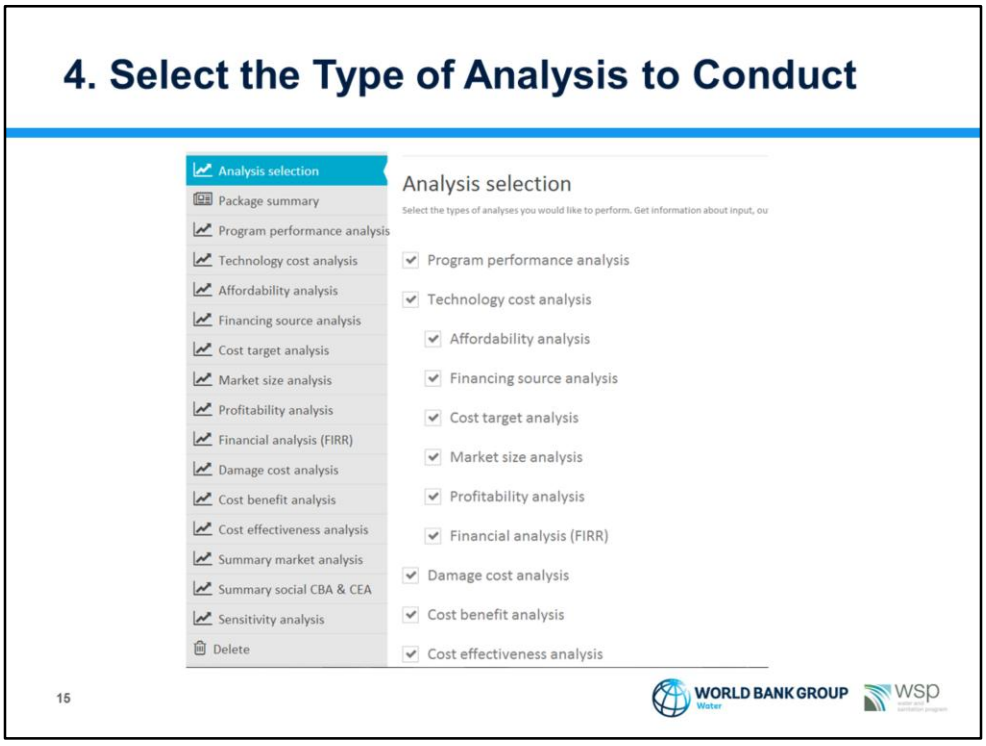
Slide 12. The first option you have is to open a new or an existing package. Your existing packages are shown in chronological order of last saving, with most recent listed first.

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.



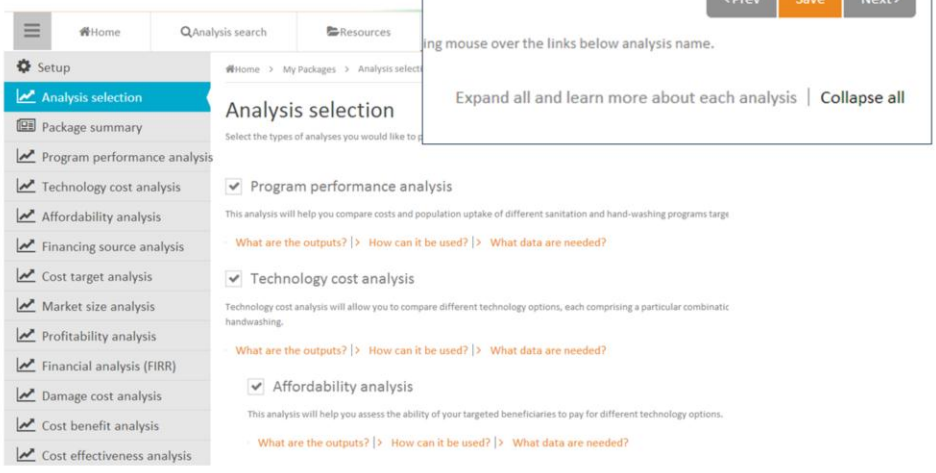
Slide 14. Still on the set up page, you enter key information for the rural or urban sites on household size, poverty and sanitation and hygiene coverage. Here you also decide which currency data will be entered in, and an international currency can be selected for presenting the results.

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.



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



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4. Understand More About Each Analysis

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What are the outputs?

Technology cost

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handwashing.

What are the outputs?

Affordability

This analysis will help you

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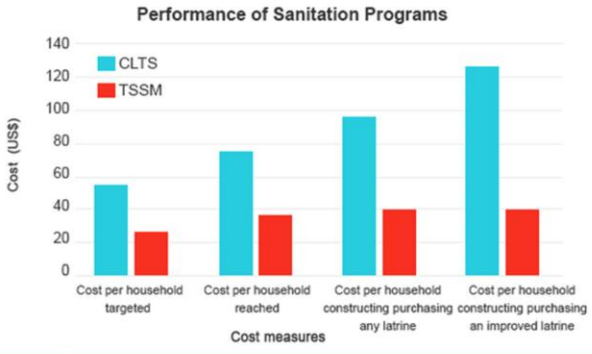
The output of the analysis will include a presentation of the costs per household targeted, reached and engaged for each sanitation and handwashing program you enter data for. If required by you in the setup sheet, these results will also be converted to an international currency of your choice. The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



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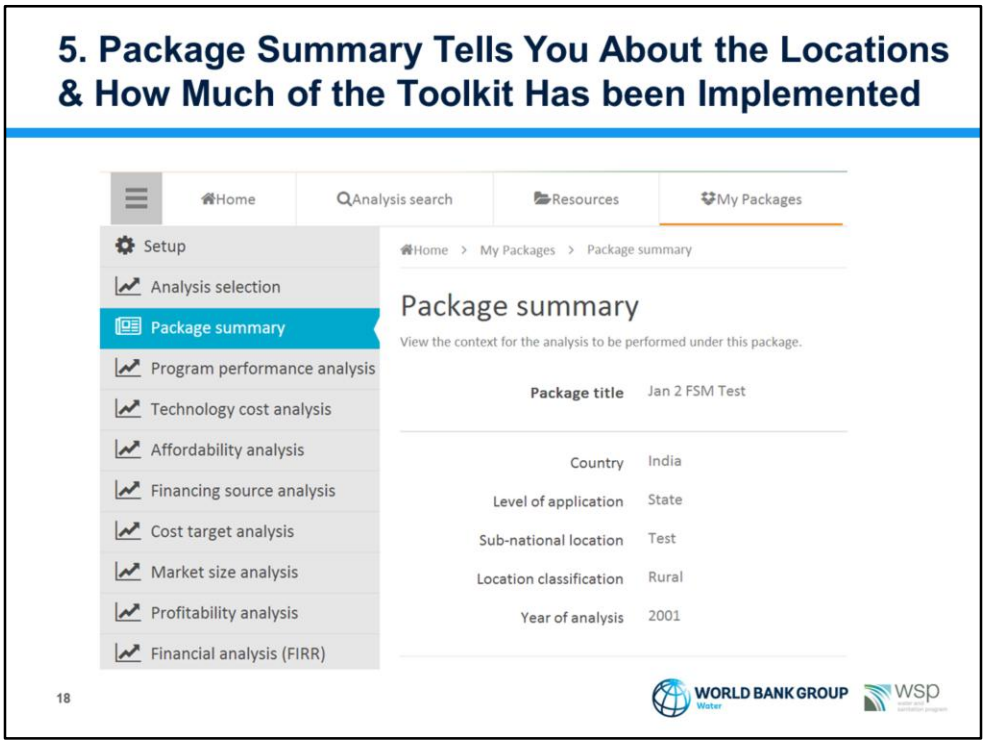
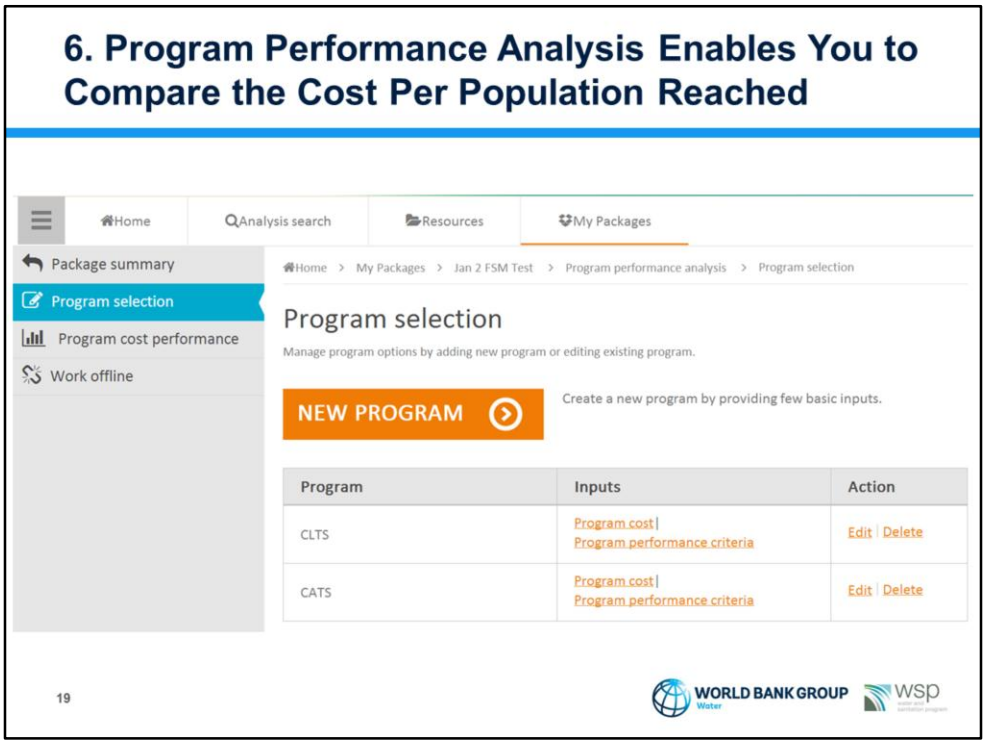
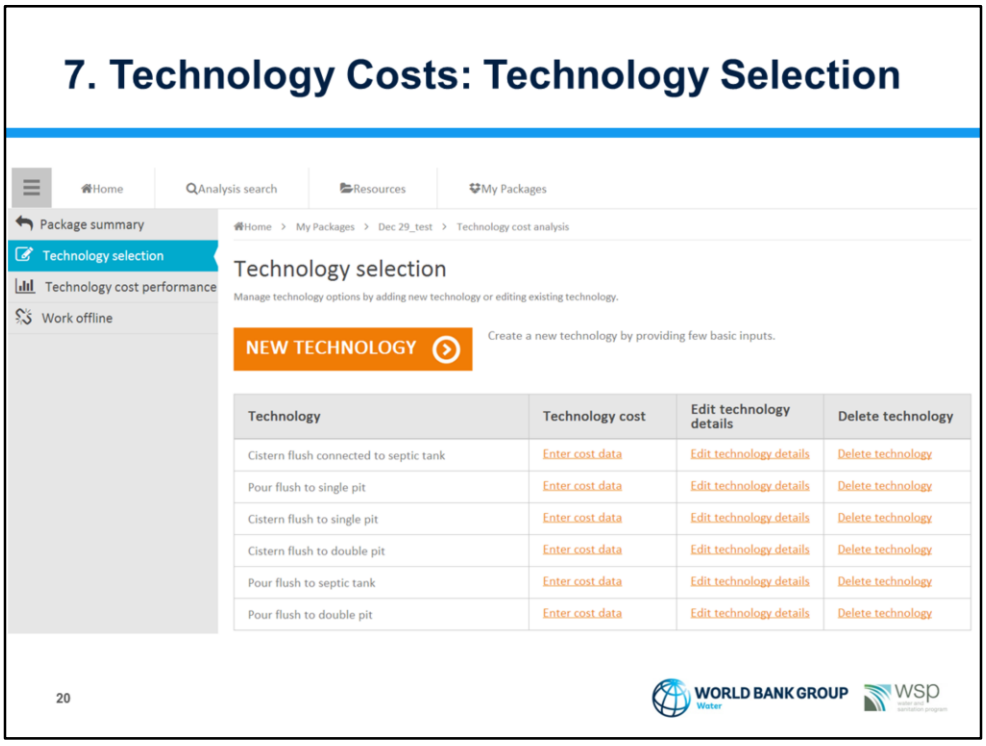


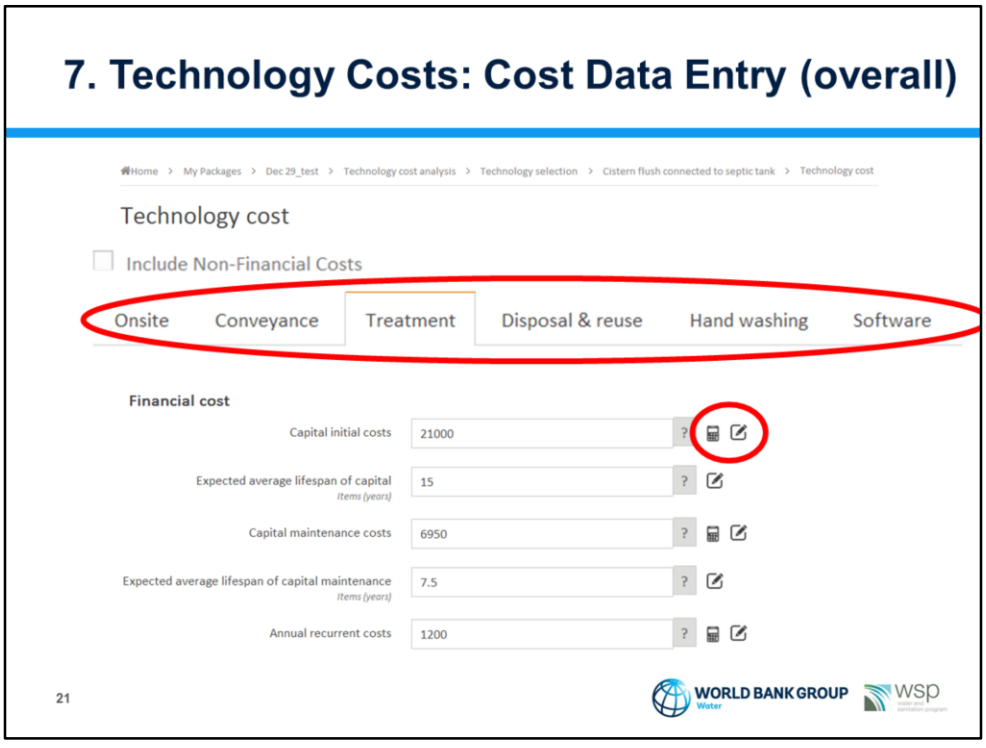
Slide 17. On the left panel is Package Summary – which shows a summary of the choices made, and shows how much data entry has been completed (percentage of variables with data entered) to enable you to keep tabs on the data entry process.



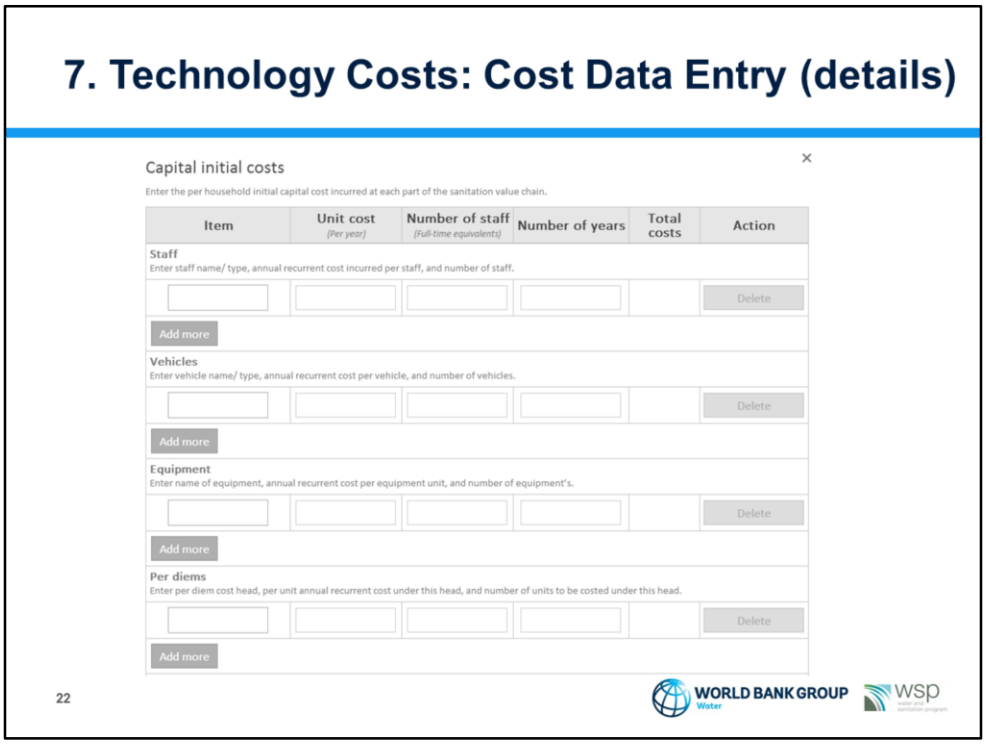
Slide 18. When you do not want to evaluate the outcomes of sanitation and hygiene interventions in monetary or health terms, but instead assess the cost per infrastructure installed or per population with behavior changed – program performance analysis allows you to compare the performance of different 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.



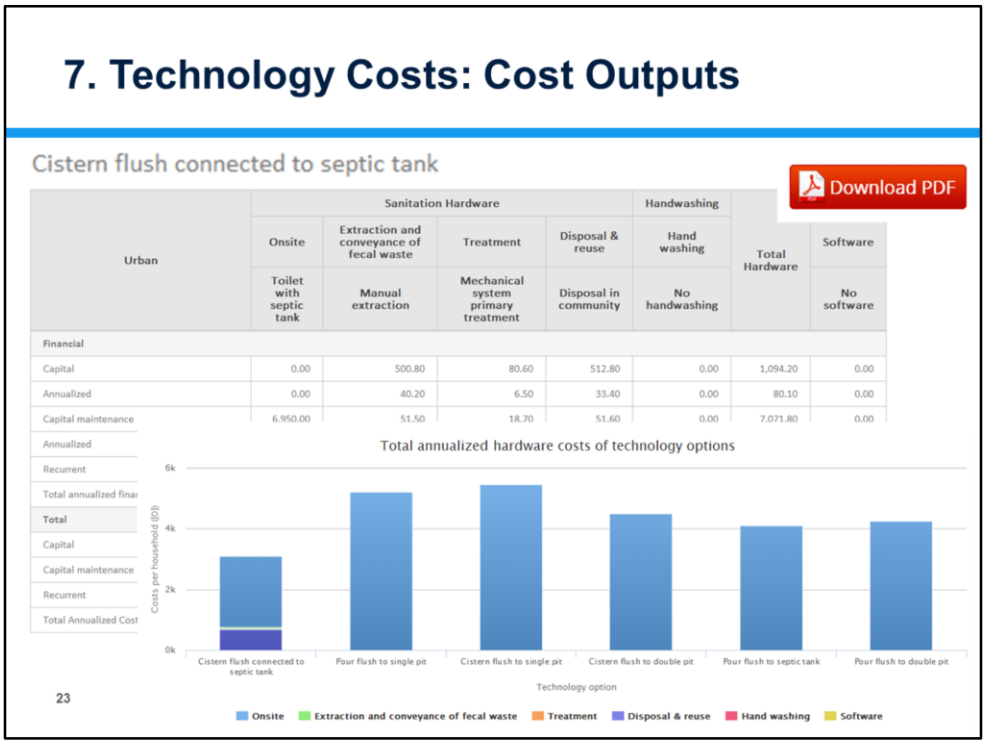
Slide 19. The technology costs module enables one initially to enter the costs of each sanitation or hygiene option – either at household or system level – to calculate costs per household reached. Based on these cost data, later sub-modules assess financing, affordability, costs of reaching targets, 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.



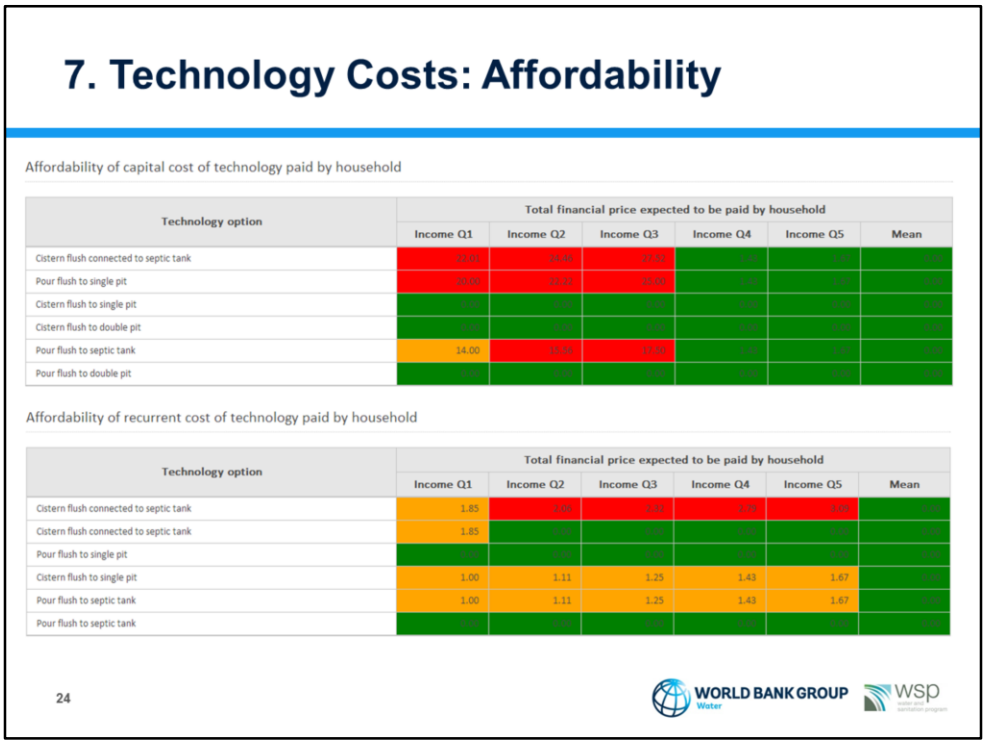
Slide 20. Costs are mainly financial in nature, but if the user wants to enter non-financial costs such as volunteer labor for software or construction activities, they just need to check the box and they will have data entry screens for these costs. Costs can be entered separately for onsite, conveyance, 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.



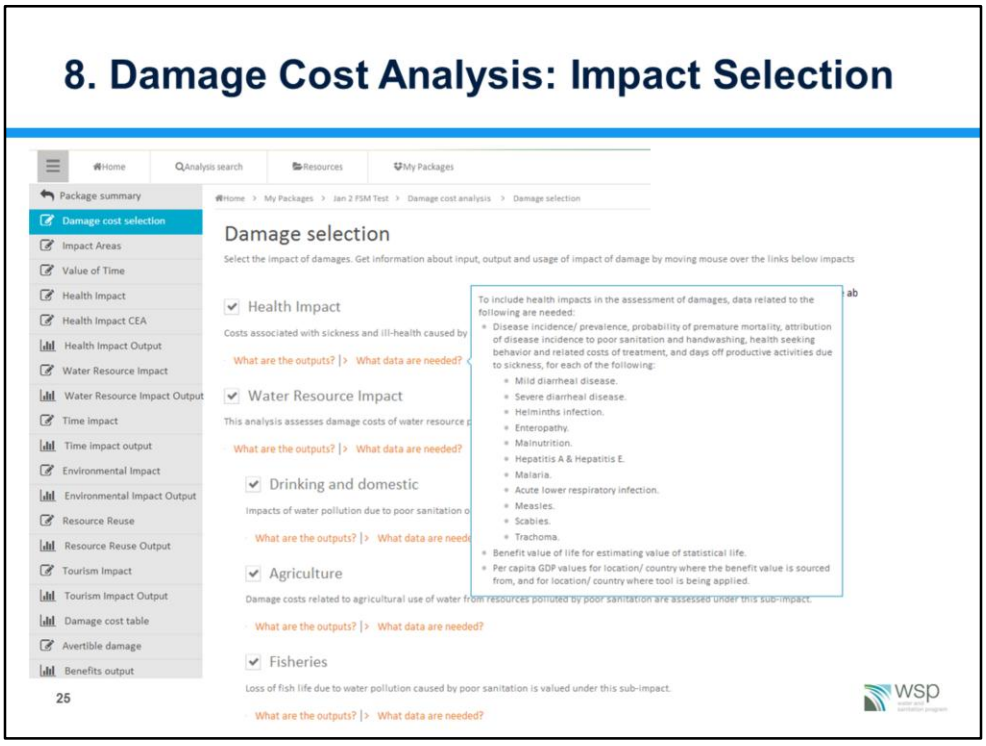
Slide 21. The calculator icon takes you to this screen where you can aggregate the various ingredients of a cost category separately for staff, vehicles, equipment, per diem and other items entered by the user.



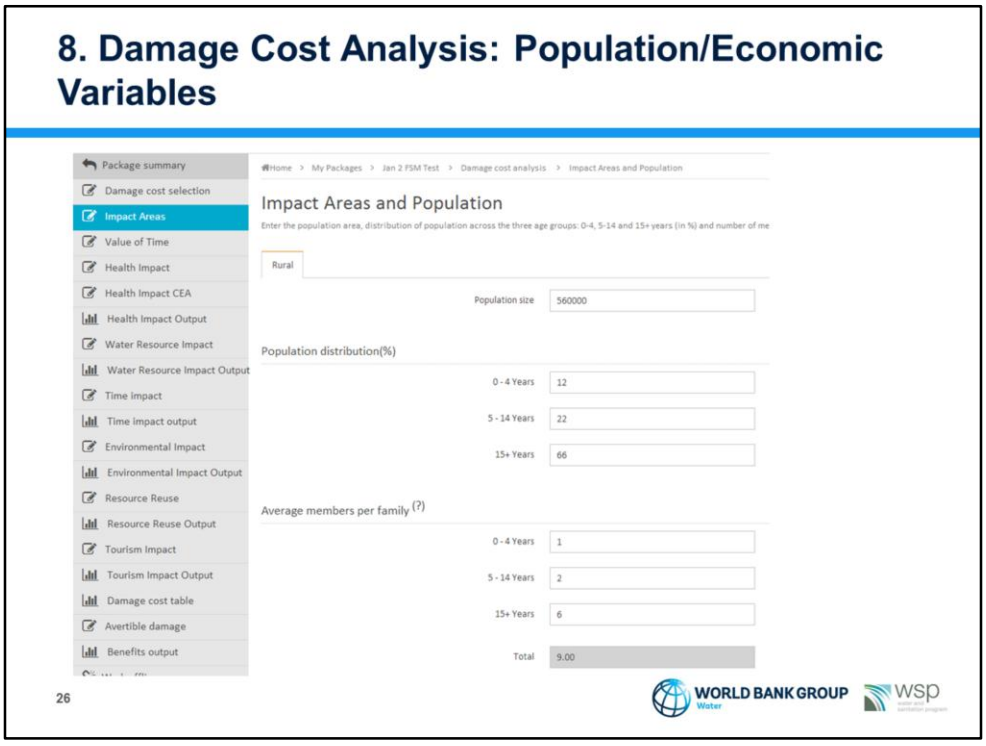
Slide 22. Cost outputs show in tables the type of cost for each part of the sanitation service chain, and graphics compare the (up to six) technology options by part of the service chain. All outputs in the Toolkit can be saved as PDF or can be copied by hand over to a Word or Excel file.



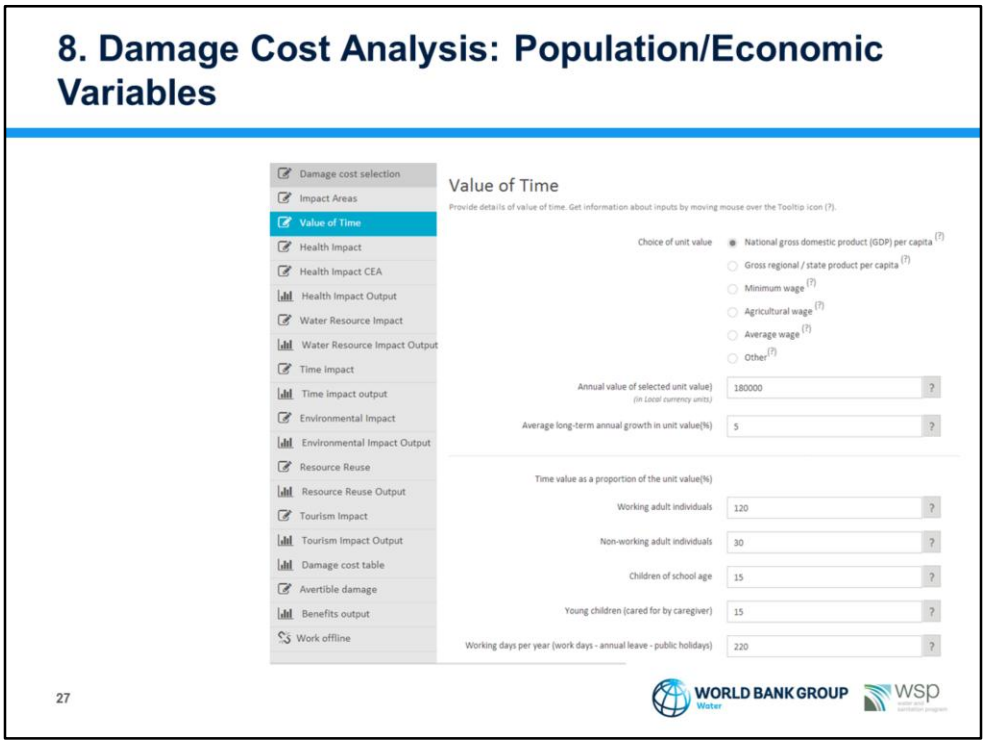
Slide 23. If you enter benchmarks for affordability – defined as percentage of annual income spent on capital, recurrent or total sanitation costs – tables are automatically generated showing which services are below the lower threshold and definitely affordable, which are above the upper threshold and 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.



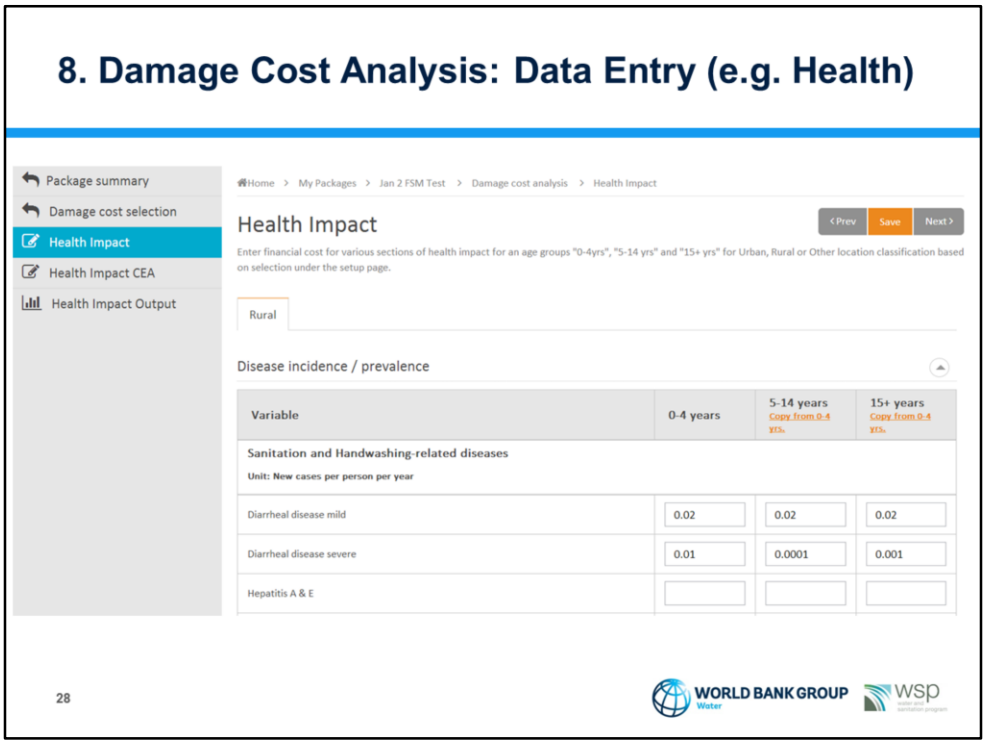
Slide 24. A number of damage cost categories are available to evaluate, including negative impacts on health, water resources, time use, environment and tourism, as well as resource reuse opportunities not exploited. While all of these are linked with poor sanitation and hygiene, the scientific evidence 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.



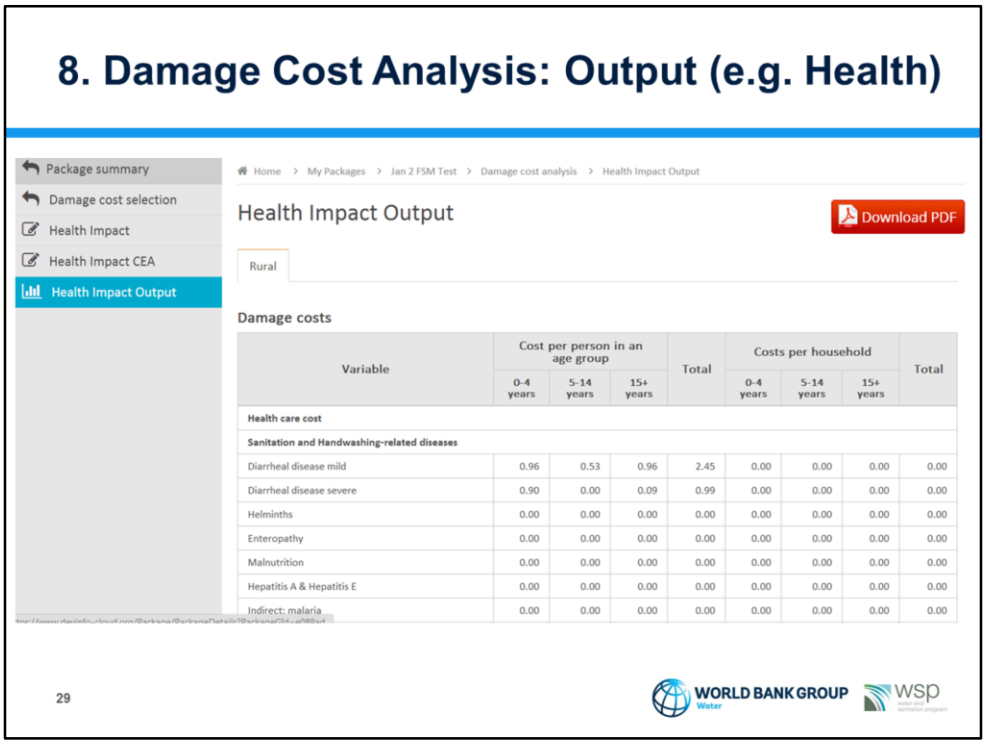
Slide 25. To calculate damages, the user should enter the population size, age composition and average household size. Many impacts require a value for the opportunity cost of time lost, whether it is for lost work or school due to illness or from accessing sanitation facilities or open defecation sites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



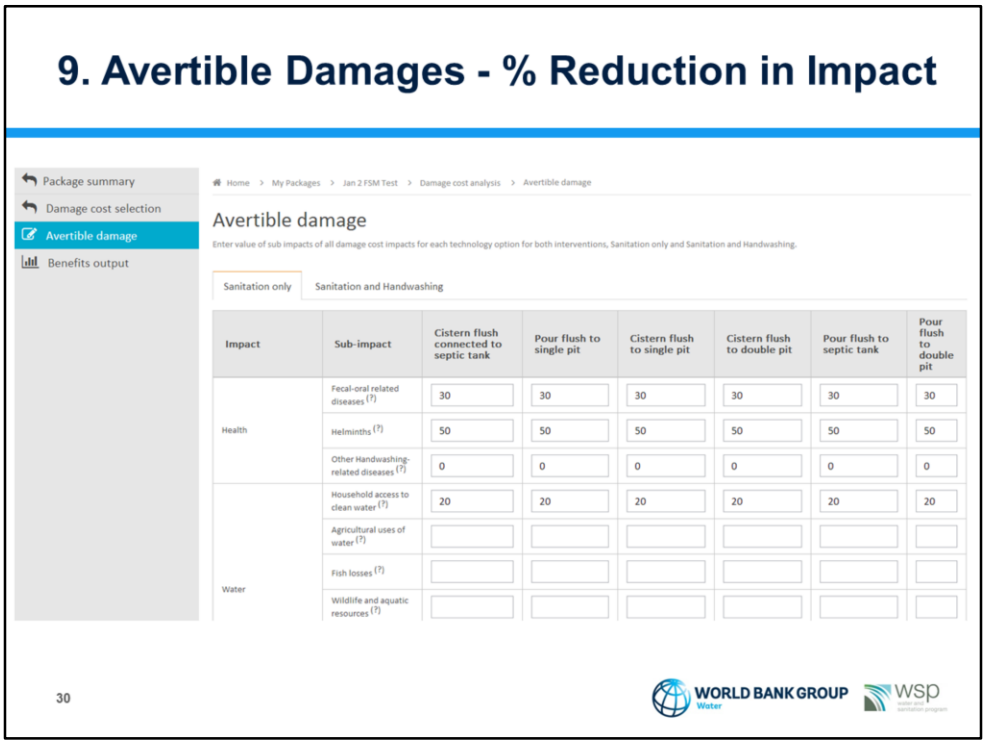
Slide 25. On this page, you are given options for valuing time of differently aged beneficiaries.



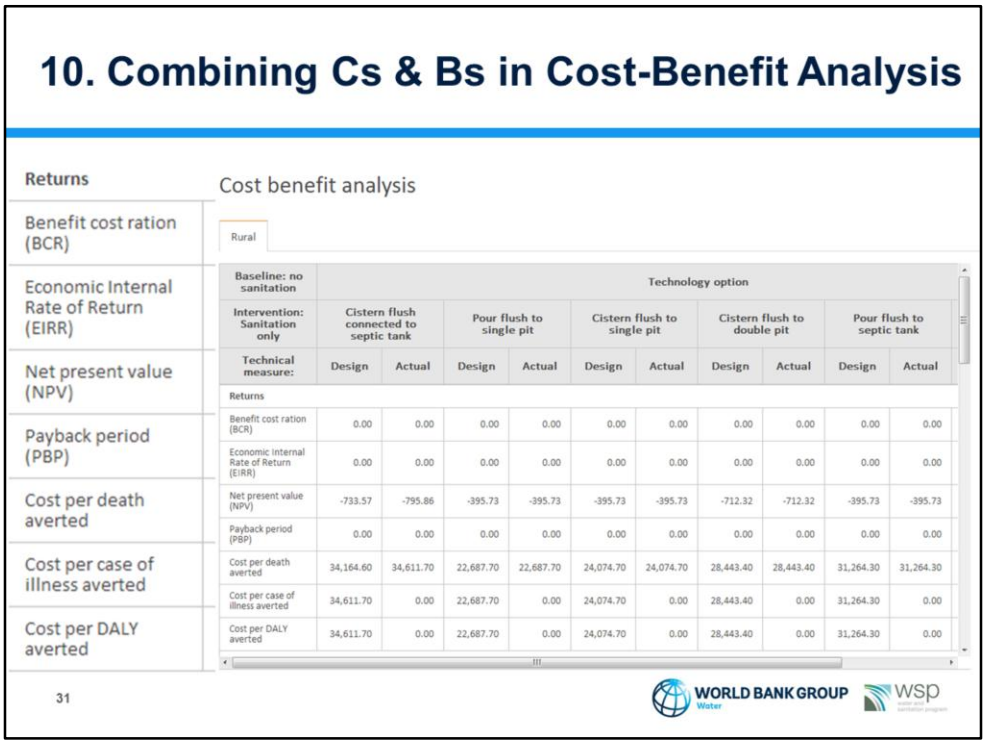
Slide 26. As an example of an impact data entry screen, here are the disease incidence rates from poor sanitation and hygiene, where data can be entered separately for three age categories: young children, children, and adults. Below this are a number of data entry variables relating to health care costs,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



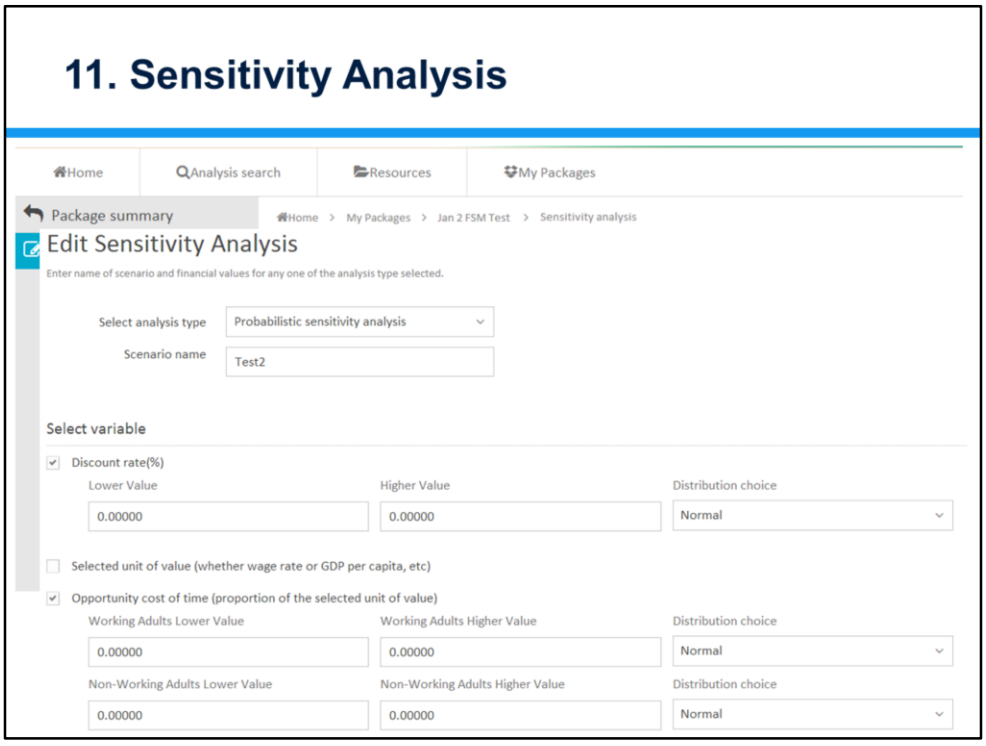
Slide 27. Health outputs are providing per disease, per age group and at the total household level based on average household size.



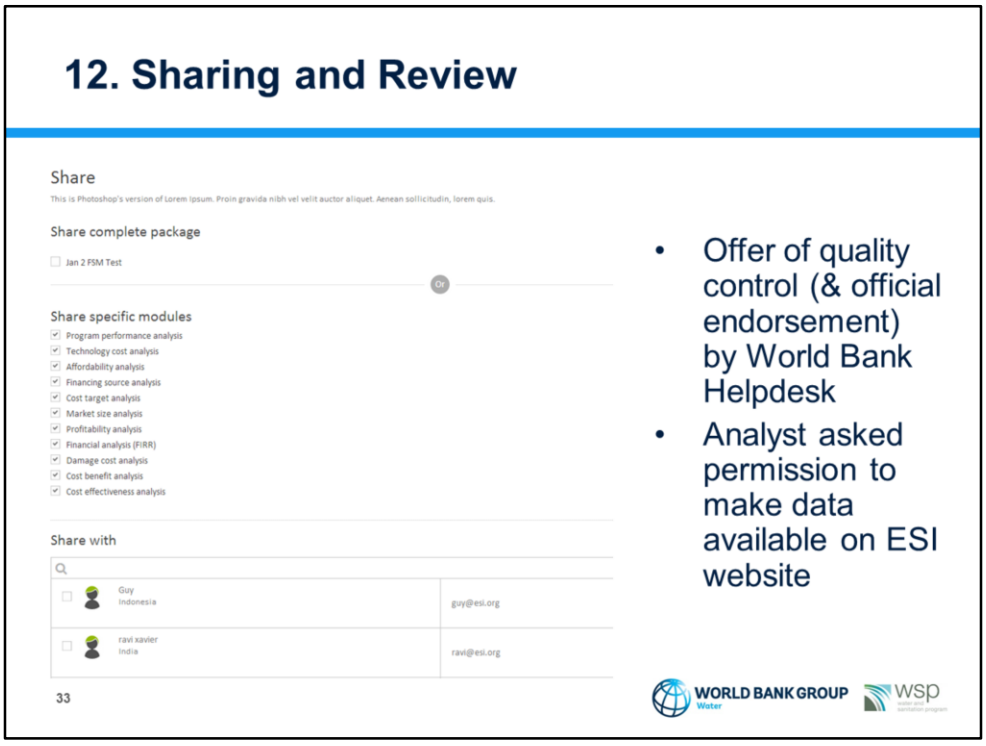
Slide 28. Once all the damage costs are entered for all the selected impacts, the user is asked to enter how much of these damages are averted for each of the (up to six) sanitation and hygiene options, separately for each impact.



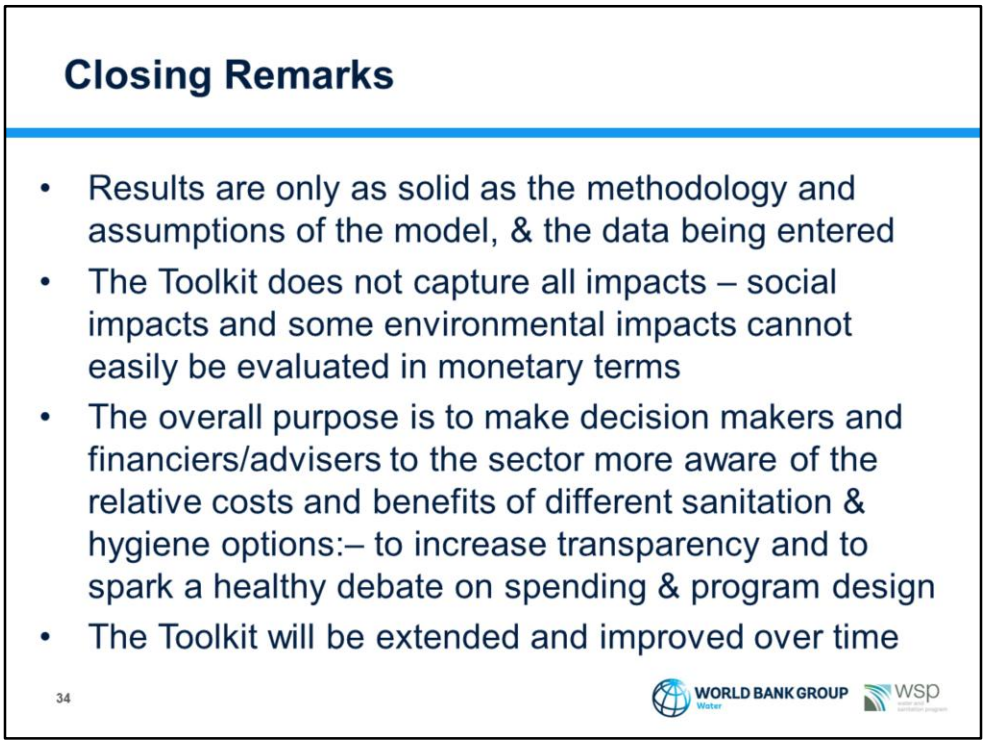
Slide 29. With technology costs, damage costs and damages averted, economic performance measures are presented for each technology, at both full capacity use as well as actual use. As well as benefit-cost ratios, other common Cost-Benefit Analysis outputs are produced such as annual rates or return, 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.



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.



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.



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.

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