Turning the Tide: Advancing Zambia's Future Through WASH

A Cost Benefit Analysis of WASH in Zambia

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WaterAid

Summary

Water, sanitation and hygiene (WASH) are a cornerstone of social and economic development, but access to even basic WASH services in Zambia remains seriously inadequate: less than one half of the population uses a basic sanitation facility at home and less than half of school children have access to a basic sanitation facility at school, and at least one-third of health facilities do not have basic water access.

There are many impacts of inadequate WASH with major costs to the Zambian population, covering health, environmental, social and economic impacts. This study quantified selected impacts that could be estimated and valued at national level. It found that the annual costs of inadequate WASH in Zambia amount to US$1.55 billion in 2023, which is US$79 per capita and the equivalent of 5.6% of GDP. A large share of these costs reflect the value of premature death (53.2%), followed by the value of lost time due to water collection or sanitation access (29.0%). While a smaller share of the economic costs were healthcare costs (5.2%), these financial costs (US$81 million) equate with 5.2% of the total expenditure on healthcare in Zambia in 2023.

With the provision of basic WASH, an estimated US$600 million worth of these impacts could be averted each year from 2024 to 2030. With a higher service level – safely managed WASH services – US$812 million could be averted annually. Women benefit more than men from WASH services in Zambia, enjoying two-thirds (66%) of the total benefits, largely due to the time savings. Also, poor people will benefit the most from receiving WASH services, due to the lower proportion of poor people currently covered with WASH services.

Extending basic WASH to unserved households costs US$204 million per year in capital costs and US$236 million per year in O&M costs, from 2024 to 2030. Safely managed WASH requires capital costs at US$475 million per year, with recurrent costs of US$478 million. The costs of maintaining existing household WASH services will cost US$249 million per year for basic WASH and US$475 million per year for safely managed WASH. The costs of achieving and sustaining WASH in schools and health care facilities adds US$45 and US$24 million per year, respectively. Overall, the costs of basic WASH in these three settings totals an equivalent 3.1% of Zambia's GDP, while safely managed WASH costs 6.1% of GDP.

When costs and benefits are modelled to the year 2050 and discounted to a common year, the benefit-cost ratio (BCR) is calculated. The BCR reflects the number of times by which benefits exceed the costs of providing WASH services; hence, a bigger number is better. There is a significant variation in the ratios between service types, locations and levels. Overall, the BCR for basic WASH is 2.5 and the BCR for safely managed WASH is 1.7. The BCR is highest for rural basic water, at 6.8. Basic sanitation has a BCR of 4.1 and basic hygiene a BCR of 2.2, with little variation between rural and urban areas. Safely managed water has a BCR of 2.7 with a lower BCR in urban areas. Safely managed sanitation has a BCR of 2.0, also with a lower BCR in urban areas. The BCR of combined WASH is lower than water, sanitation and hygiene individually due to the health benefits of combined WASH being lower than their sum.

Overall, the cost-benefit analysis has shown significant returns on investment, with all BCRs greater than 2.5 which indicates that all WASH services in rural and urban areas generate good value-for-money (VFM). The VFM will vary between different technology options, requiring the selection of efficient options, finding the right balance between options with a lower cost ('economy') and options that last ('sustainability'). However, estimates of WASH costs and benefits in a nationwide study – with rural and urban breakdown – is only as strong as the data values used and the variables included. In general, costs are more likely to have been comprehensively evaluated, while several benefits have been excluded due to challenges in quantification or monetisation, especially educational and environmental benefits. Hence the returns on investment are likely to be significantly greater for WASH than those estimated here.

Based on the findings of this study, it is recommended to elevate basic WASH in the prioritisation of financing under the Zambia Water Investment Programme (ZIP) Resource Mobilisation Strategy. This study provides important evidence to support additional public resource allocations to achieve national WASH goals. Key sectors where impacts will be felt – especially health and education sectors – should increase their attention to WASH and allocate more budget. The study highlights the fact that the main beneficiaries are the households and communities who enjoy better WASH practices, suggesting that a dialogue is required on what constitutes an affordable tariff to contribute to cost recovery. The potential willingness to pay of non-poor households to help close the financing gap should be explored, thus allowing limited public funds to be channelled to those least able to afford WASH services.

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1. Introduction

Access to safe and affordable drinking-water and sanitation are human rights, and together with hygiene, are enshrined in the Sustainable Development Goals (SDGs). Drinking-water, sanitation and hygiene (WASH) make significant contributions to both economic and social development, and their appropriate management is crucial for the environment and climate adaptation.
For these reasons, all countries worldwide have committed to meeting universal access to WASH services contained within targets 6.1 and 6.2 (safely managed WASH) as well as target 1.4 (basic services) and target 4a (WASH in schools). In Zambia, Vision 2030 released in December 2006 stated a goal of providing "secure access to safe potable water sources and improved sanitation facilities to 100 percent of the population in both urban and rural areas" (Government of Zambia, 2006). In addition, WASH is essential in healthcare facilities to provide quality services and reduce the transmission of disease, and it is needed in other locations outside the home such as in work-places, markets, and public spaces.
However, WASH access and WASH practices remain inadequate in both households and institutions in many countries, including in Zambia, as evidenced by national statistics as well as regular global reporting of the WHO/UNICEF Joint Monitoring Programme. Access to basic WASH is particularly low in Sub-Saharan African (SSA) countries, as shown in Table 1 for household access in the year 2022. Basic water access in SSA is barely two-thirds of the rates of other developing regions, and only one in three (1 in 3) living in SSA has access to basic sanitation and less than one in four (1 in 4) has access to handwashing station with soap and water. WASH access is lower in SSA than in all 46 least developed countries combined, of which SSA makes up 33 countries. Table 1 shows that – according to WHO/UNICEF (2023) statistics – compared with the average for Sub-Saharan Africa, Zambia now has a slightly higher rate of basic water access , a similar rate for basic sanitation and a lower rate of basic hygiene.

Table 1. Population coverage of at least a basic level of WASH service in households, in

SDG Region / Country	Drinking Water	Sanitation	Hygiene
Central and Southern Asia	95%	81%	87%
Eastern and South-Eastern Asia	95%	95%	94%
Latin America and the Caribbean	98%	90%	NA [1]
Northern Africa and Western Asia	92%	91%	89%
Least Developed Countries	70%	42%	39%
Sub-Saharan Africa	68%	35%	27%
Burkina Faso	50%	32%	26%
Liberia	79%	23%	3%
Niger	53%	16%	22%
Zambia	73%	23%	18%

Source: WHO/UNICEF Joint Monitoring Programme (2023). [1]NA: not available; rural rate 72%.

Contrasting these coverage rates with the most recent national household surveys, the Living Conditions Monitoring Survey reports 74.9% improved water sources, which has now been incorporated into the new JMP estimates, thus bringing the rate up from the 68% JMP estimate in 2022 (Zambia Statistics Agency, 2022). For sanitation, the LCMS reports 41.7% nationally with improved household toilet, which is almost 5% higher than the latest JMP estimates. The DHS (2023) shows lower rates - at 66% for basic water coverage and 30.2% for basic sanitation.

A number of factors explain why many sub-Saharan African countries are not able to accelerate progress on giving their populations access to basic WASH. Many African countries are far from achieving universal WASH access, and in some countries, WASH progress appears to have stalled. One set of reasons is the low political prioritization that WASH receives, leading to weak institutions, inadequate capacity, weak accountability, and limited budget allocations. A second set of reasons is the limited spending power of households, some of whom would demand a higher service level if they had the financial means and also the historical expectation of free services. Government budgets are too limited to fill the gap, and the rate of public works investments in infrastructure is very slow. Governments are often faced with poor sustainability of their WASH systems leading to high levels of dysfunctional facilities and a slow rate of extending services to the unserved. A third set of reasons is the strength of existing cultural practices which means some populations may accept the status quo, thus leading to inertia in the expectations of populations and effectiveness of both public programmes and private initiatives to accelerate WASH progress. However, the nation through the Ministry of Water Development and Sanitation is implementing an Open Defecation Free Zambia Strategy. The Strategy describes key measures such as the Community Led Total Sanitation (CLTS) to end open defecation and promote universal access to sanitation by 2030. Contributing to the inertia and weak demand for better services is the lack of awareness of water supply and sanitation as human rights.

Given these factors and constraints, a multi-pronged approach is needed to move the needle. Recognizing the human rights to drinking water and sanitation is a critical starting point to motivate governments to prioritise WASH and to help populations to claim their rights. This understanding of the human rights needs to be accompanied by key evidence which shows the consequences of populations not claiming their rights, which include major adverse economic, social and environmental impacts. In addition, the costs of achieving the human rights needs to be considered affordable to citizens, and agreements made on what is a fair price populations should pay for accessing WASH services and how finance gaps can be filled by public funders and private investors. Hence, having cost information over the lifetime of the WASH service is important to inform these conversations.

Therefore, the purpose of this study is to generate key evidence that will help decision-makers to give greater policy attention to WASH, and support advocacy efforts to put the issue in front of politicians, budget-holders and investors. Many of the actions that are needed by these decision-makers are described in the Africa Water Investment Programme (AIP) High-Level Panel's Investment Action Plan (AIP, 2023). In line with this, Zambia has developed the $5.7 billion Zambia Water Investment Program (2022) and a resource mobilisation strategy, requiring investments of $800 million per year. The CBA will be a useful part of mobilising those resources.

This study attempts to answer the following five questions in Zambia:

1. What are the socio-economic impacts that result from a lack of WASH services?
2. What are the lifecycle costs of providing basic and safely managed WASH services in households, schools and healthcare facilities?
3. What are the benefits of providing basic and safely managed WASH services in households, schools and healthcare facilities?
4. What is the rate of return on investment (economic benefit per cost) from WASH services?
5. What are the options for financing the costs of WASH services based on cost recovery policies, public budgets and grants to fill the gap?

2. Methods

2.1 Overview

A comprehensive economic model was constructed to estimate:

- The costs of not providing WASH services
- The costs, the benefits, the benefit-cost performance, and the financing options of providing WASH services.

The model integrates more than 50 different parameters to present summary results with several policy-relevant breakdowns of results. The costs of inaction are estimated based on valuing the health and time impacts of not having WASH services. Cost-benefit analysis is conducted by estimating the costs of delivering basic WASH and safely managed WASH services, and the benefits (reduction in damages) that each of these service levels are likely to bring until the year 2050.

Results are presented at the national level and are compared with GDP to give a perspective of the importance of WASH in the national economy in terms of annual impacts, annual benefits and annual costs. Medical costs are compared with health expenditure to give an idea of the overall potential of reducing healthcare costs from WASH preventable diseases. Break-downs are provided to further understand costs and benefits in terms of where greater attention is needed for investments and for achieving population benefits – with presentation by rural/urban location, by income quintile, by age group, by gender, by level of WASH service received, and by year.

Impacts, costs and benefits are included for which there are reasonable data available at the national level and which are likely to have important bearing on the overall results. A more detailed description of the methodology is provided in previous publications (see Annex 1).

2.2 Analysis year

The costs of inaction are estimated for a 7-year period from 2024 to 2030, assuming there is no change in WASH coverage from the baseline rate. The calculations generate an average annual cost of not investing in WASH services. The costs of interventions are estimated over the same 7-year period, with the aim of achieving national coverage targets by the year 2030. The cost-benefit study models the costs and benefits of achieving national targets by the year 2030 and continues to model costs and benefits for those same populations from 2030 to 2050. This approach enables the full costs and full benefits over the entire lifetime of the assets invested in, which have a lifespan of up to 25 years.

2.3 Population size

The latest population size for Zambia is taken from the 2022 National Census. Populations projections until 2030 are based on average growth from the intercensal period from 2010-2022 rural (3.4% per year) and for urban (3.5% per year) areas separately. The average household size and gender ratio are taken from the 2022 National Census (see Table 2). The age composition (0-4 years, 5-14 years, 15 years and older) is taken from UN DESA statistics.

Table 2. Population size by year, average household size and gender ratio in Zambia

Location	Population size (million)							Average household size	% Female	% Male
	2024	2025	2026	2027	2028	2029	2030			
Urban	8.12	**8.40**	8.70	9.00	9.32	9.64	9.98	4.6	51.0%	49.0%
Rural	12.17	12.58	13.01	13.45	13.91	14.38	14.87	5.0	51.0%	49.0%

Source: Zambia National Census 2022.

2.4 Scope of WASH services

At the household level, the costs of inaction due to the lack of access to WASH are estimated for water, sanitation and hygiene, both separately and together. The costs and benefits of basic water, basic sanitation, basic hygiene and basic WASH are estimated, and compared with the benefits of the same services to estimate the benefit-cost ratio of basic WASH. The costs and benefits of safely managed water, safely managed sanitation and basic hygiene are also estimated separately and together, and benefit-cost ratios similarly estimated.

At the institutional level, WASH in healthcare facilities and WASH in schools are included. The coverage of services in WASH in schools and WASH in healthcare facilities is taken by level and by rural/urban location and applied to the total number of establishments of each level. The unit cost per facility is then applied to close the service gap, and total costs estimated.

2.5 Coverage

The latest available statistics from the WHO/UNICEF Joint Monitoring Programme (JMP) are used for Zambia, reflecting coverage in 2022 by service type and level by rural and urban areas (WHO/UNICEF, 2023) (see Table 3). Where all the components of safely managed water and safely managed sanitation are not available from the Joint Monitoring Programme, the lowest figure from the components of safely managed that are available is used. For safely managed water, 10.5% of rural households have water on the plot in Zambia. For safely managed sanitation, 33.1% of urban households are assumed to have coverage. For the analysis of income quintiles, data are available from the previous JMP report for the year 2020, available on the JMP website (WHO/UNICEF, 2021). Income quintile data are adjusted to allow for the change in overall coverage between the 2020 and 2024 of the Joint Monitoring Programme, increasing coverage in each quintile by similar proportions.

Table 3. Population WASH coverage in households and targets for Zambia

Service	Service Level	Current coverage (2023)1		Target coverage (2030) 2	
		Urban	Rural	Urban	Rural
Water	Safely managed	50.2%	10.5%3	100%	100%
	At least basic	50.2%	58.5%	100%	100%
	Limited	3.6%	10.1%	0%	0%
	Unimproved	5.6%	21.4%	0%	0%
	Surface water	0.5%	10.1%	0%	0%
Sanitation	Safely managed	33.1%	31.3%	100%	100%
	Basic	43.3%	32.3%	100%	100%
	Limited Improved	37.3%	9.6%	0%	0%
	Unimproved	18.7%	54.9%	0%	0%
	Open Defication	0.7%	3.2%	0%	0%
Hygiene	Basic	28.7%	9.2%	100%	100%
	Limited	24.4%	22.3%	0%	0%

Sources: Current coverage: 1 WHO and UNICEF Joint Monitoring Programme (2023), based on Government of Zambia data. 2 Target coverage: basic water and improved sanitation is from Vision 2030 (Republic of Zambia, 2006); basic hygiene and safely managed water and sanitation: assumed for the purposes of the analysis. 3 Estimates not available for safely managed water – instead, the lowest value out of 'accessible on premises' and 'available when needed' is used.

For WASH in schools and WASH in healthcare facilities, national coverage data are available in Zambia and reflected in the latest WHO/UNICEF updates reflecting 2021 . The coverage levels reported by WHO/UNICEF are presented in Tables 4 and 5, respectively. Breakdown is provided for levels of schools and healthcare facilities, where available.

Table 4. WASH coverage in schools in Zambia

Service	Level	Primary	Seconday
Water	Basic	78.1%	91.6%
Sanitation*	Basic	23%	46.0%
Hygiene	Basic	55.4%	58.0%

Source: WHO and UNICEF Joint Monitoring Programme (2022b), based on Government of Zambia data. # 2016 data. * 'Basic' not reported – figures reflect 'Improved and usable'. ^ Guestimate.

Table 5. WASH coverage in healthcare facili-

Service	Level	Hospital	Non-hospital
Water	Basic	58.3%#	68.5%
Sanitation*	Basic	100%*	65.2%*
Hygiene	Basic	30.0%^	13.9%

Source: WHO and UNICEF Joint Monitoring Programme (2022b), based on Government of Zambia data. # 2016 data. * 'Basic' not reported – figures reflect 'Improved and usable'. ^ Guestimate.

The number of schools and healthcare facilities in rural and urban areas of Zambia are shown in Table 6, encompassing both public and private establishments.

Table 6. Number of schools and healthcare facilities in Zambia

Service	Level	Urban	Rural	National
Schools	Primary	1,680	7,761	9,441
	Secondary	410	880	1,290
	Total	**2,090**	**8,641**	**10,731**
Healthcare facilities	Hospital*	115	134	249
	Non-hospital^	659	2,524	3,183
	Total	**774**	**2,658**	**3432**

Sources: Schools: Education statistics bulletin 2020. Ministry of Education. Health: Annual Health Statistical Report 2022. Ministry of Health. * Levels 1, 2, 3 and mini. ^ Health centres, health posts and hospital affiliated health centres.

Note safely managed WASH consists of safely managed water, safely managed sanitation and basic hygiene.

2.6 Target coverage of WASH services

Results are presented under the target coverage of universal coverage of household WASH for both basic and safely managed service levels in 2030, to reflect the global SDG targets 6.1 and 6.2. The latest statement of national target coverage for WASH services in Zambia is the Vision 2030, which states that the development objective is "To provide secure access to safe potable water sources and improved sanitation facilities to 100 percent of the population in both urban and rural areas safe". As the Vision 2030 was released before the wording of the targets and indicators was formulated under the global Sustainable Development Goals, there is no alignment on which exact service levels Zambia would be targeting under the SDGs, whether 'basic' or 'safely managed'. Hence, for simplicity, it is assumed that Zambia targets 100% coverage of both safely managed and basic water supply and sanitation, and basic hygiene, with results presented under each of the service levels (see Table 3).

For WASH in schools and healthcare facilities, the target is universal access to basic WASH by 2030. For healthcare facilities the costs of improving environmental hygiene and healthcare waste management are excluded due to lack of data on coverage and costs of interventions to improve them.

For all scenarios, a linear growth is assumed from the baseline coverage in 2024 to the target coverage in 2030.

Costs are presented separately for (i) populations newly receiving a service by 2030 who were not covered with the service in 2024; and (ii) populations already with a service in 2024 who need the service to be provided until 2030. These costs are aggregated to estimate the total cost of achieving and maintaining coverage targets in Zambia.

2.7 Impact estimation

The impacts of not having adequate WASH (costs of inaction) in households are health and time to access a water and sanitation facility. Likewise, the benefits of having adequate WASH facilities include both health and time benefits. This choice is based on previous experience (see Annex 1). For WASH in institutions, there is more limited prior analysis on quantifying their economic benefits; and furthermore, if the health impacts are analysed separately, it risks double counting the health impacts and benefits in households.

Health impacts

Health economic impacts include medical costs, health-related productivity and premature mortality. Premature mortality due to the following diseases are included, given they were reported for all countries in WHO's latest Global Burden of Disease update: diarrheal disease, respiratory infection, malnutrition, schistosomiasis and soil-transmitted helminths (Prüss-Ustün et al, 2019). The attribution of death from these diseases to poor WASH are 67%, 13%, 16%, 43% and 100%, respectively, taken from a global review (Prüss-Ustün et al, 2019). Morbidity is included for diarrheal disease and respiratory infection, given they are routinely reported for children under five years of age in the periodic DHS and normally represent the most significant impacts of poor WASH. Other faecal-oral diseases are excluded due to being relatively minor compared to diarrhoea and/or due to lack of national data. For example, national data are not available for hepatitis A and E, scabies, and trachoma. Musculoskeletal afflictions and exhaustion resulting from water haulage are excluded from the empirical calculations due to lack of national data.

As shown in Table 7, WHO estimates 5,000 deaths per year from diarrhea due to poor WASH. When comparing mortality WHO figures with those reported by the Zambian Ministry of Health in the Annual Health Statistical Report 2022, there is a significant discrepancy in the numbers. The Ministry of Health reported 849 deaths from non-bloody diarrhoea in 2022, plus 43 deaths in under five children from diarrhoea from viral sources. These 892 deaths are less than one-fifth of the deaths estimated from WHO sources. The discrepancy data is likely because the MOH numbers predominantly reflect data from public primary health care facilities, while 2nd and 3rd level public facilities and most private facilities have not been included in the analysis due to low reporting. As a validation exercise, the overall reported deaths from the Zambian Ministry of Health (8,188 deaths from the top 10 causes of death, which account for 58.3% of total deaths, giving total deaths of 14,045 in 2022) are compared with those estimated based on the overall death rate of 6.7 per 1,000 population (World Bank, 2024). For a population of 19.6 million people, the number of deaths based on 6.7 deaths per 1,000 population would be 132,000. Hence it is likely that only about 10% of deaths are recorded and reported by the MOH system. Therefore, the WHO numbers for diarrheal deaths are used.

Mortality rates attributable to poor WASH for diarrhoea, respiratory infection, malnutrition, schistosomiasis and soil-transmitted helminths are based on World Health Organization (WHO) estimates from 2016 (Prüss-Ustün et al, 2019), and projected to 2023 based on population growth. Total deaths are assigned to rural and urban areas according to population size and urban/rural mortality rate differences for children under the age of five years (Yaya et al, 2022). Deaths are assigned to age groups based on global estimates, whereby 35.8% of diarrheal deaths are of children under five years of age (Prüss-Ustün et al, 2019).

Cholera poses a continued threat to populations in Zambia. From January 1977 through June 2024, Zambia has reported about 31 cholera outbreaks, predominantly in low-income urban areas and rural fishing communities (WaterAid, 2024). Cholera has a high case fatality rate (CFR) of 9.3% in the 2023/24 outbreak when 740 deaths were recorded and cholera spread to 72 districts. These cholera deaths are not added to diarrhoea deaths reported by WHO because it is likely that there would be some double counting. Furthermore, there has been considerable year-to-year variation with many recent years being significantly fewer numbers and deaths (WaterAid, 2024a).

Disease prevalence is sourced from Demographic and Health Survey (DHS, 2018) data for children under five years of age for diarrhoea and for respiratory infection. Respiratory infection was also published by Ekholuenetale et al (2023) using DHS data in 37 sub-Saharan African countries. Diarrheal disease and respiratory infection incidence were 15% and 1.9%, respectively, translating to approximately 3.1 and 0.4 cases per child per year (2.1 and 0.1 after considering episodes attributable to inadequate WASH). Diarrheal incidence in the DHS was slightly lower than two urban studies in Lusaka that found 15.8% prevalence (Bosomprah et al, 2016) and 18.9% prevalence (Chisenga et al, 2018), and a rural study from 2 communities with average 22.5% diarrheal prevalence (Hamooyah et al, 2020). For older children and adults, some African studies have found adult diarrhoea prevalence as high as (if not higher than) children. In Soweto, South Africa, adult prevalence was 1.4 cases per year (Johnstone et al, 2021) and in urban Zambia, adults had an incidence of 1.74 cases of diarrhoea per year (Kelly et al, 1996). A global review of diarrheal disease incidence in older children and adults found no studies that gave average estimates for the continent of Africa, and used incidence rates from South and South-East Asia to approximate rates in Africa: an incidence of 0.67 cases per year for 5–14-year-olds and 0.3 cases per year for adults (Walker and Black, 2010). To be conservative, these latter rates were used for Zambia. The annual health impacts attributed to poor WASH in Zambia are presented in Table 7.

Table 7. Health impacts attributed to poor WASH in Zambia (2024)

Variable	Disease	0 to <5 years	5 to <15 years	15 years +
Mortality	Diarrhoea^	2,311	2,311	607
	Respiratory infection	977	382	382
	Malnutrition	214	0	0
	Soil-transmitted helminths	4	4	3
	Schistosomiasis	39	39	607
Morbidity	Doarrhoea&	4,512,024	3,939,796	6,604,565

^ Compares to 517, 79 and 296 deaths, by age group respectively, from MOH data.
& Compares to 1,392,216 cases of non-bloody diarrhoea in total, from MOH data

Cholera cases have a large year-to-year variation, with 2023/24 being the largest reported numbers at 20,000 cases but most recent years being below 5,000 per year (WaterAid, 2024a). While an important indicator for the unresolved WASH situation in Zambia, and the high cost per case, the cholera cases are small relative to the overall diarrhea cases. Also, the large year-to-year variation in cholera cases makes it difficult to predict for future years; hence, cholera cases are excluded from the analysis.

To estimate costs of hospital admission and lost productivity, data are required on the number of outpatient visits per disease episode, the duration of diarrheal disease episodes, the rate of hospital admission, and the length of hospital stay for admitted patients. Lamberti et al (2012) undertook a systematic review of duration and severity of diarrheal diseases in low- and middle-income countries. Among children 0-59 months of age, the weighted mean duration was 4.3 days among cases assessed in the community and 8.4 days among hospital inpatients. However, 8.4 days would most likely overestimate how long infants are admitted to hospital, and instead 4.3 days is conservatively used. The reported mean duration of episodes among adults ≥ 16 years of age was 3 days in the community. This figure is supported by Shimamura et al (2023) from Zambia which found that the number of days lost due to an episode of diarrhoea is 3.2 days for adults of working age. It is assumed that inpatient length of stay in Zambia would have the same duration. Due to lack of studies on duration amongst children 5-15 years of age, it is conservatively assumed they have the same duration as adults. Lamberti et al (2012) classified cases by severity – of 35.2% of cases that are moderate of which 51.4% involve some dehydration requiring hospitalisation. Given low inpatient admission rates in Zambia, only 2% of diarrhoea cases are expected to be hospitalised. Due to lack of data for Zambia, it is conservatively assumed that for those seeking medical care, they have 1 visit each (i.e., no repeat visits for the same episode).

The DHS (2018) also collected data on how WASH-attributable diseases are treated. Table 8 shows rates of treatment for children-under-five-years-of-age in Zambia. Due to lack of data on treatment seeking for older children and adults, 50% of the treatment seeking rate of children 0-5 years of age is used.

Table 8. Rates of treatment for diarrhoea and respiratory infection for children under 5

Treatment	Diarrhoea		Respiratory infection	
	Urban	Rural	Urban	Rural
Treatment seeking	60.9%	73.8%	88.9%	71.9%
Receiving ORS	80.9%	76.6%	-	-
Receiving zinc	41.5%	36.9%	-	-
Receiving antibiotic	21.3%	22.9%	45.0%	45.0%

Source: DHS Zambia (2018). ^ Includes anti-motility for diarrhoea

When comparing the number of non-bloody diarrheal cases reported by the Ministry of Health (1,392,216 for 2022), the number of predicted cases shown in Table 7 exceed the reported cases by 10 times. For children under five years of age, the difference is 673,708 reported cases (MOH) versus 4.5 million cases from the DHS, of which at least 3 million are stated to have been taken to a healthcare facility (60.9% in urban areas and 73.8% in rural areas). The discrepancy is partly explained by the fact that many cases of diarrhea are non-severe and the patient does not seek healthcare, and thus do not get recorded. Also, as stated above for mortality estimates, the figures reported in the Zambian Annual Health Statistical Report 2022 largely omit public referral healthcare facilities and private healthcare facilities. Given the major discrepancy in diarrheal mortality between the two sources is likely explained largely by underreporting, it is also assumed that morbidity is under-reported, and hence the values in Table 7 are used.

For WASH in healthcare facilities, a study on the costs of healthcare associated infections is available that was conducted in 14 countries in Sub-Saharan Africa, including Zambia (Hutton et al, 2023; Hutton et al, 2024). The study used a cost-of-illness approach to estimate the financial costs of additional healthcare needed to treat HAIs, and the economic costs of lost productivity of the patient, and premature mortality. The methods are more fully described in Hutton et al (2023).

Time use impacts

Time use impacts include the time lost due to water haulage and from accessing sanitation outside the home. Basic water brings water sources closer to home, but households still need to access water from community wells, thus requiring some travel time. Safely managed water brings water source to the household plot, thus reducing water haulage time to zero. Safely managed and basic sanitation bring the sanitation facility to the household plot, thus reducing sanitation access time to zero (from households either using shared/community toilets or practising open defecation). The time use for water is estimated based on the estimated time per journey or visit and assumptions on the number of water hauling journeys per day. The time use for sanitation is estimated based on the estimated time per journey or visit and the number of visits per day to the place of sanitation, which varies between men and women. However, there are few surveys or research studies from Zambia on the time to access water or sanitation. A global systematic review of water time (Ho et al, 2021) found that in sub-Saharan Africa between 18 and 135 minutes per day are used per household to access water, with a clustering of several studies at about 40 minutes per day.

In Zambia, few studies measure the distance and time to a water source or the total time spent collecting water. The Zambia DHS (2018) asks how long it takes to travel to, wait and bring back water from off-plot sources, but does not report the results on the average trip length (in minutes) by service level in the main report. While nationally 70.7% of households enjoy an improved water source, 63.8% are from within 30 minutes round trip (=basic water) and 6.9% are from more than 30 minutes round trip (=limited) (WHO/UNICEF, 2023). The JMP estimates are a little lower than the DHS values for improved water of 72%.

Overall, including unimproved sources, 4.2% of the urban population and 15.6% of the rural population access their water from more than 30 minutes round trip. 28.8% of households responded that their usual water source was not available for at least 1 day in the previous 2 weeks (43.1% in urban areas and 9.2% in rural areas), hence indicating that additional journey time is required to access water on those days.

Winter et al (2021) assess the time saved from piped water interventions in 4 villages in rural Zambia. They find that almost 4 hours of time are saved per week of the median household from a starting time of 5 hours per week. This means that time per day is 43 minutes (e.g., 1 trip of 43 minutes or 2 trips of 21.5 minutes each), which can be reduced by 34 minutes per day to 9 minutes spent on water collection. Because of the saving in time and effort, household water consumption was found to increase by 32%.

Shimamura et al (2022) find from their survey of rural water practices in Zambia that on average 64 litres of water are collected by a household, entailing approximately 3.5 journeys per day. In another study that measured time spent of orphaned and non-orphaned children found that in the baseline they spent 57 minutes per day collecting water, and an additional 1 hour 42 minutes on water-related household chores (Shimamura et al, 2023). These times were reduced to 28 minutes and 64 minutes, respectively, following the intervention of providing more boreholes for project communities. At the endline, orphans still spent about twice the time collecting water than non-orphans. However, there was no disaggregation by wells that are lower than or above 30 minutes roundtrip, to be able to use the data in the present study.

Therefore, time estimates used for Zambia in this study are the following: basic water requires about 20 minutes roundtrip time, limited water 75 minutes roundtrip time, and unimproved water 40 minutes roundtrip time, as presented in Table 9. While the distance in rural areas is likely to be longer, the waiting time is likely to be longer in urban areas, hence justifying a similar overall roundtrip time between rural and urban areas.

Table 9. Travel time assumptions and journeys/visits per day for Zambia, by gender

Service, service level and gender	Access time to service (or no service)			
	Minutes per journey		Journeys per day	
	Urban	Rural	Urban	Rural
Water				
Basic water	20	20	2	2
Limited water	75	75	2	2
Unimproved water	40	40	2	2
Sanitation				
Open defecation - girls and women	15	20	3	3
Open defecation - boys and men	10	10	1	1
Shared sanitation - girls and women	10	15	3	3
Shared sanitation - boys and men	10	15	3	3

The identity of the water hauler has not been collected in a nationally representative survey in Zambia, neither the last Multiple Indicator Cluster Survey (MICS) published in 1999, nor the previous DHS published in 2018. No research studies identified provided this information. Therefore, information is taken from the neighbouring country which has similar social characteristics. At least three-quarters of the person usually collecting water is female.

Table 10. Identity of primary water hauler for households without water on premises –

Identity	Location	
	Urban	Rural
Adult female	72.8%	79.9%
Female child	3.0%	4.2%
Proportion female	**75.8%**	**84.1%**

Source: Zimbabwe MICS, 2019

The time to access place of sanitation is not available from any surveys in Zambia, neither is the number of trips per day. Estimates presented in Table 9 are based on a review by sanitation experts in Zambia, with the understanding that there will be a wide range from those with minimal distance to those with greater distance and/or waiting time. It is expected that men and boys will not take the trouble to travel to a more distant site of sanitation except for defecation once per day. It is expected that women will visit sanitation at least 3 times per day for both defecation and urination.

Other impacts

Several impacts are excluded from the empirical analysis. Social benefits of basic sanitation such as pride, comfort and security are excluded as there are few studies that examine these issues and they are hard to value in monetary terms. No willingness to pay studies have been conducted in Zambia for improved water supply or hygiene, and one WTP study was conducted for toilets which compared three different valuation methods for estimating WTP among tenants of low-income housing in Lusaka (Tidwell, 2020). The contingent valuation presented mean estimates of 33.5 Kw for flushing toilets, 26.1 Kw for solid doors, and 15.6 Kw for inside and outside locks, which represented 7.4, 5.8, and 3.5% of median monthly rent (450 Kw) in the sample, which was just under half of median tenant monthly income of 1,000 Kw.

Environmental impacts are excluded from the study. The economic values associated with averted pollution from achieving either basic or safely managed sanitation are hard to value without location-specific studies and it is therefore difficult to estimate at national level. Furthermore, pollution originates from multiple sources and not just poor sanitation, such as from mining activities in some locations in Zambia.

Educational benefits of improved WASH in schools and at home are an important benefit in Zambia, especially for girls. Studies from Zambia have shown reductions in dropouts of girls from schools following basic and safely managed WASH services, following findings from the End of Term Evaluation of the National Rural Water Supply and Sanitation Programme (NRWSSP) 2006-2015 (Ministry of Local Government and Housing, 2015). One other study used quantitative data from the Education Management Information System (EMIS) for over 10,000 schools in Zambia, which revealed that lack of WASH leads to high rates of repetition and dropout in school for girls, compared to boys especially from the age of 13 and in grades 6, 7 and 8 (Agol and Harvey, 2018). Consequently, Zambia's National Adaptation Plan (NAP) states "Climate-induced water shortage can make it difficult for girls to manage their menstrual hygiene which in turn also affects either school attendance and/or their self-esteem" (Republic of Zambia, 2023). However, these benefits are difficult to value and capture in CBA, hence they are excluded. Furthermore, evidence from the literature is mixed on the extent of impact of WASH and menstrual hygiene facilities in schools.

The economic value associated with reuse of sanitation products (e.g. compost, fertiliser, biogas etc) and wastewater reuse is dependent on the local market, which currently exists on a small scale in Zambia. Furthermore, there are additional costs associated with reusing these products which would need to be factored in. Hence, the CBA results need to be interpreted bearing in mind the omitted benefits of safely managed WASH services.

2.8 Impact valuation

All the impacts described previously need to be valued in monetary terms to allow costs of inaction to be estimated and cost-benefit analysis conducted. This study uses standard economic methods to value the costs of inaction and the benefits. Medical costs are valued using cost per outpatient visit and cost per hospital bed day taken from the most recent study for Zambia (see Table 11 top row) (Banda et al, 2024). Costs from 2016 are updated to 2023 using the GDP deflator available from World Bank open data and converted to US$ using the average ZMW/US$ exchange rate for 2023. Cost per bed day was taken from health centres and not hospitals, to be conservative. The additional costs of treatment of specific diseases are estimated based on pharmacy prices of common antibiotics and ORS for diarrhoea. User fees paid by patients for medical care are excluded to avoid double-counting. Patient costs for home treatment (those not seeking formal care), transport and accommodation when health seeking are excluded due to lack of prior studies. In comparison, WaterAid Zambia (2024) reports that the cost incurred per case of cholera hospitalised in the 2023/24 outbreak varies from ZMW 188 (US$9.3) to ZMW 455 (US$22.5), which are below the cost per bed day sourced from Banda et al (2024).

Table 11. Cost per outpatient visit, per inpatient day and medication costs per illness

Cost item	Outpatient (per visit)		Inpatient (per day)	
	Urban	Rural	Urban	Rural
Unit cost1	$2.54	$2.54	$34.5	$34.5
Diarrhea treatment	$0.53	$0.53	$0.53	$0.53
Diarrhea treatment	$1.06	$1.06	$1.06	$1.06
Diarrhea treatment antibiotics (Trolox)2	$1.24	$1.24	$1.24	$1.24
Respiratory infection antibiotics (Cafalexin)2	$2.84	$2.84	$2.84	$2.84

Source: 1 Banda et al (2024). To be conservative, figures reflect paediatric patients in rural health centres. 2 Survey of pharmacy prices in February 2025.

Time is lost from inadequate WASH due to illness and water and sanitation facilities not being conveniently located at the household level, thus requiring travel, waiting and extraction time. Time loss has an associated value due to the opportunity lost from spending time in one activity instead of another. Lost time might have been used in productive or non-productive pursuits, both of which are differently valued. Evidence is mixed on whether household members use their time gained for productive activities or not. However, in the longer term, time gains are likely to be increasingly shifted to productive activities. One recent study from Kenya found that time saved on water collection was re-directed to income generating activities (Bisung and Elliot, 2018).

Productivity impacts are estimated based on distinguishing income-earning adults from non-income earning adults. It is based on World Bank data on employment levels for women (54%) and men (66.4%). For income-earning adults, the average monthly wage across all sectors is taken of Kwacha 5,342 from the Labour Force Survey 2022 (Ministry of Labour and Social Security, 2023), or US$13.2 per day. Half of this value is used (US$6.6), as the time value savings often used in industrialized countries is 50% of an individual's after-tax wages (Whittington and Cooke, 2019). In sensitivity analysis, half of the value-added from industry of US$26.1 is used. For children and non-income earning adults, 15% and 30% of the daily value-added for agriculture is taken, respectively, to reflect an opportunity cost of time

VSL estimates do not measure the value of life. The VSL represents aggregate demand for widespread, but individually very small, reductions in mortality risk, i.e. how much individuals are willing to pay for a very small reduction in the probability of death, paid for by forgoing the consumption of other goods and services. For example, if a policy reduced the risk of death by 0.00001 per person, then it would take 100,000 people to accumulate a collective risk reduction of one 'statistical life'. If, on average, each individual is willing to pay $100 per year to reduce the probability of dying by 0.00001, then collectively the group would be willing-to-pay $10m per year to prevent the loss of one 'statistical life' (Colmer, 2020).

(Whittington and Cooke, 2019).

Mortality impacts are valued using the value of a statistical life (VSL). VSL is preferred over the human capital approach because VSL identifies how people value a small reduction in mortality risk and therefore reflects potential willingness to pay, and therefore the value of reducing mortality risk. On the other hand, the human capital approach – which values the expected future income stream of an individual, only considers material losses (lost production) and does not value life itself or reductions in pain and suffering. Additionally, the human capital approach is inappropriate for estimating the VSL of children and elderly who are not part of the labour market.

VSL studies based on primary studies are rare in Africa. In a recent economic study estimating the impact of physician migration on mortality in low and middle-income countries, and published in the British Medical Journal, Saluja et al (2020) use the latest global meta-analysis of VSL studies and extrapolate a VSL value from developed countries to LMICs based on differences in GDP per capita using differences in purchasing power.

Due to a lack of VSL studies in Zambia, this present study similarly estimates VSL in Zambia by extrapolating from VSL studies conducted in developed countries. Banzhaf (2022) conducted a meta-analysis of previous meta-analyses of VSL studies in the USA, and estimates the VSL to be US$ 8 million in 2019, with a 90% confidence interval of $2.4–$14.0 million. Therefore, the US$8 million figure is converted to economic values in Zambia based on the proportional difference in GDP per capita between the USA and Zambia in PPP values. Furthermore, Robinson (2019) recommends making the conversion using income elasticity above 1.0 because people in lower-income countries are likely to be willing to spend a lower proportion of their income on mortality risk reduction. Therefore, an income elasticity of 1.5 is used in the baseline results, giving a VSL in Zambia of US$106,106. In sensitivity analysis an income elasticity of 1.2 and 1.0 are used, giving a VSL range from US$251,889 to US$448,253. In comparison with the values used for Africa and for middle-income countries, these are US$204,998 and US$324,325, respectively (Saluja et al, 2020), which are higher than the baseline value used in Zambia.

To enable comparison with other methods for valuing life, values obtained when using the human capital approach were estimated. This leads to different values depending on the age at death and the life expectancy. The human capital approach gives discounted future earnings of young children (US$65,495), older children (US$57,339) and adults (US$25,872). The value for adults is lower than for children because the median age of working adults (40 years old) means they have fewer years of working life ahead of them. As these are similar to VSL estimates, sensitivity analysis is only conducted using different income elasticities on VSL, as described above.

2.9 Benefit estimation

Health benefit is based on the most recent meta-analysis estimating the percent reduction in disease by service type and level (see Table 12). The values shown in Table 12 are applied for reduction in the risk of both WASH-related morbidity and WASH-related mortality. For combined water, sanitation and hygiene interventions, there is a lack of evidence on the combined risk reduction achieved. As pointed out by Wolf et al (2022), combining water or sanitation interventions with other WASH interventions did not substantially increase reduction in diarrhoea. However, there is rationale for a combined effect being greater than a single intervention, given water, sanitation and hygiene have different mechanisms for disease prevention (with reference to the “F-diagram”). Also, mortality estimates used in this study were WASH-attributable, meaning if WASH is provided and practised to a very high level, then the majority of these deaths should be preventable. Also, some evidence supports the case for a bigger risk reduction of combined WASH interventions. For example, children who received combined WASH interventions grew better (25% higher) compared with children who received single interventions (Gizaw

and Worku, 2019). Bekele et al (2020) also showed that combined WASH interventions had an impact on height-for-age z-score, while individual WASH interventions did not. Therefore, this study assumes the following:

- A 50% reduction for basic WASH (halfway between the highest individual relative risk reduction of 30% and the combined RR reduction of 70%).
- A 74% reduction for safely managed WASH from basic WASH (half way between the highest individual relative risk reduction of 41% and the combined RR reduction of 107%) .
- A 90% reduction for safely managed WASH from unimproved WASH (half way between the highest individual relative risk reduction of 52% and the combined RR reduction of 129%)

Table 12. Health risk reductions for diarrheal disease

Coverage level achieved	Starting point	Percent reduction in disease
Basic Water	Unimproved	19%[1]
Basic Sanitation	Unimproved	21%[1]
Basic Hygiene	Unimproved	30%[1]
Basic WASH	Unimproved	50%[2]
Safely managed Water	Unimproved	52%[1]
Safely managed Water	Basic	41%[1]
Safely managed Sanitation	Unimproved	47%[1]
Safely managed Sanitation	Basic	34%[1]
Safely managed WASH	Unimproved	90%[2]
Safely managed WASH	Basic	74%[2]

1 Wolf et al (2023). 2 Assumption based on Wolf et al (2023)

Time savings from closer water and sanitation are based on the changes in access time implicit in the damage cost estimates. When a household goes from limited water to improved water, the roundtrip reduces by 55 minutes. Transitioning from unimproved water sources to a basic water source, time savings are 20 minutes per roundtrip. The other services – safely managed water, basic sanitation and safely managed sanitation – all reduce time losses to zero given these services are now available inside the household or on the household plot.

2.10 Cost estimation

The cost assessment involves estimating the lifecycle costs for each service type (water, sanitation, and hygiene) and for each service level (basic, safely managed). Lifecycle costing is the process of compiling all costs incurred to enable WASH services to be provided over the lifespan of an infrastructure or intervention period. Lifecycle costs include capital expenditure, capital maintenance, operating expenditure, direct support costs, indirect support costs and costs of capital (Fonseca et al, 2011). The first three of these are included here as they reflect the major share of costs and are most readily available. The selected technologies and their respective lifespan and costs are provided in Table 13 for Zambia.

Capital expenditure (CapEx) includes the infrastructure costs, and the software/ programme costs to implement and to change behaviour. These include direct support costs. Cost data are sourced from a desk study conducted by Info-Quest Consult Limited on behalf of WaterAid Zambia which compiled all WASH unit cost data available in Zambia, as part of this present study (WaterAid, 2024c). Due to the unknown contribution of loans to the investment made in WASH to meet national targets – and the variation in interest rate depending on the lender – the costs of capital are excluded from the estimations.

Capital maintenance expenditure (CapManEx) includes the costs of major periodic maintenance, repair and rehabilitation to extend the lifespan of the infrastructure to its full useful life. Due to lack of CapManEx costs available in Zambia, it is assumed that CapManEx will be needed once half-way into the expected lifespan of the asset, costing 30% of the original capital cost (Hutton and Varughese, 2016).

Operating expenditure (OpEx) includes the full annual recurrent supplier costs for providing the service, and direct support costs. Cost data are sourced from the unit cost study conducted in Zambia.

Indirect costs which encompass the costs of higher administrative levels and policy-level costs are excluded as these are hard to measure, and unlikely to be substantially different from the current expenditures. Indeed, these costs would be relatively minor on a per capita basis when compared with the CapEx and OpEx costs.

The technologies selected per service level in Zambia are shown in Table 13.

Basic water, basic sanitation and basic hygiene all require a simple infrastructure. It is assumed that these technologies chosen, and the associated maintenance and user behaviours, bestow a minimum degree of climate resilience. Basic water is essentially a protected community source with no major treatment and no conveyance to the household. The unit costs for basic urban water are based on emergency works conducted across several low-income settlements in Lusaka that involved the construction of water distribution networks of various lengths, water kiosks, drilling boreholes and elevated storage tanks at a total cost of ZMW 102.45 million (US$5 million) in 2018 for 95,000 people. Basic sanitation is an improved household toilet – a simple pit in rural areas and VIP latrine in urban areas – with leach pit or septic tank and no extraction and treatment. The average cost of these technologies was calculated from a number of sanitation projects.

Table 13. Technologies delivered to achieve national goals for household WASH, and their per capita costs (US$, 2023 prices)

Service level	Service	Location	Technology	Lifespan (Years)	Capital cost	Annual CapManEx	Recurrent Cost	Percentage distribution
Basic	Water	Urban	Standpost /kiosk	30	52.4	1.5	5.6	100%
		Rural	Boreholeal	15	21.5	0.3	1.4	100%
	Sanitation	Urban	VIP latrine	20	50.2	1.9	11.3	64%
			WC connected to septic tank with infiltration	30	105.2	4.1	23.9	33%
		Rural	Simple pit latrine	20	39.3	1.5	3.9	50%
			VIP latrine	20	113.1	4.4	11.1	50%
	Hygiene	Urban	Handwashing station	5	2.4	0.0	10.1	100%
		Rural	Handwashing station	5	2.4	0.0	10.1	50%
			Tippy tap	3	0.8	0.0	5.7	50%
Safely managed	Water	Urban	Piped, treated water	30	134.7	3.9	11.9	100%
		Rural		30	37.1	1.1	7.1	100%
	Sanitation	Urban	Mechanical or manual emptying and FSTP	20	16.6	2.4	6.1	50%
			WC with sewer connection and treatment	30	121.5	5.5	39.4	50%
		Rural	WC with sewer connection and treatment	10	21.4	3.4	9.65	100%

^ Safely managed sanitation costs are related to conveyance and treatment only; hence these add to the basic sanitation unit costs to estimate total unit costs.

Safely managed water is either piping of treated water to the household (with water safety plans) or is a well on plot. The cost per person served of US$134.7 is for a low-income settlement in Lusaka that services 550 households. It is an extensive system that includes borehole drilling and equipping using a solarised pump, distribution network and 130m3 storage, with direct and indirect costs attributed to project planning and community mobilisation. The per capita costs are high due to the low number of households served.

Safely managed sanitation includes the full sanitation service chain, from the improved toilet and containment, extraction, transport, treatment and safe disposal or reuse. Unit costs for safely managed services is provided as a lump sum across emptying/conveyance, treatment and disposal. In urban areas it is based on the average of seven different faecal sludge management (FSM) schemes and one sewerage scheme, while for rural areas it is based on 2 FSM schemes. For households already with an improved latrine or water closet, no additional cost of containment (toilet) is assumed for a safely managed sanitation service.

The unit costs of WASH services in institutions are presented in Table 14. The total cost estimates are based on delivering WASH services to the unserved institutions (in the case of health care) and unserved pupils (in the case of schools). The O&M costs of delivering services to the already served are also estimated.

Table 14. Unit costs of WASH services in institutions – cost per pupil (schools) and cost per institution (healthcare facilities) (US$, 2023 prices)

Institution	Service	Location	Technology	Lifespan (years)	Capital cost (per pupil)	Recurrent Cost (per pupil per year)
Schools	Water	Urban	Protected tubewell or borehole with hand-pump	15	4.31	0.37
		Rural		15	20.20	1.61
	Sanitation	Urban	WC connected to septic tank + infiltration	30	9.70	1.55
		Rural	VIP latrine	30	40.74	6.23
	Hygiene	Urban	Permanent handwash-ing facility	15	3.71	1.99
		Rural		15	3.71	1.99
Institution	**Service**	**Location**	**Technology**	**Lifespan (years)**	**Capital cost (per institution)**	**Recurrent Cost (per pupil per year)**
Healthcare facilities	Water	Urban	Protected tubewell or borehole with handpump	15	3,896	195
		Rural		15	3,896	195
	Sanitation	Urban	WC connected to septic tank + infiltration	30	30,347	4,552
		Rural		30	30,347	4,552
	Hygiene	Urban	Permanent handwashing facility	15	1,661	106
		Rural		15	2,117	106

2.11 Discounting future values

For the cost-benefit analysis, all benefits and costs that are incurred after the baseline year (2024) are discounted to the baseline year to account for the time preference for money. A discount rate of 5% is used in the baseline estimations, varying between 0% and 10% in sensitivity analysis, 10% being the rate used by the World Bank.

2.12 Financing WASH services

To aid policy makers to assess how the costs can be financed, a simple presentation is made of the financing required from two major sources: (a) from the household in terms of tariffs paid and own household investment; and (b) from public sources, whether government budgets, overseas development assistance (ODA) allocations or charitable donations. These two major sources cover the 3 'T's (taxes, tariffs and transfers), with taxes and transfers being bundled together to simplify this analysis. Private finance is implicitly included in household expenditure, as these costs need to be repaid to the provider of finance and/or the provider of services.

According to the National Rural Water Supply and Sanitation Programme (NRWSSP) 2019 – 2030, the financing of capital costs is split as follows (Ministry of Water Development, Sanitation and Environmental Protection, 2019): Government of the Republic of Zambia (30%), cooperating partners, including international NGOs (55% including climate funds), local authorities (10%) and community (5% mostly capital contributions for water point development). These figures refer to water supply only, and therefore sanitation and hygiene hardware are expected to be fully paid for by households. The costs for O&M of water points will be financed by communities, except rehabilitation works which will be financed by the government through the local authorities. The O&M of sanitation facilities, including rehabilitation, will be borne by the users/owners (see Table 15).

In Zambia, the costs recoverable from tariffs and fees in providing water and sanitation services in urban areas varies depending on the service provider and the type of infrastructure. For utility supply, regulated by the National Water Supply and Sanitation Council (NWASCO), the policy mandates that utilities aim to recover 100% of operational and capital expenditures in the long term (NWASCO, 2014). However, the current situation is that the set tariffs do not cover CapEx, with the specific percentage of cost recovery varying depending on factors such as the efficiency of the utility and the level of service provided. It is assumed that tariffs pick up some (10%) of the urban water supply and safely managed sanitation capital costs (see Table 15).

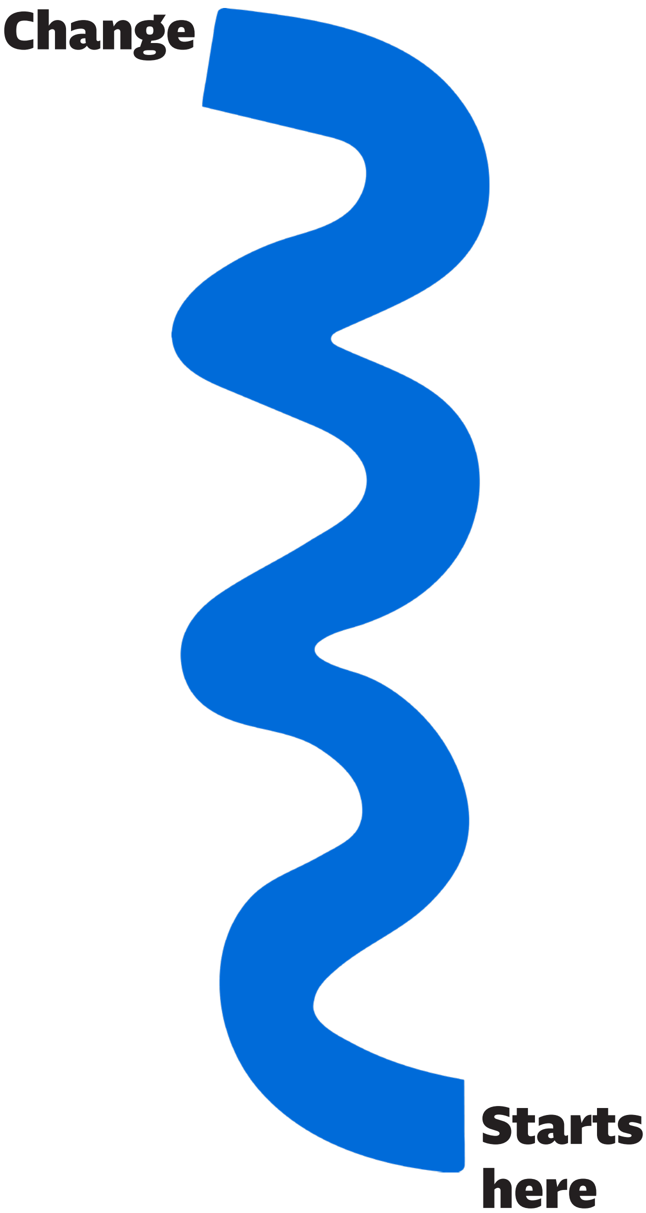
Some allowance is typically made for poor households. For example, the increasing block tariff model that NWASCO has adopted is expected to cater for the poor. The lifeline water amount (0 to 6 m3 per month) is in the first band which costs 150 Kwacha (US$7.3) per 6,000 litres. The higher the band and the more water used, the domestic use pays more and therefore cross subsidizes the lower use consumers.

Faecal sludge management (FSM) service providers typically recover 100% of their operational expenses, but it is unclear whether they also recover capital expenditure costs. This ambiguity may stem from the diverse nature of FSM services and the varying business models employed by different service providers.

Table 15. Percent of costs covered by tariffs in Zambia, by service type and level*

Service, service level and population	Financing from tariffs (%)			
	Capital Costs		O&M costs	
	Urban	Rural	Urban	Rural
Safely managed water	10%	5%	100%	100%
Basic water	10%	5%	100%	100%
Safely managed sanitation	10%	5%	100%	100%
Basic sanitation	100%	100%	100%	100%
Basic hygiene	100%	100%	100%	100%

*Note: the remaining finance is assumed to be from public sources.



3. Results

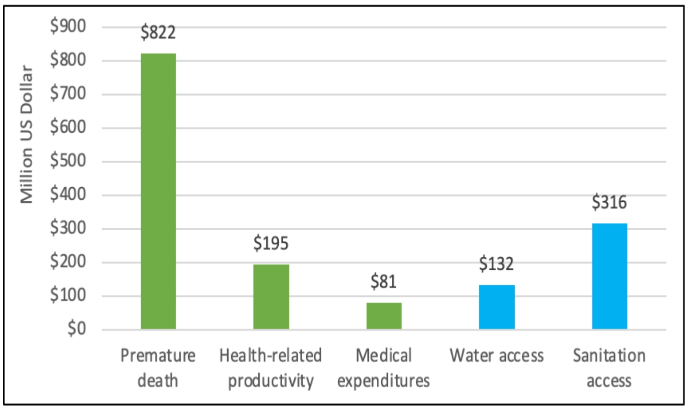
This section presents key results on:

- The costs of inaction (or 'damage costs') from Zambia not achieving any increase in WASH coverage from 2024 to 2030.
- The lifecycle costs of achieving national targets for basic and safely managed WASH services. Costs are presented separately and together for extending services to those without a given level of service in 2024, and the costs of maintaining and operating a service for population already covered with the service in 2024.
- The benefits of achieving national targets for basic and safely managed WASH services from 2024 until 2030.
- The costs versus the benefits over an extended period, from 2024 until 2050, of achieving and maintaining the national targets by 2030.
- The financing of achieving national targets for basic and safely managed WASH services, showing the required financing from tariffs and from public funds.

3.1 Costs of inaction

The total costs of inadequate WASH in Zambia amount to US$1.55 billion in 2023. This value includes the full cost of WASH-attributed diseases as well as the time lost due to not having water and sanitation access at the household level. This value amounts to US$79 per capita across the entire population and is the equivalent of 5.6% of GDP. While 40.8% of the Zambian population is classified as living in rural area, rural areas account for 56% of damages versus 44% in urban areas, largely due to a higher proportion of the population that accesses water from distant sources (6.5 percentage points higher 'limited' water supply in rural areas) and who practice open defecation (2.5 percentage points higher in rural areas). Figure 1 presents the breakdown between health costs and access time costs.

Figure 1. Annual costs of inaction on WASH in Zambia (US$ million, 2023 prices)

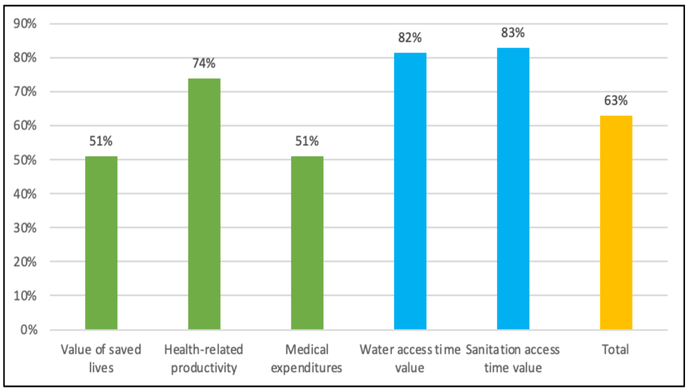


The greatest contributor to total damages is the value of premature death at US$822 million, followed by the value of time for accessing sanitation at US$316 million, and health-related productivity at US$195 million. Medical expenditures account for US$81 million per year, or 5.2% of total damages.

In comparison to current health expenditure, the medical costs of WASH-attributed diseases amount to 5.2% of health spending. Given that 43.5% of health expenditure is from the government in Zambia and 35% from out-of-pocket expenditure, both government budgets and household economies will benefit from this significant saving in costs from treating WASH-related diseases.

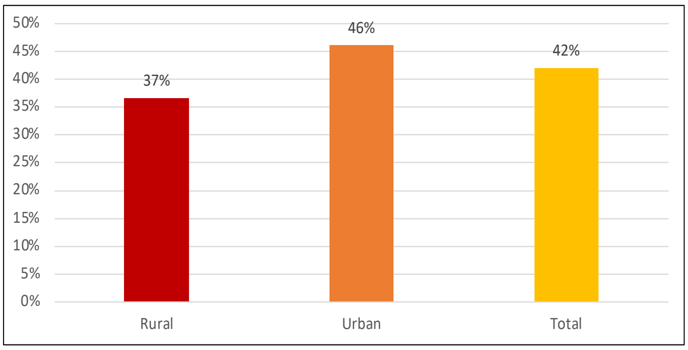
A gender breakdown of the costs shows that 63% of the total damage costs are borne by women and girls, shown in Figure 2. The majority of the difference is due to the fact that women and girls bear most water hauling and they spend more of their time accessing their place of open defecation than men and boys (see Table 9 for assumptions). Also, 74% of health-related productivity is accounted for by women because they have to look after their children when they become sick.

Figure 2. Damage costs to women and girls as a proportion of total damage costs in Zambia (%)



Infants under five years of age account for 15.5% of the Zambian population (UN DESA, 2024). Given the higher WASH-related disease rates in young children, they account for an important share of the medical spending on these diseases in Zambia, at 42%. The rate is higher in urban (46%) compared to rural areas (37%) (see Figure 3).

Figure 3. Proportion of medical costs for treating children under five years of age compared to the entire population in Zambia (%)



In terms of institutional WASH, the lack of convenient and safe WASH services causes a range of impacts, including health impacts, loss of time, security, and dignity. Some impacts overlap with community-wide impacts already evaluated, such as health. Also, school children and hospital patients may be forced to bring their own water, and some may need to access place of sanitation away from the school or health centre – impacts which are covered in household WASH estimates. On the other hand, the healthcare associated infections (HAIs) are not covered above, and are an additional impact. According to a recent study, with a HAI rate of 12.8%, hospital or health centre inpatients in Zambia may incur as many as 242,000 HAIs per year and 25,000 premature deaths from HAIs (Hutton et al, 2024). When valued in economic terms – additional health care costs, lost productivity and premature death – these impacts could cost Zambia as much as US$674 million per year, or 2.3% of GDP in 2022. The economic cost per capita (across all the Zambian population) is US$33.7 per year. Of these costs US$115 million are direct, financial healthcare costs, which is US$5.8 per capita and represents 6.9% of overall health spending (Hutton et al, 2024). Further information can be found in the Zambia brief (WaterAid, 2024).

The figures generated in this present study are subject to uncertainty given the methodological and data weaknesses. Table 16 shows that the overall results change considerably when different economic values are used for VSL and the hourly value of time. VSL varies from US$440 million to US$3.5 billion, leading to overall damages of 6.8% to 17.8% of GDP. If the average wage in services and industry are used to value time, the total value of lost time increases to US$1.26 billion and US$2.82 billion, respectively, leading to overall damages of 10.2% and 15.9% of GDP. These high values show how sensitive the overall damages are to the economic values for life and for time, and indicate that the values used in the baseline results are relatively conservative.

Table 16. Costs of inaction under different economic values (US$ million)

Variable	Value of impact	Total damages	Damages as % GDP
Value of a life using:			
Baseline	$822,263,582	1,545,601,771	8.2%
Human capital	$822,263,582	1,164,200,978	6.2%
VSL using IE of 1.2	$1,846,991,348	2,570,329,537	13.6%
VSL using IE of 1.0	$3,473,717,429	4,197,055,618	22.3%
Productivity cost using:			
Baseline	$711,068,926	1,545,601,771	8.2%
Industry value added	$2,821,786,592	3,724,948,396	19.8%
Service value added	$1,263,454,039	2,166,615,843	11.5%

3.2 Costs of action

Table 17 presents the overall annual costs by setting (households, schools and healthcare facilities) and by service level in Zambia. The total costs of extending basic WASH to unserved households amounts to US$204 million per year in capital costs and US$236 million per year in O&M costs. Safely managed WASH increases the capital costs to US$475 million per year. Together, the capital and recurrent costs of extending and maintaining existing services in households will cost US$690 million per year for basic WASH and US$1.43 billion a year for safely managed WASH.

Schools and healthcare facilities represent a fraction of these costs, at US$28 million per year for capital and US$27 million per year for O&M to extend services, and US$14 million per year to operate existing service levels. WASH in schools and healthcare facilities totals US$69 million per year to reach basic WASH by the year 2030.

Adding households and WASH in institutions together, WASH in all these settings cost US$759 million per year for basic WASH and US$1.5 billion a year for safely managed WASH, which are equivalent to 3.1% and 6.1% of GDP per year.

Table 17. Annual costs of WASH interventions (from 2024 to 2030) to reach universal access

Annual cost	Costs of extending services		Costs of maintaining services		Total
	Capital	Recurrent	Capital	Recurrent	
Households - basic	$204	$236	$69	$181	$690
Households - safely managed	$475	$478	$104	$371	$1,428
Schools - basic	$21	$21	$0	$3	$45
Healthcare facilities - basic	$7	$6	$0	$11	$24
Total - all basic	$233	$263	$69	$194	$759
Total – household safely managed	$503	$505	$104	$385	$1,497
As percent of GDP	**Costs of extending services**		**Costs of maintaining**		**Total**
	Capital	**Recurrent**	**Capital**	**Recurrent**	
Basic	0.96%	1.08%	0.28%	0.80%	3.11%
Safely managed	2.06%	2.07%	0.43%	1.58%	6.14%

Households

The total costs of achieving universal household WASH access in Zambia between 2024 and 2030 is US$8.6 billion for safely managed WASH and US$4.1 billion for basic WASH, as shown in Figure 4. The capital and recurrent costs of extending basic WASH over the 7-year period are US$1.23 billion for capital and US$1.4 billion for O&M, while the costs of maintaining existing services are US$413 million for capital and US$1.1 billion for O&M. The capital and O&M costs of extending safely managed WASH to the unserved cost US$2.9 billion each. The recurrent costs of maintaining existing safely managed services are considerable, at US$2.23 over 7 years.

Figure 4. Total costs of achieving universal access to basic and safely managed WASH in households in Zambia, by capital and recurrent (US$ million, 2023 prices)

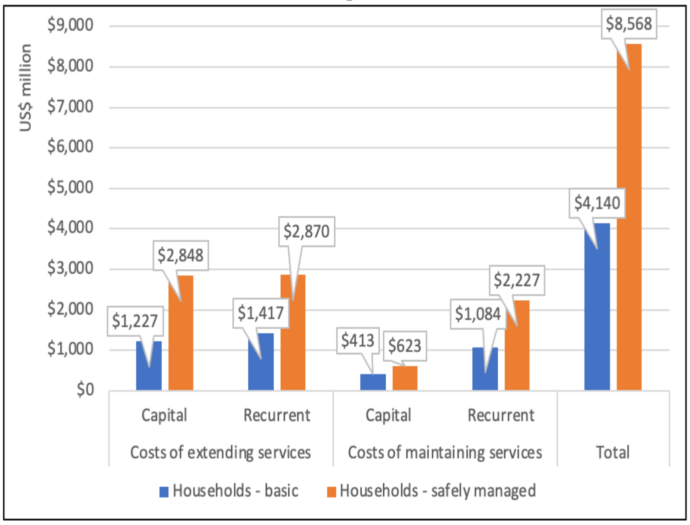
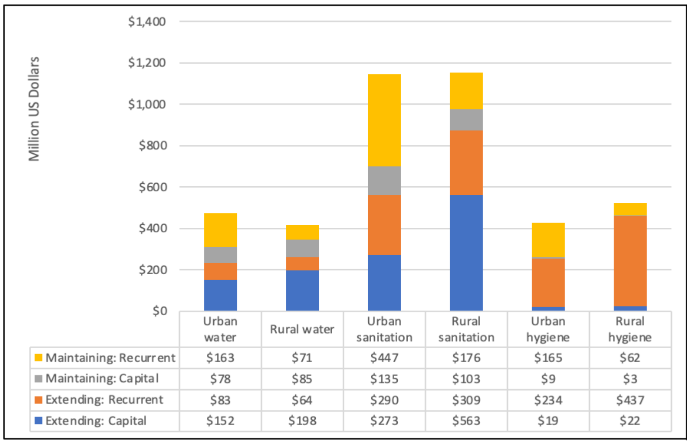
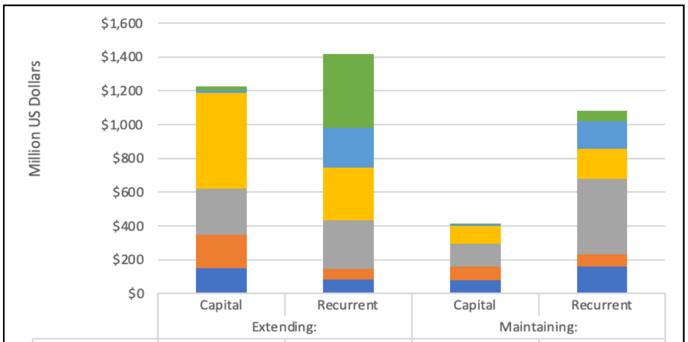


Figure 5 shows the total costs of achieving basic water, sanitation and hygiene in Zambia. The capital and the recurrent costs of extending services account for the majority of costs, at between US$1.64 and US$2.5 billion, respectively, or US$273 and US$417 million per year. The costs of sanitation exceed both water and hygiene costs by at least two times.

Figure 5. Total costs of achieving basic WASH services in households in Zambia (US$ million, 2023 prices)

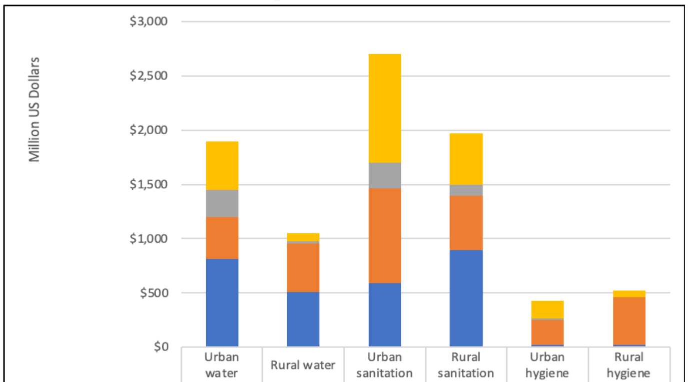




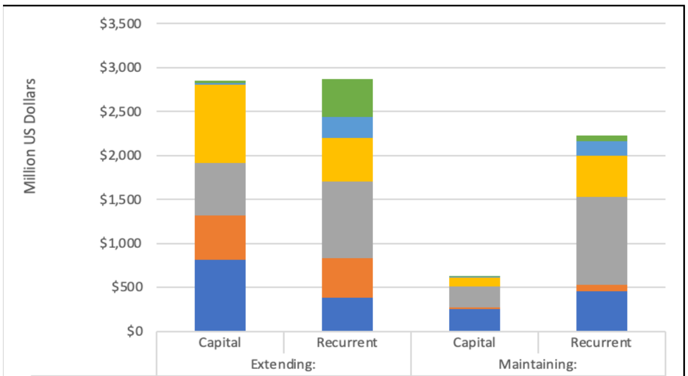
	Extending: Capital	Extending: Recurrent	Maintaining: Capital	Maintaining: Recurrent
Rural hygiene	$22	$437	$3	$62
Urban hygiene	$19	$234	$9	$165
Rural sanitation	$563	$309	$103	$176
Urban sanitation	$273	$290	$135	$447
Rural water	$198	$64	$85	$71
Urban water	$152	$83	$78	$163

Figure 6 shows the total costs of achieving safely managed water and sanitation, and basic hygiene. The capital and the recurrent costs of extending services are both almost US$3.47 and US$5.1 billion, respectively, or US$578 and US$850 million per year. Urban sanitation has the greatest costs at US$2.7 billion, followed by urban water and rural sanitation at just under US$2 billion each, followed by rural water at US$1 billion.

Figure 6. Total costs of achieving safely managed WASH services in households in Zambia (US$ million, 2023 prices)



	Urban water	Rural water	Urban sanitation	Rural sanitation	Urban hygiene	Rural hygiene
Maintaining: Recurrent	$451	$73	$1,003	$473	$165	$62
Maintaining: Capital	$250	$22	$236	$103	$9	$3
Extending: Recurrent	$382	$447	$872	$498	$234	$437
Extending: Capital	$814	$506	$591	$895	$19	$22



	Extending: Capital	Extending: Recurrent	Maintaining: Capital	Maintaining: Recurrent
Rural hygiene	$22	$437	$3	$62
Urban hygiene	$19	$234	$9	$165
Rural sanitation	$895	$498	$103	$473
Urban sanitation	$591	$872	$236	$1,003
Rural water	$506	$447	$22	$73
Urban water	$814	$382	$250	$451

Schools

The total cost of achieving school WASH is US$128 million in capital costs and the same amount - US$128 million in recurrent costs - for extending to the unserved schools, while the O&M costs of maintaining current coverage are US$15.7 million. Together, the costs amount to US$45.4 million annually from 2024 to 2030. As shown in Figure 8, sanitation costs dominate due to the low current coverage. Primary schools account for the largest share of costs due to the lower existing WASH coverage and the larger number of primary schools (9,441) compared with the number of secondary schools (1,290), as reported in the Education Statistics Bulletin (2020) from the Ministry of Education.

Figure 7. Total costs of achieving basic school WASH from 2024 to 2030, by primary and secondary schools.

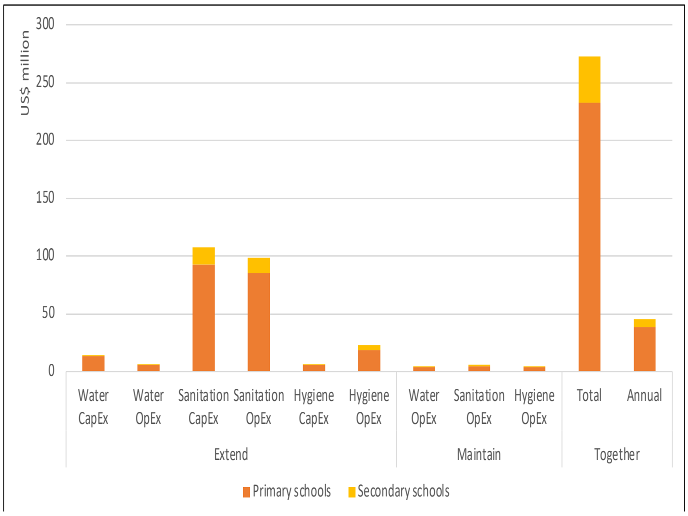
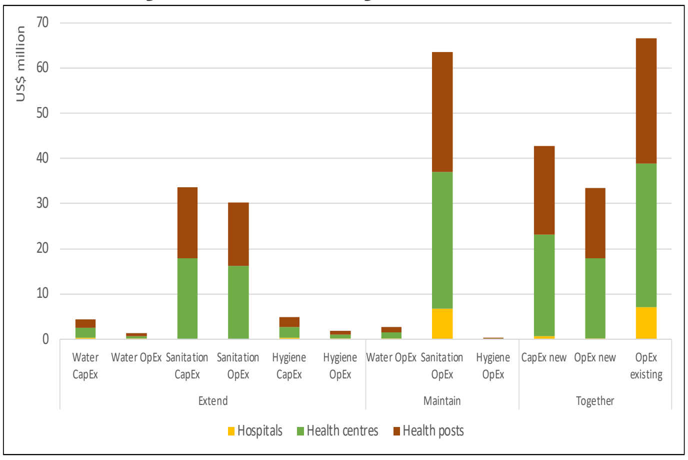


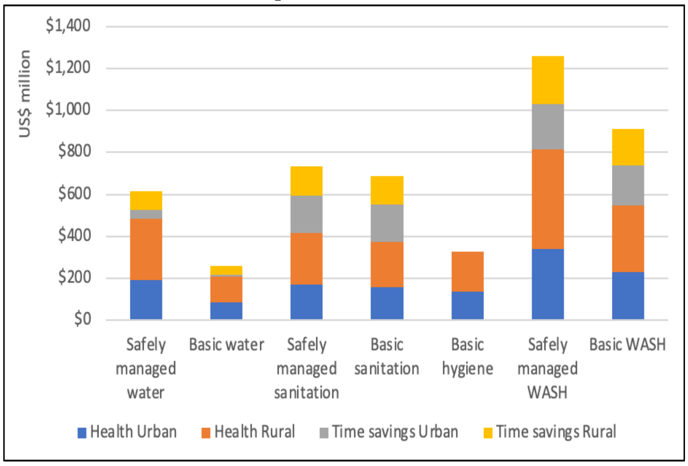
Figure 8. Total costs of extending basic WASH to unserved healthcare facilities from 2024 to 2030, by health facility level.



3.3 Benefits of action

The total benefits of basic and safely managed WASH services are US$8.8 billion and US$16.4 billion, respectively from 2024 to 2030. The annual benefits by service type are shown in Figure 10. As a percent of GDP, safely managed WASH is worth 4.6% of GDP and basic WASH is worth 3.3% of GDP in 2023. These benefits result from achieving universal coverage across all settings, and not just households.

Figure 9. Annual benefits of achieving basic and safely managed service levels, by service (US$ million, 2023 prices)



Women benefit more than men from WASH services in Zambia. For basic WASH, women enjoy 66% of the total benefits, largely due to the time savings, especially for sanitation. For safely managed WASH, women incur 64% of the benefits. Low-income households will benefit the most from receiving basic WASH, due to the lower proportion of these households covered with basic WASH services.

The benefits of improving WASH services in schools and healthcare facilities are not separately estimated for community transmission of disease, as it is already included in the above estimates. Time savings from closer water supply of institutional WASH are not included due to lack of previous studies to make estimates in Zambia. However, healthcare associated infections (HAIs) are likely to be reduced following major improvements in WASH services, environmental cleaning and waste management in healthcare facilities. One recent study estimated the costs of inaction and potential economic benefits for Zambia, and found that total cost of HAIs was US$33.7 per capita and US$5.8 per capita for economic and medical financial costs, respectively (Hutton et al, 2024). If it is conservatively estimated that 50% of HAIs can be prevented through a comprehensive WASH, IPC and HCWM package, it means that US$16.9 per capita can be averted in economic costs and US$2.9 per capita can be averted in medical expenditures.

3.4 Cost-benefit analysis

When costs and benefits are modelled to the year 2050, and discounted to a common year (2024), the benefit-cost ratios (BCR) are calculated. The BCR reflects the number of times by which benefits exceed the costs of achieving WASH; hence, a bigger number is better. The values in Figure 11 refer to households receiving WASH services that did not previously have them. Overall, basic WASH has a BCR of 2.5. At 6.8, the BCR is highest for rural basic water, while the BCR for basic sanitation is 4.1 and for basic hygiene 2.2. Safely managed water and sanitation BCRs are below those of basic water and sanitation: 2.7 for safely managed water and 2.0 for safely managed sanitation.

Figure 10. Cost benefit ratios of WASH service provision in Zambia, by service level and type

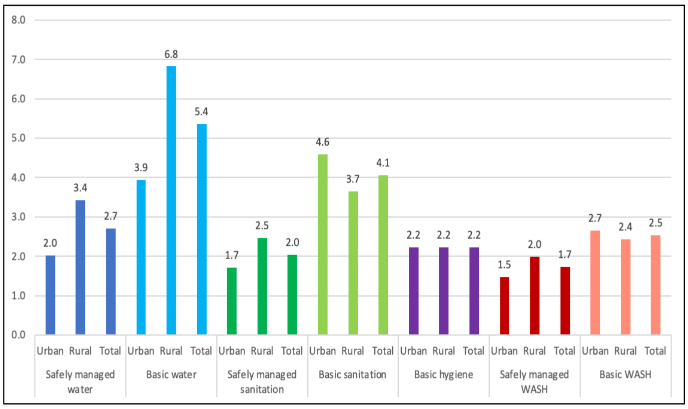
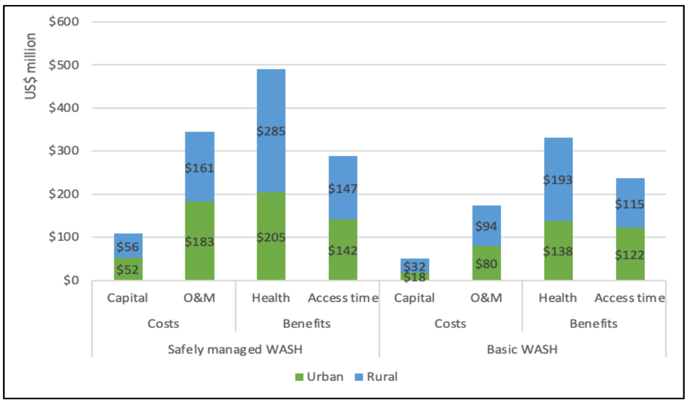


Figure 12 presents costs compared with benefits over the 27-year period from 2024 to 2050, with breakdown by capital/recurrent, rural/urban, and health/time benefits. The costs are considerably lower than those presented in section 3.2 because they are averaged over a 27 year period instead of a 7-year period, and the future costs reduce considerably when discounted. On the other hand, the costs presented in Figure 12 include replacing capital items at the end of their lifespan (15 years for sanitation and 20 years for water infrastructure).

Safely managed WASH has overall health benefits of US$490 million and access time US$289 million, compared with capital costs of US$108 million and O&M of US$344 million. Basic WASH has overall health benefits of US$332 million and access time US$137 million, compared with capital costs of US$50 million and O&M of US$174 million. Overall, rural and urban areas require similar amounts of spending to achieve the safely managed standard, while for basic WASH rural areas require higher spending.

Figure 11. Summary of the annual costs and annual benefits of extending basic and safely managed WASH to the unserved in Zambia, by rural and urban areas (US$ million, 2023 prices)

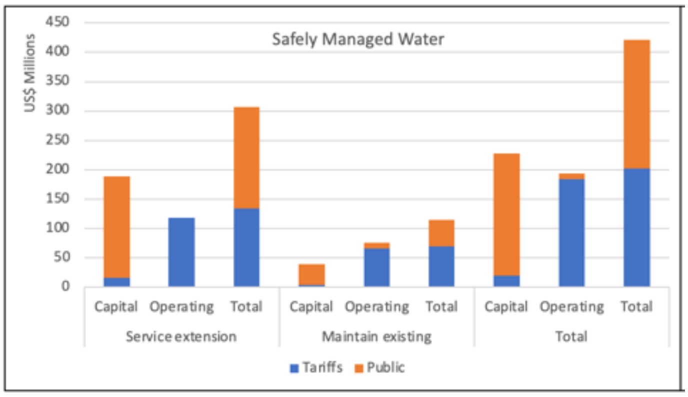


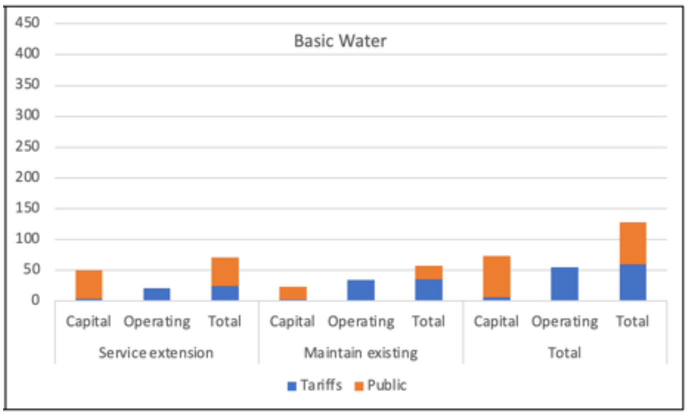
Benefit-cost ratios are also estimated for WASH in healthcare facilities. The study which estimated the costs of healthcare-associated infections in Zambia (Hutton et al, 2024; WaterAid, 2024) draws on a recent healthcare facility WASH cost study for low-income countries which estimates approximately US$1 per capita per year is needed for WASH, infection prevention and control as well as healthcare waste management (Chaitkin et al, 2022). Based on the benefits estimated in this present study and the costs from Chaitkin et al (2022), the benefit-cost ratio is US$16.9 economic returns per US$1 invested, and US$2.9 financial returns to the health system per US$1 invested.

3.5 Financing of interventions

Adopting the finance allocations for household WASH presented in Table 15, the required finance from tariffs and public sources are presented in Figure 13 for water, in Figure 14 for sanitation and in Figure 15 for hygiene. To achieve safely managed water supply, the total amount to be financed from public budgets is US$173 million per year for service extension and US$45 million per year for service maintenance, the majority of which is for capital expenditure. To achieve basic water supply, the total amount to be financed from public budgets is US$46 million per year for service extension and US$21 million per year for service maintenance, the majority of which is for capital expenditure.

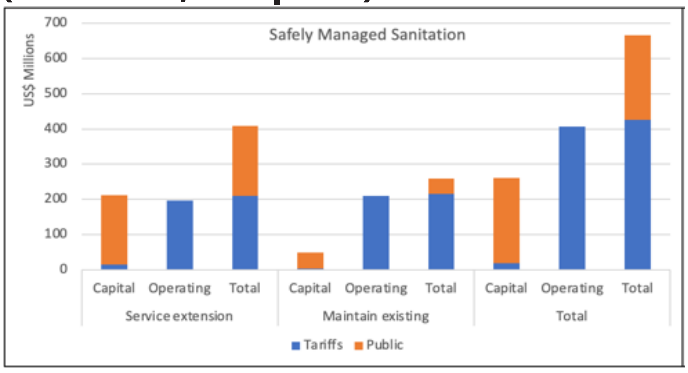
Figure 12. Sources of finance to cover the costs of achieving universal access to basic and safely managed water in Zambia (US$ Million, 2023 prices)

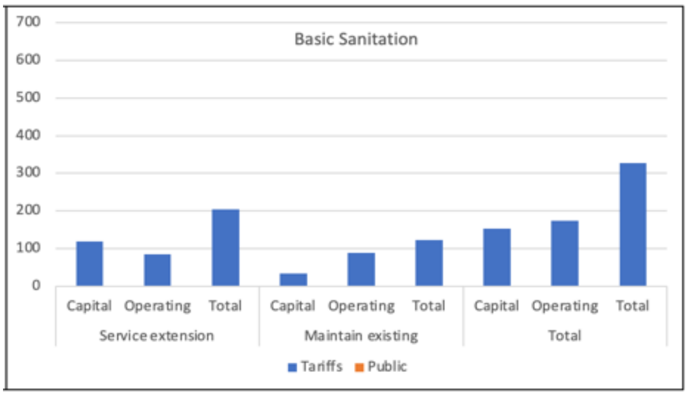




To achieve sanitation targets, according to national policy 100% of costs for basic sanitation should be met from tariffs, totalling US$341 million. For safely managed sanitation, US$198 needs to be met from public funds for service extension and US$41 for maintenance of existing service levels (see Figure 13).

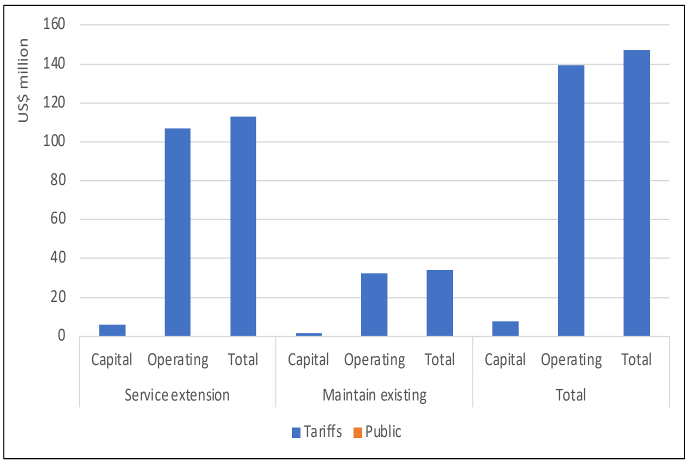
Figure 13. Sources of finance to cover the costs of achieving universal access to basic and safely managed sanitation in Zambia (US$ Million, 2023 prices)





Similarly, basic hygiene is expected to be funded by households, accounted for mainly by O&M costs (i.e., soap purchase) and amounting to US$147 million per year (see Figure 14).

Figure 14. Sources of finance to cover the costs of achieving universal access to basic hygiene in Zambia (US$ Million, 2023 prices)



In addition to household WASH, WASH services in schools and healthcare facilities need to be financed. For government institutions, the costs need to be met out of public funds. Government institutions represent approximately 70% of schools (Ministry of Education, 2022) and 87% of healthcare facilities (Ministry of Health, 2022). The rest are operated by private operator or faith-based organisations. This adds up to US$56 million per year needing to be sourced from public funds for extending WASH services to unserved institutions, split between US$42 million for schools and US$13 for healthcare facilities.

4. Discussion

4.1 Key findings and their interpretation for policy

The total costs of inadequate WASH in Zambia amount to US$1.55 billion in 2023, which is US$79 per capita and the equivalent of 5.6% of GDP. A large share of these costs reflect the value of premature death (53.2%), followed by the value of lost time due to water collection or sanitation access (29.0%). While a smaller share of the economic costs were the financial costs of healthcare, these costs (US$81 million) equate with 5.2% of the total expenditure on healthcare in Zambia in 2023. Depending on the proportion of disease cases and deaths prevented from sanitation and hygiene interventions – from 40% for basic WASH to 62% for safely managed services – the annual benefits amount to between 3.3% and 4.6% of GDP per year. These benefits can be generated from a total cost over 6 years of US$4.14 billion for basic WASH and US$8.57 billion for safely managed services. Overall, the quantified benefits exceed the costs of basic WASH over the course of 20 years by at least 2.5 times.

Recovering costs from tariffs and fees is important for ensuring the financial viability and sustainability of water and sanitation services. Clear and transparent policies regarding cost recovery mechanisms help to incentivise efficient service delivery while also ensuring affordability and accessibility for all segments of the population. While the Ministry of Water Development and Sanitation (MWDS) policy stipulates that communities are responsible for covering only 5% of capital expenditure, they are responsible for covering 100% of operating expenditures. This policy has challenged the ability of some communities to operate and maintain their systems (Nkhosi, 2020).

4.2 Comparison with previous studies

This is the first known cost-benefit study on WASH interventions in Zambia. Previous regional and global studies have shown both lower and higher benefit-cost ratios, depending on the service type and location.

For basic water, Hutton (2018) shows a similar BCRs for SSA to this present study in Zambia which presents BCRs of 6.8 and 3.9 in rural and urban areas, respectively. For basic sanitation, the rural BCR for Zambia is similar to that in Hutton (2018) for SSA, while the urban BCR is several times higher in the present study. In summary, there are no major differences except for urban sanitation, which are more optimistic in this new study for Zambia.

Table 18. Benefit-cost ratios for basic water supply and sanitation in rural and urban areas in Sub-Saharan Africa

Service	Area	Hutton (2018) study		This study
		Sub-Saharan Africa	All LMICs	Zambia
Basic water supply	Rural	7.3	6.8	6.8
	Urban	3.2	3.4	3.9
Basic sanitation	Rural	3.8	5.2	3.7
	Urban	1.2	2.5	4.6

Source: Hutton (2018). LMIC – low- and middle-income countries.

There are no previous studies for Africa that estimate BCRs for safely managed water and sanitation. A global study conducted by WaterAid (2021) estimated BCRs of safely managed water between 1.5 and 1.9, and safely managed sanitation between 2.2 and 2.9. This present study reports an average BCR for safely managed water of 2.7 which is above the upper limit of the WaterAid (2021) study, and an average BCR for safely managed sanitation of 2.0 which is below the lower limit of the WaterAid (2021) study.

4.3 Uncertainties and areas for further research

Generating estimates of costs and benefits of WASH in a nationwide study – with rural and urban breakdown – is only as strong as the data values used and the variables included. Cost data were based on the most robust and recent available studies, although there are greater uncertainties around the frequency and costs of emptying pits and septic tanks, and the full capital and O&M costs of safely treating and disposing of waste. These costs may have been overestimated, given lower cost options are likely to be found in the face of the high cost

Benefits are likely to have been significantly underestimated, as follows:

- The broader environmental costs of not isolating and treating human excreta properly were omitted. Environmental costs to society include higher costs of treating surface water for municipal and industrial purposes, and the health and productivity impacts of using untreated wastewater (or dirty river water) to irrigate fields and use for watering livestock.
- The social and security costs of households still using open defecation and shared toilet facilities. These include dangers for women of the need to travel outside their home at nighttime. Also, the indignity suffered by the population of having to resort to open defecation is ever present but little talked about. This includes the discomfort of schoolchildren not being able to go to the toilet when needed, or humiliation faced by schoolchildren having to resort to open defecation near the school, felt more acutely by girls.
- There are uncertainties associated with the actual number of diarrhoea cases, and the hidden costs of enteropathy and the nutritional impact of repeated diarrhoea cases, especially on children. These health impacts have been underestimated, but the information is insufficient to make national estimates of their impacts.
- Treatment seeking behaviours are not fully known, and the study relied on the survey data for treatments provided to young children – but at a population level this is not fully known, and is not well captured by alternative sources such as government data on hospital admissions.
- The number of deaths from WASH-attributed disease relied on data available from global studies led by the World Health Organization which were adjusted to 2024 values based on population growth. Such values could be quite inaccurate for a variety of reasons, although out of all the possible data sources, it is likely to be the most accurate. These are all areas that can be improved upon in future research to enable a more regular assessment of the economic costs of inadequate sanitation and hygiene in Zambia.

4.4 Recommendations

The findings and conclusions of this study should be disseminated at national level in Zambia, and can also be used in international dialogue and WASH advocacy events. The study highlights in particular the attention that needs to be paid to the remaining WASH service gap, even for basic WASH, and recommends:

1. The elevated prioritisation for financing of basic WASH under the Zambia Water Investment Programme (ZIP) Resource Mobilisation Strategy, given the equity impacts of increasing access to basic WASH. While public funds are vital for achieving WASH targets, they should be used prudently to have the greatest impact. Government funds should be used to leverage donors, and both government and donor funds should be used to leverage private investors – if it can be shown that engagement of the private sector will lead to better quality and/or lower priced services.

2. The potential willingness to pay of non-poor households to help close the financing gap should be explored, thus allowing limited public funds to be channelled to those least able to afford WASH services.

3. Given the cost savings to the healthcare system, more health sector budget should be dedicated to disease prevention through promoting better WASH practices nationwide.

4. To support the previous recommendation, the collection and reporting of WASH-related diseases – including from private healthcare establishments – should be improved, and would give greater prominence to achieving universal WASH access and practice in Ministry of Health's priorities.

5. Elevate the importance of school WASH in the education sector and WASH in healthcare facilities in the health sector. The costs of providing basic WASH in all schools and healthcare facilities are relatively minor compared to households, but will have major impacts on students and on users of health services. As fees cannot be charged to users, the funds need to be raised from the education and health budgets for public facilities, and standards need to be correctly applied by private schools and healthcare facilities and financed out of their income.

6. Promote the key role of menstrual hygiene facilities in schools, together with awareness raising, to improve school attendance by girls.

7. Increasing awareness among major polluting sectors of the impacts of water pollution on freshwater resources, with linkage to industrial and mining activities which pollute drinking water sources.

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Plot No. 21A, Middleway, Kabulonga | **wateraid.org**
Tel: +260 211 267557 | Mobile +260 570 496 853 | +260 768 610 274

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