ECONOMIST IMPACT

Tackling Toilet Loss

Technical annex: methodology note

Supported by Unilever

Contents

Methodology note

The findings from this research are based on analysis conducted by Economist Impact, supported by Unilever, to quantify Toilet Loss and assess the costs and benefits of alternative investment pathways towards providing all children with access to clean and usable toilets in schools. The findings are based on insights gathered from a literature review, expert interviews and a custom economic impact model developed by Economist Impact. This technical annex details the methodology used in conducting the analysis.

Developing the methodology

The methodology was developed based on research conducted through a literature review, expert interviews and a data audit. Combined, this research has informed a methodology that is robust and relevant to the research question, while also feasible based on the availability of data.

Literature review. The findings from our literature review fed into the development of our definition of "Toilet Loss"; overall theory of change and the potential channels through which Toilet Loss could emerge; model methodology; and pilot country selection. We consulted existing global, regional and country-specific studies published by academia, governments, international organisations and the private sector. These broadly covered: the state of access to maintained sanitation services in schools; the costs associated with the construction, operation and maintenance of toilets; the direct benefits to children from access to toilets in schools; and the indirect benefits to societies from improved outcomes for children.

Expert interviews and consultations. In developing the methodology and conducting the analysis, we conducted one-on-one interviews with 15 individuals. The experts we spoke with provided input into and validated our theory of change and model methodology, and guided us towards relevant datasets. In addition, we engaged experts in wider roundtable discussions to input on the methodology and provide validation of the findings. The full list of experts consulted through the programme is included in the "about the report" section. They come from a diverse range of professional backgrounds across academia, government agencies, international organisations, and non-profits with expertise in water, sanitation and hygiene (WASH) in schools, as well as WASH financing, infrastructure and monitoring.

Data audit. The data audit of available data on WASH and toilets in schools contributed to the development of our model methodology and the selection of the four focus countries. As part of the data audit, we consulted the following key databases and tools amongst others:

- WHO/UNICEF Joint Monitoring Programme (JMP), a global database for data on the current state of access to sanitation services in schools.[1] Data points explored include the percentage of children with access to no, limited and basic sanitation services.
- Fit for School App (GIZ) for data on the costs involved in constructing, operating and maintaining a toilet.[2]
- WASHCost Share Tool and Guide (IRC) for data on costs involved in constructing, operating and maintaining a toilet.[3]

[1] https://washdata.org/data
[2] http://www.fitforschool.international/
[3] https://www.ircwash.org/news/washcost-share-quick-start

Defining Toilet Loss

Toilet Loss is the economic and societal cost of neglected toilets. Toilets can become unusable through neglect from:

a) lack of investment in operations and maintenance;

b) lack of appropriate school-level management policies to enable toilet use (e.g. safety policies, school policies on routine O&M); and

c) lack of provision of essential resources (for example, water and sanitary products).

The analysis conducted for this report estimates the losses that are incurred from constructing toilets that are not fit for use, or Toilet Loss. Based on our review of literature and engagement with experts, we define Toilet Loss as follows:

This definition of Toilet Loss informs our approach to the analysis, discussed below. Specifically, our analysis focuses on Toilet Loss **in schools** through **lack of investment in O&M.** It seeks to quantify:

- The costs incurred in constructing toilets in schools that become unusable as a result of insufficient investment in O&M (Toilet Loss)
- The future financial costs and socioeconomic benefits under alternative policy scenarios, to explore options for addressing Toilet Loss

In doing so, the analysis is designed to both:

1. provide a **backward-looking** view on the cost of historic inaction and the losses that have already been incurred as a result of neglecting toilets; and
2. provide a **forward-looking** view on the impacts of different policy options to guide decision-making in minimising future Toilet Loss

The definition of Toilet Loss is intentionally broad to cover the occurrence of Toilet Loss across a broad range of contexts, including within schools, homes and other settings. The objective of this analysis is to quantify the scale of the loss arising specifically: (a) from lack of investment in O&M; and (b) in the context of schools. Subsequent analysis can draw on a similar methodology to explore how the issue of Toilet Loss is being addressed across countries in different contexts and monitor progress towards tackling Toilet Loss.

Data definitions

The analysis draws on data from the JMP as a basis.[4] The JMP classifies toilets as one of the following, in the context of schools:

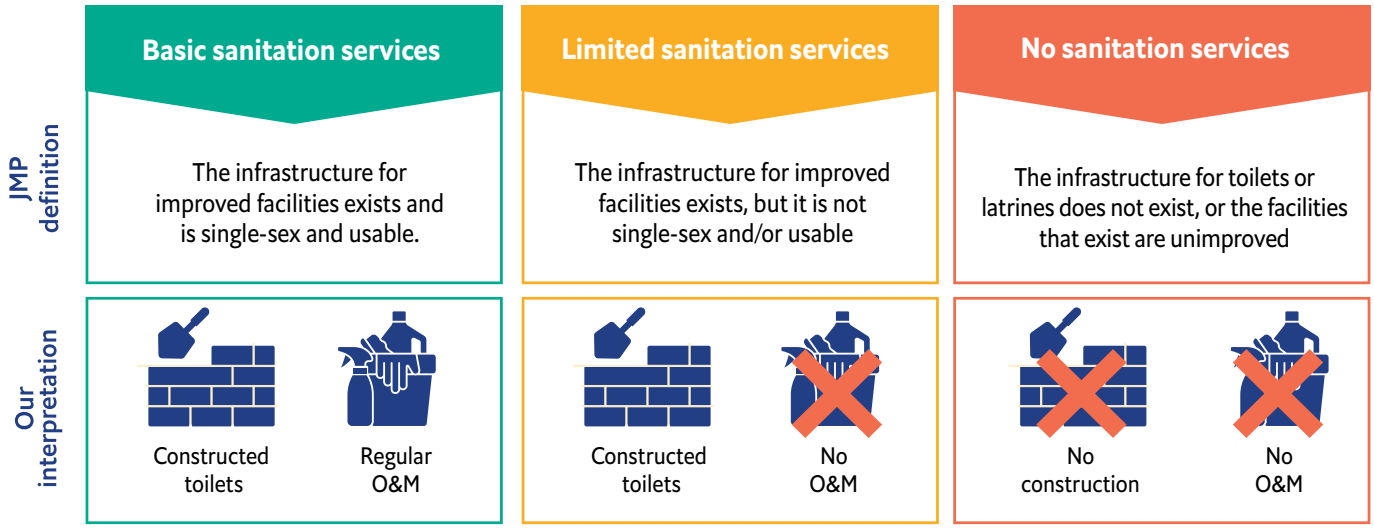
- **No service:** The infrastructure for toilets or latrines does not exist, or the facilities that exist are unimproved (pit latrines without a slab or platform, hanging latrines, bucket latrines).
- **Limited:** The infrastructure for improved facilities exists (flush/pour-flush toilets, pit latrine with slab, composting toilet), but it is either not single-sex or usable
- **Basic:** The infrastructure for improved facilities exists and is single-sex and usable.

Improved facilities are defined as those that use technologies designed to hygienically separate excreta from human contact.[5]

A fourth level of service—advanced services—incorporates additional elements of toilet usability such as student per toilet ratios, facilities for menstrual hygiene management and toilet accessibility for all users. However, data on advanced services is not currently collected across schools.

[4] See JMP service definitions for sanitation in schools: https://washdata.org/monitoring/schools
[5] See JMP service definitions for sanitation in schools: https://washdata.org/monitoring/schools

FIGURE A1. Interpreting the JMP's data on basic, limited and no sanitation services



Based on the JMP's definitions, our analysis assumes that toilets that are defined as "limited service" exist, but are not usable because they have not received sufficient and regular O&M. Meanwhile, toilets defined as "basic service" both exist and are usable.

Analysis scope

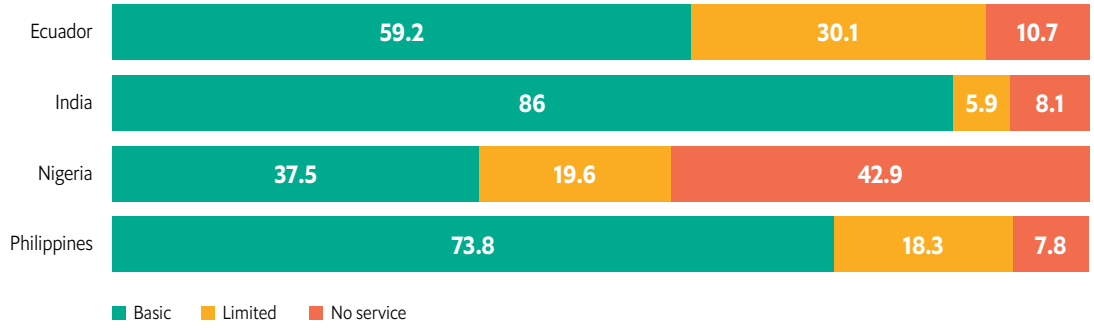
Country selection

The objective of the analysis is to **estimate Toilet Loss and the options for addressing it** in four selected countries: **Ecuador, India, Nigeria and the Philippines.** These countries were selected based on a number of criteria:

1. **Geography.** We have selected countries to provide wide geographic representation to demonstrate the scale of toilet loss across different global regions. We therefore include one Latin American country (Ecuador), two Asian countries (India and the Philippines) and one African country (Nigeria). The spread of geographies provides insight into where Toilet Loss is the most pronounced, and the different policy responses that may be required across regions to address it.
2. **Availability of data.** The availability of data formed an important criterion in country selection to ensure that current levels of availability and usability can be determined to then estimate the gap that needs to be filled. The four selected countries all have the most recent data available on the JMP database.[6]
3. **Gaps in access to toilets.** We want to look at the countries that have the biggest gaps in toilet access to assess the magnitude of the potential gains from overcoming toilet loss (see Figure A2).
4. **Child population**. The number of children in the selected countries represents almost 26% of the global child population. This provides greater validity of the findings that emerge from the analysis (see Figure A3).

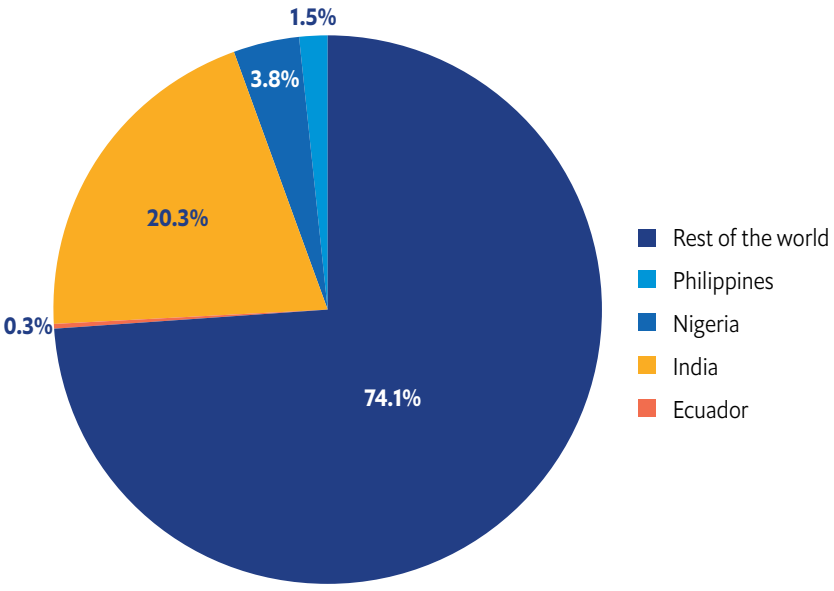
[6] The most recent data points are for 2021.

FIGURE A2. Percentage of children covered by sanitation services in sample countries[7]



Source: JMP; Economist Impact analysis.

FIGURE A3. Percentage of child population in sample countries compared to the rest of the world



Source: World Bank; Economist Impact analysis.

[7] JMP data on limited and no service shares for India have been adjusted from published data based on consultations with experts to account for data collection challenges.

Scenarios

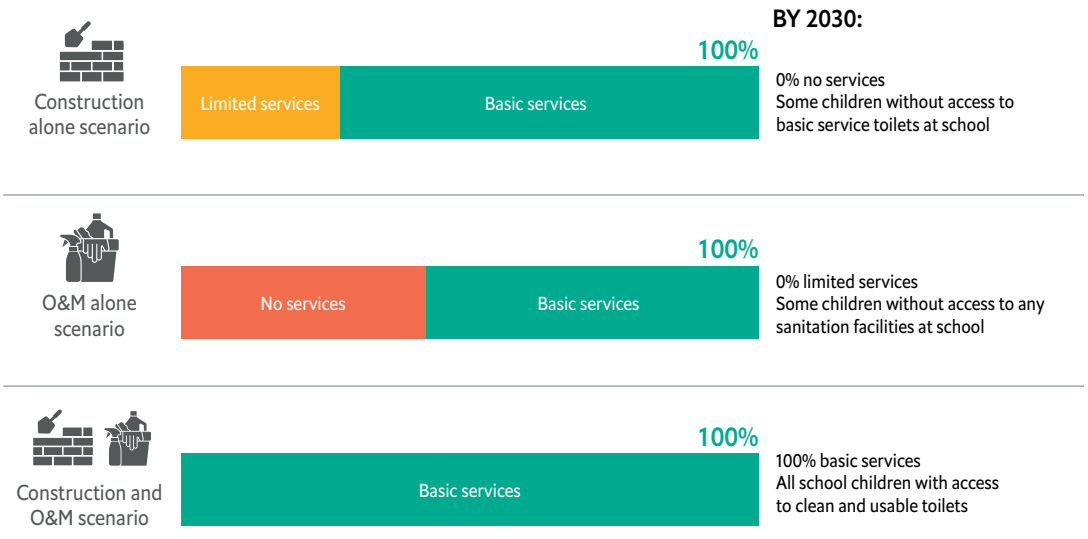
The analysis looks both at the backward-looking costs that have been incurred based on past investment decisions related to school sanitation and identifies a forward-looking pathway by comparing the future costs and benefits of different levels of investment in the construction, operations and maintenance of school toilets. The future investment scenarios assessed are outlined in Figure A4.

Construction alone scenario: All additional sanitation investment is directed entirely towards the construction of new toilets to achieve full sanitation coverage by 2030

O&M alone scenario: All additional sanitation investment is directed entirely towards the O&M of existing dysfunctional infrastructure to convert all limited service toilets into basic service toilets

Construction & O&M scenario: "Best case" scenario with investment in both construction and O&M to achieve full coverage of basic sanitation facilities in schools

FIGURE A4. Future investment scenarios for school sanitation



Detailed methodology and assumptions

As a starting point, the analysis uses data from the JMP on the level of access to toilets that children have in school and then builds on it in a number of ways to calculate, both historically and in the future: the availability of toilet infrastructure in schools; investment in sanitation in schools; and the benefits of sanitation investment.

1. **Toilet infrastructure in schools:** We calculate the number of toilets that exist across schools, split by those that are usable and those that are not.
    a. *Backward-facing analysis:* We estimate the growth in toilet infrastructure in each country since 2015, when the UN Sustainable Development Goals (SDGs) were first introduced.
    b. *Forward-facing analysis:* We estimate the required growth in toilet infrastructure to meet the SDGs and provide all children with access to toilets in school by 2030.
2. **Investment in sanitation in schools:** We use a bottom-up approach to quantify the financial costs of providing sanitation in schools, including costs incurred in construction, operation and maintenance.
    a. *Backward-facing analysis:* Based on our estimates of existing toilet infrastructure, we assess and quantify the investment levels that are expected to have gone into providing this infrastructure. Toilet Loss is estimated as the investment in constructing toilets that are currently unusable.
    b. *Forward-facing analysis:* For each scenario, we estimate the required investment in construction, operations and maintenance in closing sanitation gaps.
3. **Benefits of sanitation investment:** We quantify the socioeconomic impacts of sanitation investment in schools that emerge through reduced healthcare payments, increased family income and increased economic output.
    a. *Backward-facing analysis:* We quantify the lost benefits from constructing toilets that are unusable by children in school.
    b. *Forward-facing analysis:* For each scenario, we estimate the future socioeconomic gains that could be made from investing in closing sanitation gaps.

The remainder of this section discusses the specific methodology used in the analysis, including the assumptions made. The methodology is designed to draw on nationally collected and publicly available data using standardised methodologies that can be replicated over time and across countries.

Estimating toilet infrastructure in schools

The analysis draws on JMP data as a starting point on the percentage of children in schools with: no sanitation services; limited sanitation services; and basic sanitation facilities.[8] It should be noted that JMP data on limited and no service shares for India have been adjusted from published data based on consultations with experts to account for data collection challenges. Using these data, we assume that access to limited sanitation services denotes the availability of infrastructure that is not usable, while access to basic sanitation services denotes infrastructure that is available and usable (that is, investments in O&M have been made).

We convert data on access into estimates of toilet infrastructure using the standards outlined by the World Health Organization (WHO) in the document *Water, sanitation and hygiene standards for schools in low-cost settings*.[9] This document states a requirement of at least one toilet per 25 girls, and one toilet and one urinal per 50 boys. If, for example, an estimated 25,000 girls have access to toilets by the JMP's estimates, we therefore assume that 1,000 toilet units are available. An underlying assumption in this analysis, validated through our expert interviews, is that the required guidelines for toilet-to-student ratios are met.

[8] https://washdata.org/monitoring/schools
[9] https://apps.who.int/iris/bitstream/handle/10665/44159/9789241547796_eng.pdf?sequence=1&isAllowed=y

Using this approach, we estimate the total required number of usable toilets, based on JMP estimates of the size of the school-age population, split by:

- the number of toilets that are available and usable (basic service toilets);
- the number of toilets that are available but not usable (limited service toilets); and
- the number of toilets that are not currently available (no services).

In the present, this analysis provides an estimate of the current gap in access to toilets in schools. In the future, we account for population growth to estimate the number of toilets that will be required and the gaps in meeting those needs.

Estimating investment in sanitation in schools

Having estimated the current availability of toilets in schools and the gaps in access, the analysis quantifies the investment costs—including both those that have been incurred and those that need to be incurred to close gaps.

We use a bottom-up country-specific approach to estimating the costs involved in providing sanitation services in schools, including the costs of construction and O&M. We assume that the following costs are incurred for each type of sanitation service:

- **Basic sanitation services:** Costs are incurred in both construction and O&M.
- **Limited sanitation services:** Costs are incurred only in construction. We assume that limited toilets are unusable and, therefore, no costs are incurred in O&M.
- **No sanitation services:** No costs are incurred in either construction or in O&M. It is recognised that the "no service" category of toilets under JMP definitions includes "unimproved toilets" which will also have incurred some construction costs; however, these are not captured in the analysis.

From a backwards-looking perspective, the analysis estimates the investment that has been made between 2015 and 2021 based on the existing toilet infrastructure and the split of basic and limited service toilets currently available across schools. We estimate Toilet Loss as the investment made in constructing limited service toilets that are unusable as a result of lack of O&M.

From a forward-looking lens, we estimate the investment that is required between 2021 and 2030 to close the gaps in sanitation access. All future costs are discounted at a rate of 3.5% to estimate the present value of future required investments.[10]

It should be noted that rehabilitation costs—or the costs incurred if an existing toilet has been left unmaintained for an extended period of time and, therefore, requires rehabilitation to bring it back to a basic service level before it is available for use again—are not included in our analysis. These costs may be incurred in closing sanitation gaps; however, they vary substantially across countries and depend on the type of toilet constructed, and the extent of disrepair. The existing data do not allow for an assessment of how many toilets require rehabilitation. As a result, our estimated overall cost requirements for closing sanitation gaps will be lower than they are likely to be in reality.

Construction costs. Our estimates of construction costs are based on:

- **The cost of different sanitation technologies in each country:** In the absence of country-level data, we use estimates of construction costs from India in 2011. We update these estimates for the present local context using two adjustments: (1) the costs are adjusted for inflation between 2011 and the present using a GDP deflator to estimate real prices;[11] and (2) the costs are adjusted for purchasing power parity (PPP) between countries using a PPP adjustment factor.[12] Table 1 below summarises

[10] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent/the-green-book-2020#valuation-of-costs-and-benefits
[11] https://data.worldbank.org/indicator/NY.GDP.DEFL.ZS?end=2021&start=2000
[12] https://www.google.com/url?q=https://data.worldbank.org/indicator/PA.NUS.PPP&sa=D&source=editors&ust=1695833328157045&usg=AOvVaw2eKBkfmvOJpyNFT9yeoz8T

the base costs assumed before country-level adjustments have been applied.

- **The share of toilets by technology in each country:** We estimate a weighted average cost of constructing a toilet in each country based on the cost of each sanitation technology and estimates of the share of different technologies predominantly used in each country. The shares assumed for each country are listed in Table 2 below. In the case of urinals (not included in Table 2), a 100% share is assumed for urinals for boys, drawing on the WHO requirements of one urinal per 50 boys.

Table 1. Estimating toilet construction costs by country: cost by technology in India

Sanitation technology	Cost (2011 prices)
Simple-pit latrine	US$ 26[13]
Pour-flush	US$ 358[14]
VIP-latrine	US$ 358[15]
Cistern flush	INR 39,866[16] (equivalent to US$ 880)
Urinal	INR 8,333 (2014 prices)[17] (equivalent to US$ 137)

Table 2. Sanitation technology shares by country

	Ecuador	India	Nigeria	Philippines
Simple-pit latrine	32%	1%	38%	7%
Pour-flush	2%	43%	0.5%	43%
VIP-latrine	1%	8%	29%	7%
Cistern flush	65%	48%	32.5%	43%

Source: Economist Impact based on multiple country-specific sources.

Based on assumptions of the cost by sanitation technology, and the shares of each, we estimate the cost per toilet constructed in each country. Different estimates are used for male and female toilets, given additional requirements for urinals for male children.

O&M costs. We assess a range of costs required in the annual O&M of toilets. Assumptions on the required units of each type of expenditure per school toilet have been obtained from available literature, as outlined in Table 3 below. We convert all required units into requirements per toilet per school year, and apply unit costs to estimate the annual investment needed. Country-specific unit costs have been estimated through a scan of consumer data on online marketplaces. In cases where country-specific data are unavailable for certain countries, we use data from alternative countries as a proxy and adjust for PPP.

[13] https://www.ircwash.org/sites/default/files/IRC-2012-Cost.pdf
[14] https://www.ircwash.org/sites/default/files/IRC-2012-Cost.pdf
[15] https://www.ircwash.org/sites/default/files/IRC-2012-Cost.pdf
[16] https://www.ircwash.org/sites/default/files/Jharkhand-2004-Layout.pdf
[17] https://www.indiawaterportal.org/articles/cost-effective-urinals-established-musiri-boys-high-school-trichy-case-study-unicef-iit

Table 3. Annual O&M requirements

O&M cost category	Annual requirements*
Water for flushing	Estimated as a weighted-average based on sanitation technology:[18] simple pit: 0 litres pour flush: 3 litres per student per day VIP latrine: 0 litres cistern flush: 7 litres per student per day urinal: 2 litres per student per day
Water for handwashing	1.5l per student per day
Water for cleaning latrines	10l per toilet per day
Rubbish bin with cover	1 per toilet per year
Toilet brush	1 per toilet per year
Dipper/mug	1 per toilet per year
Floor mop or brush	1 per toilet block per year[19]
Bucket	1 per toilet block per year
Broom	2 per toilet block per year
Hand gloves	5 per toilet block per year
Face mask	2 per toilet block per year
Cleaning cloth	2 per toilet block per year
Rubber boots	1 per toilet block per year
Detergent powder	53g per toilet per day
Bleach	30 ml per toilet per day
Hand washing soap	2.5g per student per day
Cleaning staff	2 people per block per year[20]
Latrine pit emptying	Once every year[21]
Repairs to sanitation hardware	Once every year[22]
Screwdriver	1 per toilet block per year
Toilet pump	1 per toilet block per year
Hammer	1 per toilet block per year
Pipe wrench	2 per toilet block per year

[18] https://sswm.info/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems%20and%20Technologies%20-%202nd%20Revised%20Edition.pdf
[19] We assume that one toilet block contains three toilets.
[20] https://www.google.com/url?q=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5409642/&sa=D&source=editors&ust=1695834438043590&usg=AOvVaw3R-n4Huuxgk1Q0UKyH8kwn
[21] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5409642/
[22] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5409642/

Hook locks	2 per toilet block per year
Can sealing agent	1 per toilet block per year
Teflon tapes	3 per toilet block per year
Extra faucets	1 per toilet block per year
Paint	1 per toilet block per year

*Unless otherwise specified, assumptions on the unit requirements for O&M expenditure draw on the Fit for School O&M manual developed in the Philippines.[23]

Using the assumptions above on construction and O&M costs, we estimate country-level costs per toilet. The estimated values are presented in Table 4 below.

Table 4. Estimated investment costs per toilet, by country (US$, 2021 prices)

		Ecuador	India	Nigeria	Philippines
Construction costs (one-time cost per toilet)	**Female**	1,600	1,010	1,000	1,070
	Male	1,860	1,160	1,200	1,260
O&M costs (annual costs per toilet)	**Female**	560	350	390	390
	Male	680	410	440	470

Source: Economist Impact estimates.

Estimating the benefits of sanitation investment

Although there are financial costs incurred in expanding access to sanitation in schools, there are also large socioeconomic benefits of investment. We estimate these benefits to demonstrate the returns on investment into sanitation.

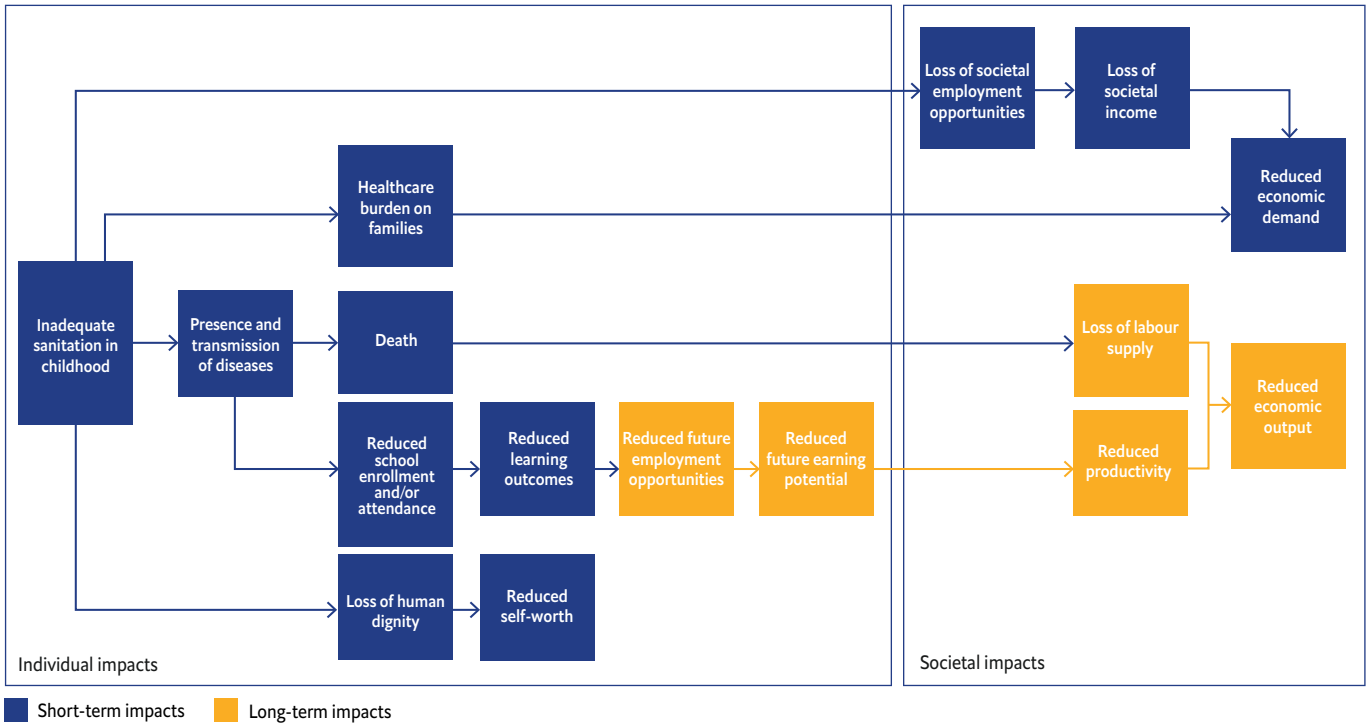
From a backwards-looking perspective, we estimate the opportunities lost between 2015 and 2021 from not providing complete access to usable sanitation services in school for all children, comparing outcomes based on current levels of access to full access.

From a forward-looking perspective, we estimate the potential gains to 2030 from investment under each investment scenario. All future benefits are discounted at a rate of 3.5% to estimate the present value of future required investments, with the exception of health-related benefits, which are discounted at a lower rate of 1.5%.[24]

There are a number of channels through which lack of adequate sanitation creates socioeconomic loss. Lack of adequate sanitation spreads infectious diseases, including diarrhoea and worm infections.[25] These diseases cause nearly 4,000 daily deaths globally.[26] Inadequate sanitation also impacts more than health. It can impede access to education—studies have shown impacts on both enrollment and

[23] http://www.fitforschool.international/wp-content/ezdocs/WASH_in_Schools_Operation_and_Maintenance_Manual_2017.pdf
[24] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent/the-green-book-2020#valuation-of-costs-and-benefits
[25] https://www.who.int/news-room/fact-sheets/detail/sanitation#:~:text=Poor%20sanitation%20is%20linked%20to,the%20spread%20of%20antimicrobial%20resistance.
[26] https://www.unicef.org/media/137206/file/triple-threat-wash-EN.pdf

FIGURE A5. The lifetime journey of potential impacts from inadequate sanitation



attendance, with more pronounced impacts for girls.[27,28] This has knock-on implications for learning outcomes and wellbeing and, over the longer term, on employment opportunities and earning potential. Across communities and societies, these individual-level impacts have wider societal and economic impacts, ranging from lower productivity to the perpetuation of social inequalities (see Figure A5).[29]

Although the longer-term benefits of investing in Toilet Loss can be substantial, the evidence on impacts is inconclusive.[30] As such, longer-term impacts cannot be robustly quantified and our analysis. In addition, some short-term benefits such as higher self-worth and improved learning outcomes cannot be quantified in monetary terms and hence are not included in the analysis. Instead, the analysis focuses on the immediate quantifiable impacts that arise through three key channels: healthcare benefits, increased family income and increased economic output. Benefits across each of these channels are aggregated to provide an overall estimate of socioeconomic impact from sanitation investment.

Healthcare benefits. We estimate the healthcare benefits of investment in sanitation based on assumptions of reductions in diarrhoeal infections and resulting cost savings from treatment. Drawing on existing literature, we assume the rate of diarrhoeal infection in children drops from 69% without access to a toilet to 49% with access.[31] Using these assumptions, we estimate the change in diarrhoeal infections from investment in sanitation in schools, assuming that this reduction only arises from access to a basic service toilet (and not from limited-service toilets). We draw on the following

[27] https://www.mdpi.com/1660-4601/9/8/2772
[28] https://iwaponline.com/washdev/article/8/1/53/38065/Sanitation-and-water-supply-in-schools-and-girls
[29] https://www.who.int/news-room/fact-sheets/detail/sanitation
[30] https://www.mdpi.com/1660-4601/9/8/2772
[31] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8437198/

cost estimates, adjusted for inflation and PPP to estimate resulting country-specific reductions in healthcare costs:

- Cost per case of diarrhoea requiring inpatient treatment: US$140 (2015 prices), applicable to 0.5% of cases[32,33]
- Cost per case of diarrhoea requiring inpatient treatment: US$37 (2015 prices),applicable to 99.5% of cases[34,35]

Increased family income. We estimate increased family income from reduced days taken off work by adults to care for sick children. We assume that parents need to take days off work or find alternative care for children for 50% of the time that children are sick, for an estimated 1.3 days per episode.[36] Applying country-specific data on average earnings per day, we estimate the additional income that could be earned from a reduced need to take these days off.[37] Across the countries assessed, the benefits from increased family income account for a small share of the overall benefits from investment in sanitation (less than 10%). As in the case of healthcare benefits, the benefits from increased family income only arise from additional access to basic service toilets that are usable by children.

Increased economic output. Increased investment in construction and O&M generate additional local economic activity through the creation of employment and, therefore, income. We estimate these impacts by applying economic multiplier estimates drawing on the relevant literature. Unlike healthcare benefits and increased family income, increased economic output benefits arise regardless of where the investment in sanitation is made—construction or O&M. Table 5 below summarises the multiplier effects assumed for every US$1 invested in construction and O&M across countries.

Table 5. Assumed economic multipliers for every US$1 invested in construction or O&M, by country

	Ecuador[38]	India[39]	Nigeria[40]	Philippines[41]
Construction	1.5	2.0	1.5	1.5
O&M	1.4	1.3	2.1	1.6

[32] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7201538/
[33] https://pubmed.ncbi.nlm.nih.gov/22480268/
[34] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7201538/
[35] https://pubmed.ncbi.nlm.nih.gov/22480268/
[36] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8437198/
[37] https://data.worldbank.org/indicator/NY.ADJ.NNTY.PC.KD
[38] https://contenido.bce.fin.ec/documentos/PublicacionesNotas/Catalogo/CuentasNacionales/Anuales/Dolares/PR_MatrizInsumoProducto10.pdf
[39] https://www.adb.org/what-we-do/data/regional-input-output-tables
[40] https://www.eajournals.org/wp-content/uploads/Assessment-of-Nigerias-Economic-Sectors.pdf
[41] https://www.adb.org/what-we-do/data/regional-input-output-tables

Limitations and data requirements

The analysis conducted for this research adds to the existing data and literature by demonstrating the losses incurred from lack of adequate investment in school sanitation and the socioeconomic benefits on offer. However, there are limitations that should be taken into account and serve as a call for additional data to further develop our understanding of the current state of access to sanitation across schools.

Estimating toilet availability and requirements. The analysis makes simplifying assumptions to utilise data collected by the JMP. Specifically, it assumes that toilets that are defined as "limited service" exist, but are not usable because they have not received sufficient and regular O&M. Meanwhile, toilets defined as "basic service" both exist and are usable. However, these assumptions are likely to overestimate current levels of access in two ways:

1. The number of existing toilets is overestimated. We assume that WHO guidelines on student-to-toilet ratios—one toilet per 25 girls, and one toilet and one urinal per 50 boys—are met in all schools that have access to "basic services"; however, the JMP assigns "basic service" levels to any school that has at least one toilet facility.[42]
2. The number of usable toilets is also overestimated. We assume that all "basic service" facilities are usable in practice. The JMP's definition of "basic service" accounts for school toilets being accessible, functional and private. Other measures of usability—such as cleanliness—are captured in "advanced services" for which data are not yet collected at the country level. Therefore, the analysis does not distinguish between "basic" and "advanced" levels of service.

As a result, we expect that estimates from the analysis of infrastructural and financial requirements to close access gaps—as well as the benefits that could arise from doing so—are underestimated.

Going forward, there is an urgent need for more standardised frameworks to guide data collection on not only levels of access to school toilets, but also the quality of this access. Without these data, we will continue to remain in the dark on levels of access to adequate usable facilities in practice, and we will be unable to fully grasp the scale of the challenge that lies ahead.

Estimating the socioeconomic returns from investment in sanitation. The study focuses on quantifying the short-term tangible impacts from investing in providing children with sanitation at school. These short-term impacts can translate into much larger longer-term impacts. These have not been assessed in this study for two key reasons: (a) the time horizon for the analysis extends only to 2030, as the focus is on the requirements to meet the SDGs—this is too near in the future to observe tangible longer-term impacts as the children who benefit grow into adults; and (b) the literature available is inconclusive on the magnitude of these longer-term impacts. Future research could further explore these impacts to build a more comprehensive understanding of the multifaceted impacts of sanitation investment.

[42] https://apps.who.int/iris/bitstream/handle/10665/44159/9789241547796_eng.pdf?sequence=1&isAllowed=y

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