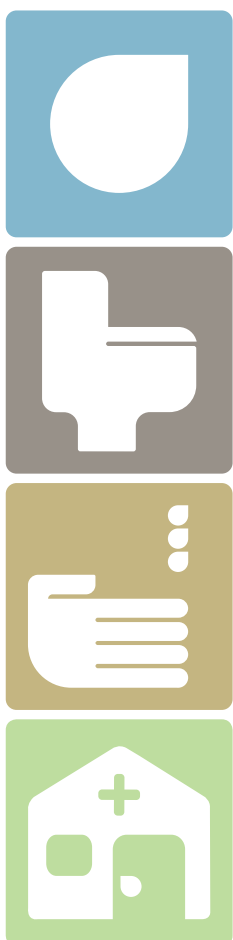


The cost of providing water, sanitation, hygiene, waste management and clean environments in health care facilities in Timor-Leste

Results of life cycle costing assessment in Manufahi Municipality, Timor-Leste

June 2022



WaterAid/Fraser Goff



washmatters.wateraid.org

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Acknowledgements

WaterAid would like to acknowledge and thank the Manufahi Municipality government staff from the Municipal Administration, Health Department, Water Supply, Sanitation and Environment Department, and Secretary of State for Equity and Inclusion who contributed their time and knowledge to this costing assessment. We would like to thank NGO partners in Manufahi (Fundasaun Luta ba Futuru, Luta ba Mudansa and Feto Asaun ba Sustentabilidade) who participated in workshops and data collection in health facilities. We would also like to acknowledge the support of the Australian Government through the Australian NGO Cooperation Program (ANCP) for supporting this assessment.

For further information on this assessment, please contact Fraser Goff (fraser.goff@wateraid.org.au), Joraida Pereira (joraida.pereira@wateraid.org.au) or Francisca Sarmento (francisca.sarmento@wateraid.org.au).

Cover photo: Bubususu Health Post staff at their accessible toilet and handwashing facility in Bubususu, Manufahi.



Executive summary

Safe, reliable water, adequate sanitation, waste systems and hygiene (WASH) services and behaviours in health care facilities (HCFs), along with safe waste disposal and environmental cleaning, are vital for safe, quality health care provision.

In 2020 Manufahi Municipality in Timor-Leste developed a Municipal WASH Strategy which sets targets for achieving universal WASH by 2030, including in healthcare settings. To support the achievement of this strategy, WaterAid supported Municipal authorities to conduct a participatory exercise to determine the costs of providing WASH services in all 27 government-run HCFs in the Municipality.

WaterAid and the sector calculated the costs of delivering, and more importantly sustaining water, sanitation, hygiene, waste management and environmental cleanliness services in HCFs (hereafter referred to as WASH in HCF). These costs are termed the life cycle costs and include the initial, one-off costs of installing services and infrastructure (CapEx), as well as the recurring costs to maintain services: operation and minor maintenance (O&M), rehabilitation and major capital maintenance (CapManEx), and the personnel costs associated with running the services (Support Costs).

These life cycle costs were determined at basic level across the five service domains which are recommended in the Joint Monitoring Programme (JMP) framework for monitoring WASH in HCFs: water, sanitation, hygiene, waste management, and environmental cleanliness.

The calculation methodology involved the following steps:

1. Assessment of WASH in healthcare facilities in all 27 health centres in the Municipality.
2. Participatory two-day workshop with sector stakeholders to agree inputs to the life cycle costing.
3. Calculation of the life cycle costs for each HCF in Manufahi as well as total costs at the Municipal Level using an Excel-based tool.

These costs were determined at a basic level across the five service domains which are recommended in the Joint Monitoring Programme (JMP) framework for monitoring WASH in HCFs: water, sanitation, hygiene, waste management, and environmental cleanliness.

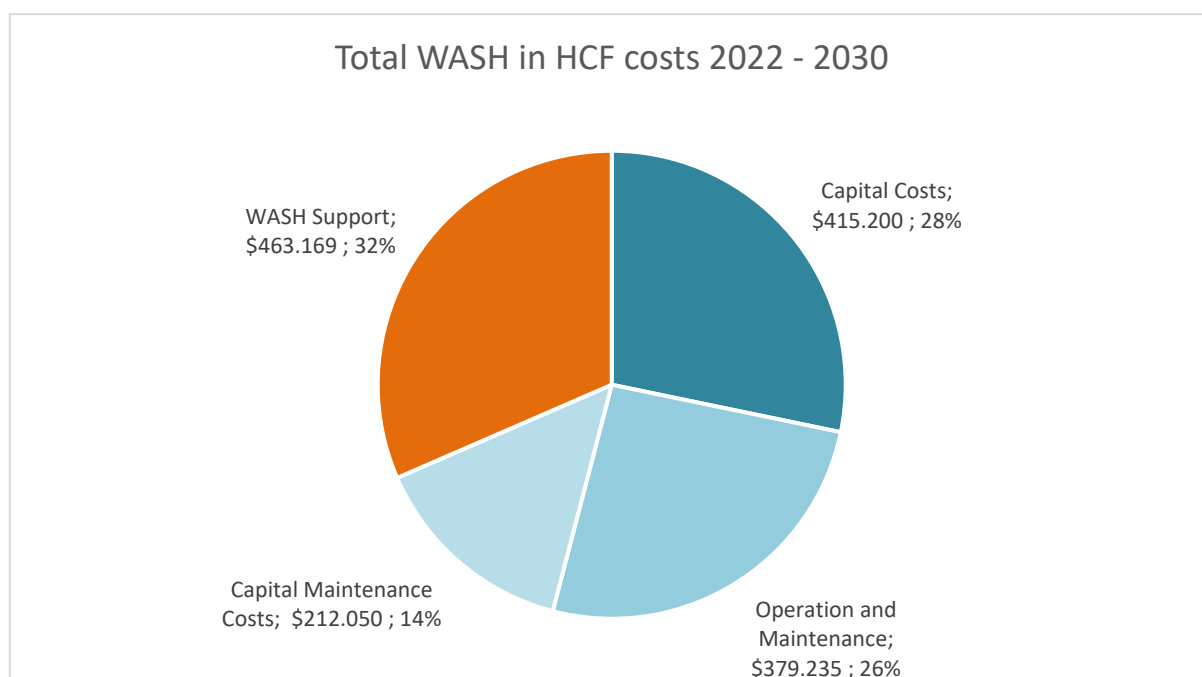
The estimated total cost of providing and sustaining WASH in HCFs in Manufahi from 2022 to 2030 is US\$1,469,654. The largest cost component is direct support – the cost of staff salaries and benefits to provide and sustain the services (see Table i, Figure i).

Table i –Total average investment needed for each service, by type of HCF 2022 – 2030, USD

Service	Average cost per Community Health Centre	Average cost per Health Post
Water	\$ 12,749	\$ 7,962
Sanitation	\$ 29,200	\$ 20,494
Hygiene	\$ 7,300	\$ 2,987
Waste Management	\$ 711	\$ 709
Environmental Cleaning	\$ 3,850	\$ 2,250
Support Costs*	\$ 49,749	\$ 8,731
Total	\$ 103,559	\$ 43,133

* Note: This is HCF-level support costs only and excludes the support costs from the Municipal departments, which is an estimated cost of \$63,360 over the analysis period

Figure i - Life Cycle Cost Components for WASH in HCF in Manufahi 2022-2030, USD



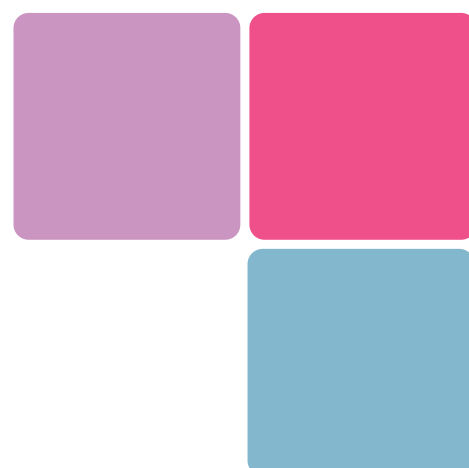
On average, each Community Health Centre and Health Post requires approximately US\$15,000 in one-off capital investment to meet minimum basic service levels, as well as recurrent annual costs of approximately US\$10,000 for Community Health Centres and US\$3,000 for Health Posts every year (Table ii). Based on the Manufahi population from the 2015 census this represents costs of US\$7.74 per capita for capital investment, and US\$2.05 per capita for recurrent costs.



Table ii – Average investment needed for each life cycle cost, by type of HCF 2022 – 2030, USD

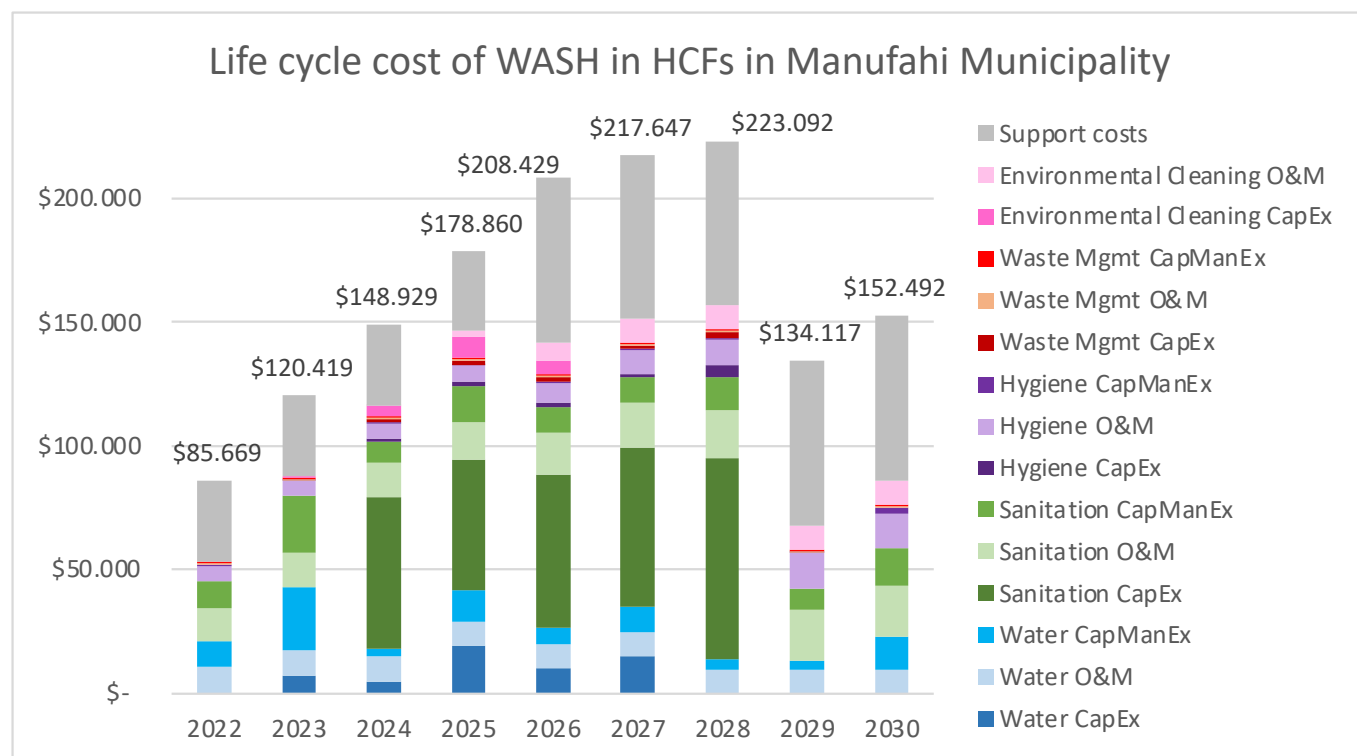
Life cycle cost category		Average cost per Community Health Centre	Average cost per Health Post
Capital investment	Capital Costs	\$ 14,863	\$ 15,467
Recurrent annual costs	Operation and Maintenance	\$ 3,128	\$ 1,288
	Capital Maintenance Costs	\$ 1,199	\$ 816
	WASH Support*	\$ 5,528	\$ 970
	Subtotal: Recurrent annual costs	\$ 9,855	\$ 3,074

* Note: This is HCF-level support costs only and excludes the support costs from the Municipal departments, which is an estimated cost of \$63,360 over the analysis period



We also calculated the total cost per year for the Municipal Government between 2022 and 2030 based on expected timelines for upgrading infrastructure, the expected lifespan of infrastructure before it requires rehabilitation, and the roll-out of training for cleaning protocols (Figure ii). The largest annual cost has been determined as US\$223,092 in 2028, with recurring costs in 2029 and beyond between US\$130,000 and US\$155,000.

Figure ii - Full life cycle costing estimates for WASH in HCF in Manufahi 2022 – 2030, USD

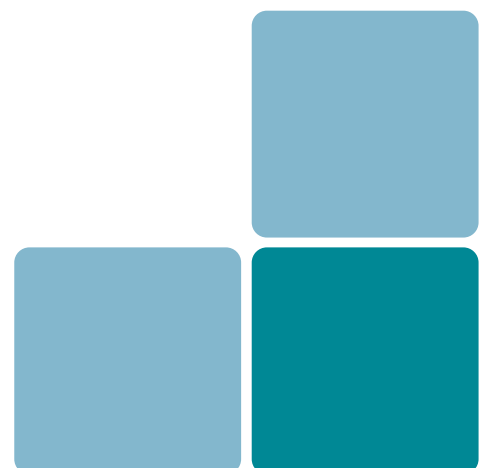


The current budget for WASH in HCFs in Manufahi is insufficient to address health risks. In order to adequately fund WASH in HCFs we recommend the following

1. The national budget, prepared by the Ministry of Health, and approved by the National Parliament, should allocate at least US\$7.74 per capita for capital investment in WASH in health care facilities, and US\$2.05 per capita for recurrent costs of sustaining WASH in health care facilities.
2. Within financing, priority needs to be given to adequately staffing support to WASH services in health care facilities, including cleaning, operation, maintenance, behaviour change promotion and capacity development.
3. The national Ministry of Health and Ministry of State should work together to clarify the roles and responsibilities for financing the various components of WASH in health care facilities to ensure finance flows are more effective and transparent.
4. The Manufahi Municipality Administration should use these costings to prepare an updated costed plan with annual budget allocations needed to achieve universal WASH in health care facilities for the whole municipality.
5. A national protocol/guideline and associated municipality-wide roll-out program should be developed to establish cleaning protocols, responsibilities and training for environmental cleanliness in every health care facility, linked with quality assurance processes.

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1. Introduction

Safe, reliable water, adequate sanitation, waste systems and hygiene (WASH) services and behaviours in health care facilities (HCFs), along with safe waste disposal and environmental cleaning, are vital for safe, quality health care provision.¹ WASH services in health care facilities are especially critical for the health of mothers and newborns to support quality, safe delivery and post-partum care. The provision of WASH in health care facilities serves to reduce the risk of infections, control the spread of disease (including SARS-CoV-2) and slow the development and spread of antimicrobial resistance.²

The Global Taskforce on WASH in health care facilities for budgets and financing recently estimated the global cost of achieving at least basic services in public healthcare facilities in least developed countries by 2030 at between US\$6.5-9.6 billion, equating to US\$2.43-3.99 per capita for capital investment and US\$2.99-3.89 per year for recurrent spending.³ As part of that estimate, UNICEF and WHO together with the Timor-Leste Ministry of Health created a high-level national estimate for the costs of WASH in non-hospital HCFs based on 2-3 years' historical expenditure by Ministry of Health. They estimated that HCFs would require US\$50,250 in capital expenditure and US\$1,492.50 in annual recurrent expenditure on average to achieve the Sustainable Development Goal targets for WASH in HCFs.⁴

In 2020 Manufahi Municipality in Timor-Leste developed a Municipal WASH Strategy which sets targets for achieving universal WASH by 2030, including in healthcare settings. To support the achievement of this strategy, WaterAid supported Municipal authorities to conduct a participatory exercise to determine the costs of providing and sustaining WASH services in HCFs for the entire Municipality. This report presents the results of the costing, using Life Cycle Costing methodology (life cycle costs are explained in Section 2). The costing uses data on WASH facilities in HCF from an assessment of the WASH and COVID-19 infection prevention controls conducted for all 27 healthcare facilities in Manufahi Municipality in 2020 (summary of results provided in section 3). The methodology for the costing is outlined in Section 4, followed by a presentation of the results in Section 5. Section 6 provides a short discussion and outlines limitations of the calculation process and results.

- 1 Water, sanitation and hygiene in health care facilities: practical steps to achieve universal access. Geneva: World Health Organization; 2019
- 2 WHO, UNICEF, WaterAid. Combatting antimicrobial resistance through water, sanitation, hygiene and infection prevention and control. Geneva: 2020. https://www.who.int/water_sanitation_health/joint-wash-ipc-amr-actions-2020-201022.pdf?ua=1
- 3 WHO and UNICEF (2021). The cost of meeting basic WASH service levels in public health care facilities: Estimates for the 46 least developed countries. Presentation to Taskforce on WASH in health care facilities: budgets and financing, 16 November 2021
- 4 High-level cost estimates provided by UNICEF Timor-Leste.

2. Glossary: What are WASH life-cycle costs?

WASH life cycle costs are the costs of delivering, and more importantly sustaining water, sanitation and hygiene services. Life cycle costs include not only the initial, one-off costs of installing new infrastructure, but also the short and long-term costs of maintaining these services long into the future.

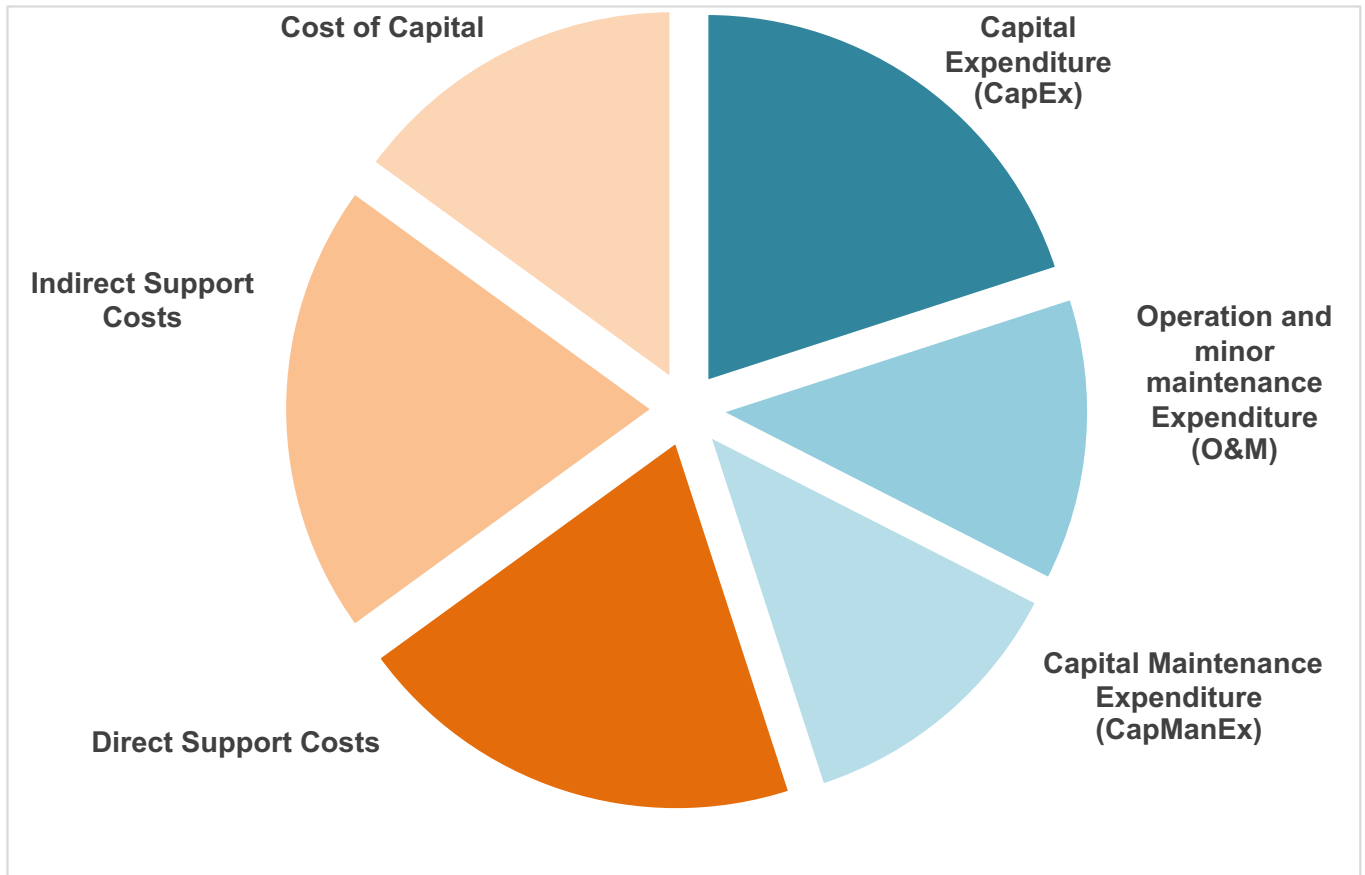
Life cycle costs are more easily understood when they are categorised into six components (Table 1).

Table 1 – Categories of life cycle costs

Cost category	Description
Capital expenditure (CapEx)	The cost of installing new services. This includes construction costs for new infrastructure, training and forming facility management groups.
Operation and minor maintenance (O&M)	The cost of running services, paying for regular mechanical checks, cleaning, replacing small parts, and recurring monthly costs like supply of soap and water.
Major capital maintenance (CapManEx)	<p>The cost to renew, replace or rehabilitate services after their design life. CapManEx has two components—the cost of repairing the existing facilities that are non-functioning, and the ones that will need to be repaired after their expected design life. These costs are less frequent than O&M costs but often more expensive per facility.</p> <p>In this analysis, we simplified calculations by considering the replacement of non-functioning existing facilities as a CapEx cost.</p>
Direct Support	<p>The cost of staffing support to keep the services functioning.</p> <p>In this costing we considered HCF and Municipality costs for providing support to WASH services in health centres, including supervising new construction, monitoring, training and behaviour change promotion. We also included the staff wages for facility cleaning.</p>
Indirect Support	<p>The cost of support to ensure a supportive enabling environment, typically incurred at national level. This might include the costs of developing strategies, policies, monitoring frameworks/tools and budgets.</p> <p>In this costing we only considered those costs incurred at Municipal level, and combined them with the direct support costs.</p>
Cost of Capital	<p>The cost of borrowing money, or investing in WASH services instead of other investment opportunities. For example if the government takes out a loan for new infrastructure and is required to pay annual interest.</p> <p>In this costing we did not calculate the cost of capital.</p>

These six categories of costs are shown graphically in Figure 1, where the three 'hardware' costs predominantly associated with infrastructure are highlighted in blue and the three 'software' costs predominantly associated with people's time, travel and loan interest repayments, coloured orange.

Figure 1 – The six life cycle components (adapted from IRC-WASH 2016)



3. Background: JMP indicators and the status of WASH in Healthcare Facilities in Manufahi

The Joint Monitoring Programme (JMP) outlines globally-comparable service levels for WASH services in healthcare settings, increasing in quality from no service to limited and basic. For the achievement of the Sustainable Development Goals, specifically SDG 6 (clean water and sanitation) and SDG 3 (good health and wellbeing) the JMP considers five services which are essential in HCFs: water, sanitation, hygiene, waste management and environmental cleaning. As Timor-Leste does not yet have a government-endorsed standard or guideline for WASH in health care settings, the JMP service levels and indicators are used for assessing WASH in HCF standards. A minimum basic service level is desired for each service, as defined in Table 2. Refer to the full JMP service ladders for WASH in HCF in Appendix 1.

Table 2 – Basic JMP service levels definitions for WASH in HCFs

Water	Water is available from an improved source located on premises.
Sanitation	Improved sanitation facilities are usable with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for people with limited mobility.
Hygiene	Functional hand hygiene facilities (with water and soap and/or alcohol rub) are available at points of care, and within 5 metres of toilets.
Waste management	Waste is safely segregated into at least three bins and sharps and infectious waste are treated and disposed of safely.
Environmental cleaning	Basic protocol for cleaning available, and staff with cleaning responsibilities have all received training.

The assessment of WASH in HCF undertaken in Manufahi in 2020 assessed the progress of WASH in 27 health care facilities (Table 3). The results of the JMP service levels are presented in Table 4. In Manufahi, 59% of health care facilities (16/27) met basic services for water supply, 7% of health care facilities (2/27) met basic services for sanitation, 37% of health care facilities (10/27) met basic service levels for hygiene, 4% of health care facilities (1/27) met basic levels for waste management and 0% of health care facilities (0/27) met basic levels for environmental cleaning.



Table 3 – Type of health care facility assessed in Manufahi in 2020

Facility type	Number
Health Post	23
Community Health Centre	4
Hospital	0
Total	27

Table 4 – JMP service level assessment for WASH in HCF in Timor-Leste in 2020 (WaterAid 2021)

JMP Service Level	Water			Sanitation			Hygiene			Health Care Waste Management*			Environmental Cleaning		
	M	L	T	M	L	T	M	L	T	M	L	T	M	L	T
Basic	59%	75%	67%	7%	14%	11%	37%	61%	49%	4%	14%	9%	0%	7%	4%
Limited	22%	21%	22%	93%	86%	89%	7%	7%	7%	11%	68%	40%	26%	32%	29%
No service	19%	4%	11%	0%	0%	0%	56%	32%	44%	85%	11%	47%	74%	61%	67%

* 4% could not be calculated, **M=Manufahi, L= Liquiçá, T=total



4. Life cycle costing methodology

Life cycle costing assessments can serve a variety of purposes. In undertaking this analysis in Timor-Leste WaterAid's objectives were to:

1. Support Municipal government and health care facilities staff to identify and understand the costs required to provide and sustain WASH in HCFs as part of the Municipal WASH strategy.
2. Identify the current funding gap for provision of WASH in HCFs and use this evidence to inform national advocacy efforts to increase the allocation of finance for WASH in HCFs.

WaterAid Timor-Leste's methodology involved the following steps:

1. Assessment of WASH in healthcare facilities in all 27 health centres in the Municipality.	<ol style="list-style-type: none">a. In 2020-2021 WaterAid, together with local Municipal government and non-government partners Fundasaun Luta ba Futuru (FLBF) and Luta ba Mudansa (LBM) conducted quantitative municipality-wide assessments of WASH in healthcare facilities in every health post and community health centre in the municipality.b. A mobile-phone based survey was used to document interviews with HCF staff and observations of WASH and infection-prevention facilities at the HCF.c. The results of the assessment identified the current WASH in HCF situation and the number of HCFs which are not yet meeting minimum basic JMP levels (see Section 3 of this report).
2. Participatory two-day workshop with sector stakeholders to agree inputs to the life cycle costing.	<ol style="list-style-type: none">a. Orientation to Municipal stakeholders about the utility of understanding and calculating the life cycle costs for WASH in healthcare settings.b. Participants conducted practical exercises based on data from HCFs in their municipality to deepen their understanding of the process of calculating life cycle costs.c. Information obtained from discussions and participant consensus included unit costs for infrastructure, operation and rehabilitation, average personnel salaries and estimated time spent by various personnel on direct and indirect support. Participants also decided how they would recommend prioritising competing priorities for limited budget.d. Workshop participants included Municipal government from the Municipal Administration, health department, planning department, public works department, women's affairs, representatives of Municipal consultative council, NGOs, and representatives from three health centres.

3. Calculation of the life cycle costs for each HCF in Manufahi as well as total costs at the Municipal Level using an Excel-based tool.

- a. Identifying the minimum number of new facilities required to meet minimum basic JMP levels for each category of water, sanitation, hygiene, waste management and environmental cleaning, considering existing facilities at each HCF. The capital costs were determined by multiplying the number of new or replacement facilities (in cases where existing facilities are non-functional) by the unit costs for new infrastructure (see Table 8 in Appendix 2).
- b. Estimating the year of construction for new facilities based on agreed priorities of the Municipal stakeholders, namely that the HCFs with the largest number of patients should be prioritised and that water supply should be prioritised before sanitation, hygiene, waste management and cleaning.⁵
- c. Calculating the annual operation and maintenance costs for each WASH and waste facility in each HCF based on the existing and expected future facilities, and the unit costs agreed by workshop participants (see Table 9 in Appendix 2). Operation and maintenance costs are expected to change once new infrastructure is installed – sometimes increasing due to the need to maintain new infrastructure, or decreasing when new on-site water facilities provide cheaper water.
- d. Estimating the year and cost of major maintenance for rehabilitating infrastructure based on each infrastructure's expected life span and expected rehabilitation costs (see Table 8 in Appendix 2). This leads to yearly variation in cost as different infrastructure ages and requires significant investment to keep it running.
- e. Estimating the support costs for personnel time to keep services functioning. This was based on the current number of staff at HCF or Municipality level (from the assessment survey) multiplied by average staff daily wages, travel and per diems, and estimated number of days each role spends supporting WASH and waste management. Both the current staffing situation and an 'ideal' future situation in which additional staff and time are dedicated for WASH in HCF were included (see Table 10 and Table 11 in Appendix 2).

⁵ We note it may be more cost effective to construct all new infrastructure at once in each HCF. For the purposes of this analysis, water facilities have been assumed to be constructed one year in advance of other services based on the workshop consensus.

5. Results: Life cycle costs for WASH in HCF in Manufahi Municipality

Total life cycle costs

The tables and graphs below show the amount of annual budget that is needed to provide WASH and waste management services in all 27 health care facilities in Manufahi Municipality from 2022 to 2030. In Table 7 we present the total expected cost required at Municipal level for each of the five JMP domains for WASH in HCF, and the personnel support costs. The total cost of providing and sustaining WASH in all HCFs in Manufahi from 2022-2030 is calculated as US\$1,469,654.

The costs are also presented as average costs for the two different types of HCF, in Table 5. This highlights that the greatest investment in Community Health Centres is in the personnel time to keep services running, followed by sanitation and then water supply. In Health Posts, the largest investment is needed in sanitation, followed by personnel costs and then water supply.

How to interpret life cycle cost results?

This section presents the results of the life cycle cost assessment at a Municipal Level as the sum of the results from the 27 HCFs. The annotated results shown here from one HCF, the Turisca Community Health Centre, can help readers to understand how to interpret the results.

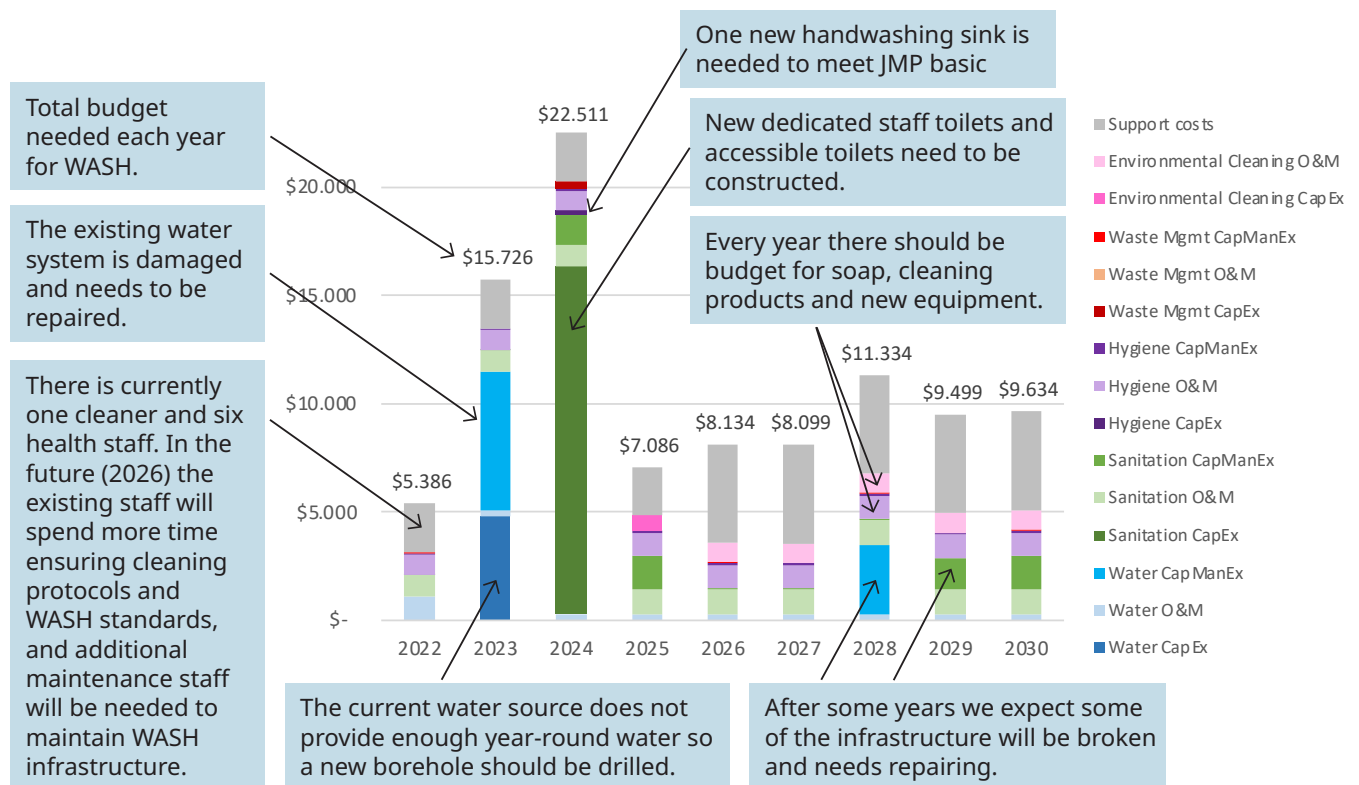


Table 5 –Total average investment needed for each service, by type of HCF 2022 – 2030, USD

Service	Average cost per Community Health Centre	Average cost per Health Post
Water	\$ 12,749	\$ 7,962
Sanitation	\$ 29,200	\$ 20,494
Hygiene	\$ 7,300	\$ 2,987
Waste Management	\$ 711	\$ 709
Environmental Cleaning	\$ 3,850	\$ 2,250
Support Costs*	\$ 49,749	\$ 8,731
Total	\$ 103,559	\$ 43,133

* Note: This is HCF-level support costs only and excludes the support costs from the Municipal departments, which is an estimated cost of \$63,360 over the analysis period

The investment needed for Community Health Centres and Health Posts for each of the life cycle categories is presented in Table 6. While more facilities are typically needed in the Community Health Centres, they tend to already have more existing facilities, or more functioning facilities. This means slightly more capital investment is needed in an average Health Post than in the Community Health Centres. Recurring annual costs in Community Health Centres are approximately three times higher than in Health Posts.

Table 6 – Average investment needed for each life cycle cost, by type of HCF 2022 – 2030, USD

	Life cycle cost category	Average cost per Community Health Centre	Average cost per Health Post
Capital investment	Capital Costs	\$ 14,863	\$ 15,467
Recurrent annual costs	Operation and Maintenance	\$ 3,128	\$ 1,288
	Capital Maintenance Costs	\$ 1,199	\$ 816
	WASH Support*	\$ 5,528	\$ 970
	Subtotal: Recurrent annual costs	\$ 9,855	\$ 3,074

* Note: This is HCF-level support costs only and excludes the support costs from the Municipal departments, which is an estimated cost of \$63,360 over the analysis period

Table 7 – Full life cycle costing estimates 2022 – 2030, USD

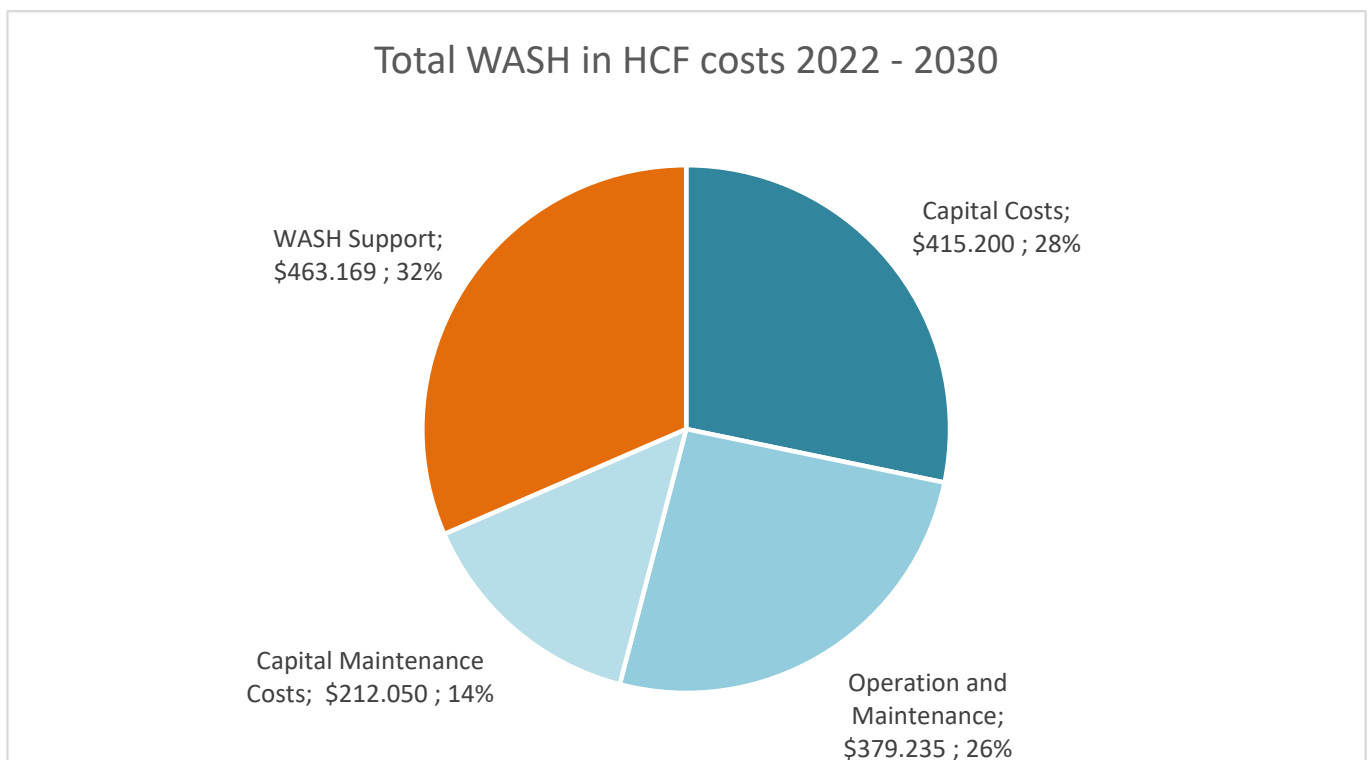
	Cost	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
Water	CapEx	\$ -	\$ 7,050	\$ 4,800	\$ 19,200	\$ 10,350	\$ 15,150	\$ -	\$ -	\$ -	\$ 56,550
	O&M	\$ 10,932	\$ 10,107	\$ 10,062	\$ 9,827	\$ 9,695	\$ 9,748	\$ 9,748	\$ 9,748	\$ 9,748	\$ 89,615
Sanitation	CapManEx	\$ 9,850	\$ 25,650	\$ 3,200	\$ 12,800	\$ 6,650	\$ 9,850	\$ 3,950	\$ 3,200	\$ 12,800	\$ 87,950
	CapEx	\$ -	\$ -	\$ 61,400	\$ 52,200	\$ 61,750	\$ 64,550	\$ 81,500	\$ -	\$ -	\$ 321,400
Hygiene	O&M	\$ 13,680	\$ 13,680	\$ 13,680	\$ 15,480	\$ 16,560	\$ 17,820	\$ 19,260	\$ 21,060	\$ 21,060	\$ 152,280
	CapManEx	\$ 10,720	\$ 23,420	\$ 8,320	\$ 14,720	\$ 10,320	\$ 10,720	\$ 13,220	\$ 8,320	\$ 14,720	\$ 114,480
Waste Mgmt	CapEx	\$ -	\$ -	\$ 1,200	\$ 1,500	\$ 2,000	\$ 1,300	\$ 4,550	\$ -	\$ -	\$ 10,550
	O&M	\$ 5,940	\$ 5,940	\$ 5,940	\$ 6,840	\$ 8,100	\$ 9,720	\$ 10,800	\$ 14,400	\$ 14,400	\$ 82,080
Environmental Cleaning	CapManEx	\$ 620	\$ 120	\$ 620	\$ 120	\$ 620	\$ 120	\$ 620	\$ 120	\$ 2,320	\$ 5,280
	CapEx	\$ -	\$ -	\$ 1,400	\$ 1,500	\$ 1,500	\$ 1,400	\$ 2,000	\$ -	\$ -	\$ 7,800
Support costs	O&M	\$ 780	\$ 780	\$ 780	\$ 780	\$ 780	\$ 780	\$ 780	\$ 780	\$ 780	\$ 7,020
	CapManEx	\$ 560	\$ 385	\$ 560	\$ 385	\$ 560	\$ 385	\$ 560	\$ 385	\$ 560	\$ 4,340
	CapEx	\$ -	\$ 700	\$ 4,200	\$ 8,400	\$ 5,600	\$ -	\$ -	\$ -	\$ -	\$ 18,900
	O&M	\$ -	\$ -	\$ 180	\$ 2,520	\$ 7,380	\$ 9,540	\$ 9,540	\$ 9,540	\$ 9,540	\$ 48,240
		\$ 32,587	\$ 32,587	\$ 32,587	\$ 32,587	\$ 66,564	\$ 66,564	\$ 66,564	\$ 66,564	\$ 66,564	\$ 463,169

TOTAL Water	\$ 20,782	\$ 42,807	\$ 18,062	\$ 41,827	\$ 26,695	\$ 34,748	\$ 13,698	\$ 12,948	\$ 22,548	\$ 234,115
TOTAL Sanitation	\$ 24,400	\$ 37,100	\$ 83,400	\$ 82,400	\$ 88,630	\$ 93,090	\$ 113,980	\$ 29,380	\$ 35,780	\$ 588,160
TOTAL Hygiene	\$ 6,560	\$ 6,060	\$ 7,760	\$ 8,460	\$ 10,720	\$ 11,140	\$ 15,970	\$ 14,520	\$ 16,720	\$ 97,910
TOTAL Waste Management	\$ 1,340	\$ 1,165	\$ 2,740	\$ 2,665	\$ 2,840	\$ 2,565	\$ 3,340	\$ 1,165	\$ 1,340	\$ 19,160
TOTAL Environmental Cleaning	\$ -	\$ 700	\$ 4,380	\$ 10,920	\$ 12,980	\$ 9,540	\$ 9,540	\$ 9,540	\$ 9,540	\$ 67,140
TOTAL	\$ 85,669	\$ 120,419	\$ 148,929	\$ 178,860	\$ 208,429	\$ 217,647	\$ 223,092	\$ 134,117	\$ 152,492	\$ 1,469,654

Reflecting the six life cycle cost categories presented earlier (Figure 1), the following chart (Figure 2) shows the relative proportion of costs expected for achieving and sustaining basic WASH in health care facilities for the life of the Municipal WASH strategy 2022-2030. The largest proportion of costs (32%, US\$463,169) is expected for WASH support – the costs of staff time and travel, both from health facility staff and municipal department functionaries, to provide supervision, monitoring, training and cleaning. While these are often ‘forgotten’ costs because they do not relate to physical infrastructure, in Manufahi these mostly reflect existing health care facility and municipal staff, whose wages are already fully budgeted. Some additional staff, especially cleaners and maintenance personnel are recommended to ensure each health care facility has dedicated staff for cleaning and maintaining cleanliness. The second largest cost is for the one-off capital costs of new infrastructure at 28% (US\$415,200) then the ongoing annual cost – operation and maintenance at 26% (US\$379,235), followed by with the smallest expected budget required for capital maintenance and rehabilitation costs at 14% (US\$212,050).

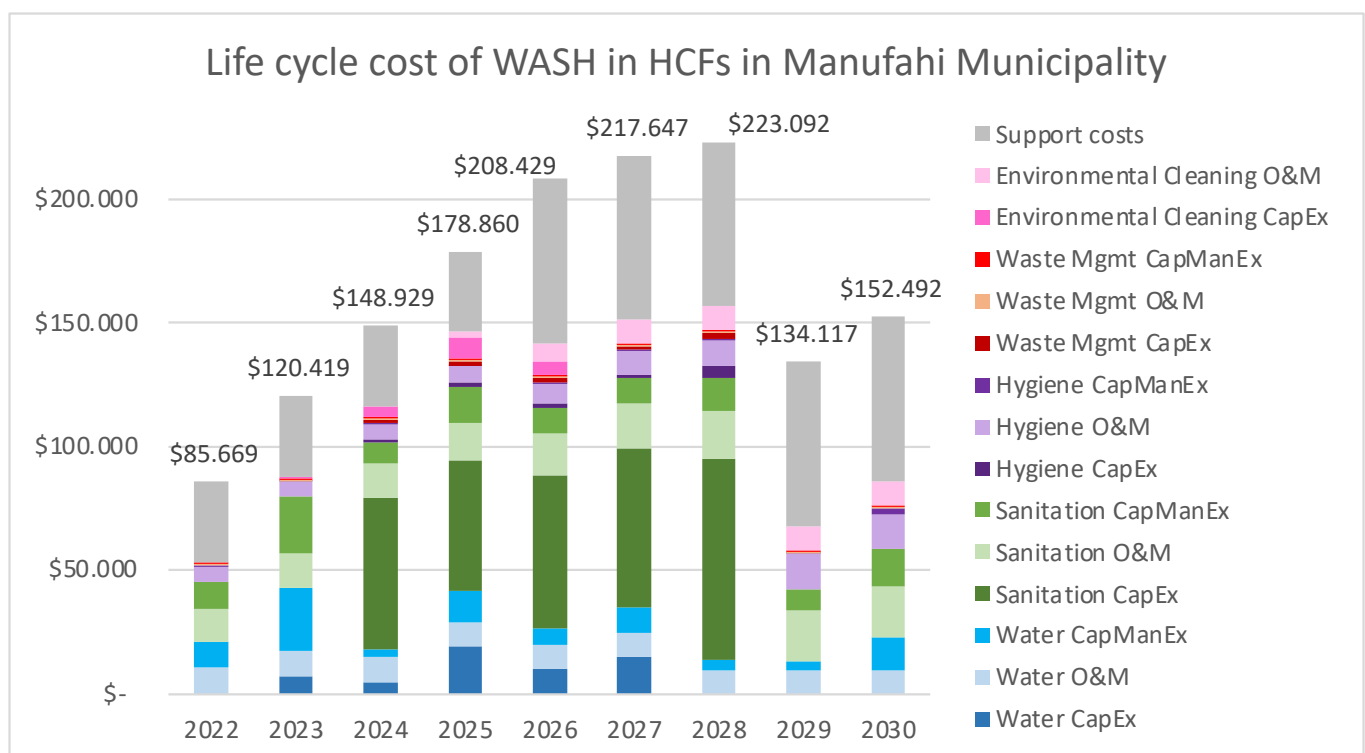
We have assumed that all existing facilities which require rehabilitation to become fully functional will be repaired in 2023, which is the reason for the higher CapManEx result for water and sanitation in that year.

Figure 2- Life Cycle Cost Components for WASH in HCF in Manufahi 2022-2030, USD



The expected costs each year for achieving the Municipal strategy for WASH in health care facilities are presented in Figure 3. The required budget varies each year depending on how many new facilities are required and the expected life span and associated rehabilitation costs of different infrastructure. The maximum estimated annual budget required is US\$223,092 in 2028. Based on the discussions with municipal stakeholders, the costs for upgrading water infrastructure were prioritised before sanitation, hygiene and waste management facilities, and the capital costs (CapEx) were distributed over five years, with completion of all new infrastructure in 2028. Beyond 2028, the annual costs for maintaining, rehabilitating and supporting services are expected to be between US\$130-155,000. The largest cost component in most years is for support costs of personnel time (salaries) and travel (transport and per diems). These support costs have not been disaggregated by water, sanitation, hygiene, waste management or environmental cleaning, as often the support is provided to all WASH components at the same time, however the large proportion of annual costs which are support costs highlights the importance of providing adequate staff salaries and time to ensure services are sustained.

Figure 3- Full life cycle costing estimates for WASH in HCF in Manufahi 2022 – 2030, USD



After support costs, the second largest proportion of costs relates to construction of new sanitation infrastructure (CapEx). This is because most of the healthcare facilities in the municipality require construction of additional toilets to allow sex-separated toilets, and separate toilets for staff and patients.

Water supply costs

The annual costs of providing basic JMP water supply services which need to be budgeted are presented in Figure 4. Construction of new infrastructure (CapEx) has been assumed in 5-7 health care facilities each year between 2023 and 2027, with the health care facilities servicing the largest number of patients prioritised first. The largest annual water cost occurring in 2023 is when new infrastructure results from the need to rehabilitate existing infrastructure which is not fully functional. From 2028 onwards the expected operation and maintenance costs (O&M) for water supply stabilise at around US\$10,000 for all 27 health care facilities in the municipality.

Figure 4- Full life cycle costing estimates for water in HCF in Manufahi 2022 – 2030, USD

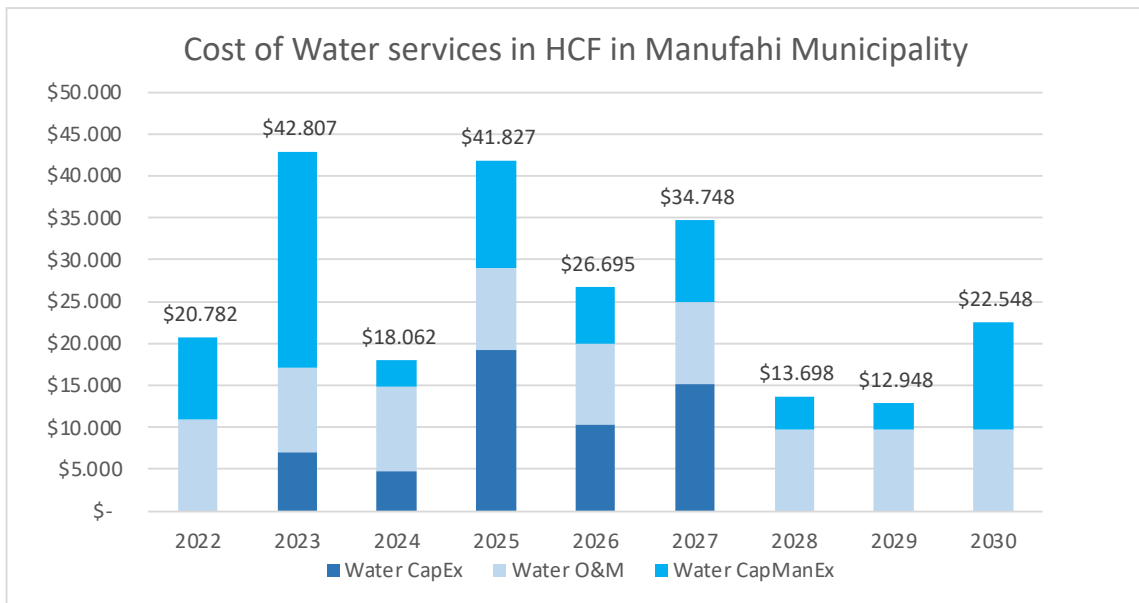
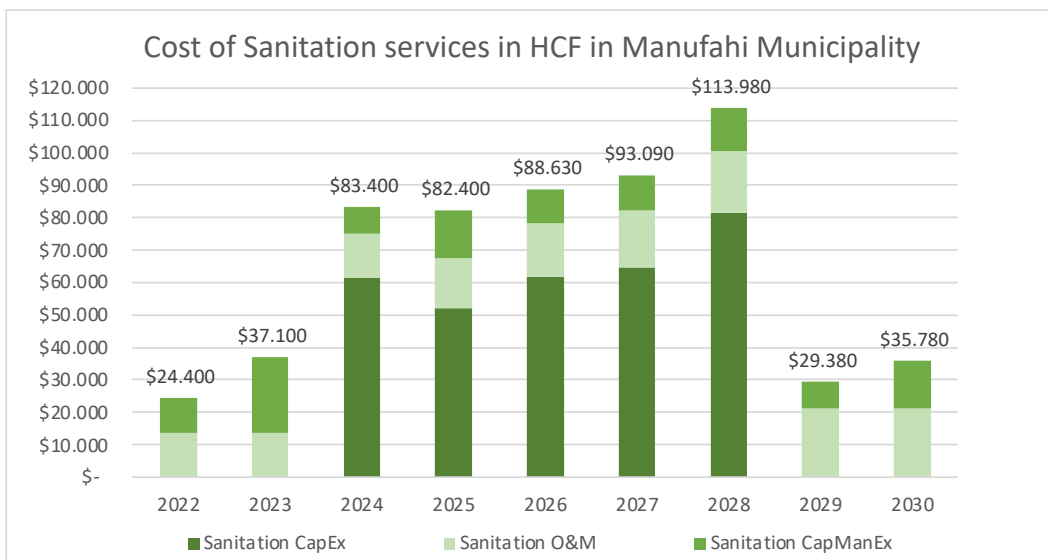


Figure 5 - While the Uma Berloic Health Post water supply meets minimum basic JMP, the generator and pump require rehabilitation to maintain this service into the future.

Sanitation costs

The annual costs of providing basic JMP sanitation services which need to be budgeted are presented in Figure 6. Construction of new infrastructure (CapEx) has been assumed for 2024-2028, and rolled out to health care facilities after water supply has already been installed the prior year, though some efficiencies in labour and transportation costs would be realised if water and sanitation facilities were constructed simultaneously. The largest annual sanitation cost is expected to occur in 2028, because the smallest health posts (lower priority) are generally the health care facilities requiring additional toilet construction to meet basic service levels (Figure 7). From 2029 onwards the expected operation and maintenance costs (O&M) for sanitation stabilise at around US\$21,000 for all 27 health care facilities in the municipality.

Figure 6- Full life cycle costing estimates for sanitation in HCF in Manufahi 2022 – 2030, USD



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Figure 7- Many of the smaller health care facilities, such as the Liurai health post, do not meet JMP basic sanitation because they require separate toilets for staff, sex-separated toilets for patients, or accessible toilets.

Hygiene costs

The annual costs of providing basic JMP hygiene services which need to be budgeted are presented in Figure 8. Construction of new infrastructure (CapEx) has been assumed for 2024-2028, and rolled out to health care facilities after water supply has already been installed the prior year though some efficiencies in labour and transportation costs would be realised if water and hygiene facilities were constructed simultaneously. From 2029 onwards the expected operation and maintenance costs (O&M) for hygiene stabilise at around US\$14,000 for all 27 health care facilities in the municipality, but significant variation in the annual cost of rehabilitation/replacement (CapManEx) is expected for health care facilities that continue to rely on bucket-tap type handwashing facilities (Figure 9) which have a shorter lifespan than sinks.

Figure 8- Full life cycle costing estimates for hygiene in HCF in Manufahi 2022 – 2030, USD

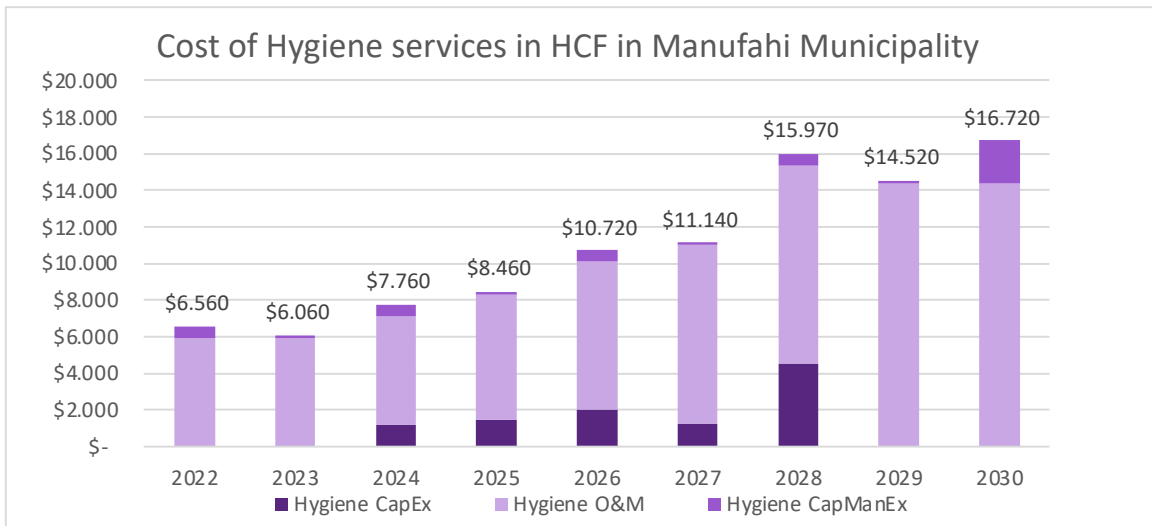


Figure 9- Bucket-tap style handwashing facilities such as this one at Dotik Health Post have proliferated during COVID-19 but have relatively life-spans before they need to be replaced, which adds significant rehabilitation costs over time.

Waste management costs

The annual costs of providing basic JMP waste management services which need to be budgeted are presented in Figure 10. Construction of new infrastructure (CapEx) has been assumed for 2024-2028, and rolled out to health care facilities after water supply has already been installed the prior year though some efficiencies in labour and transportation costs would be realised if water and waste management facilities were constructed simultaneously. Only one health care facility is already meeting basic JMP for waste management and most health care facilities require new waste bins to segregate general waste, infectious waste and sharps (Figure 11). While some health care facilities have existing incinerators (Figure 12) or transport waste for disposal at the municipal hospital or community health centres, construction and maintenance of lined, protected pits would present a relatively cheap way of achieving the waste disposal required for JMP basic service levels. From 2029 onwards the expected operation and maintenance costs (O&M) for waste management stabilise at around US\$800 for all 27 health care facilities in the municipality.

Figure 10- Full life cycle costing estimates for waste management in HCF in Manufahi 2022 – 2030, USD

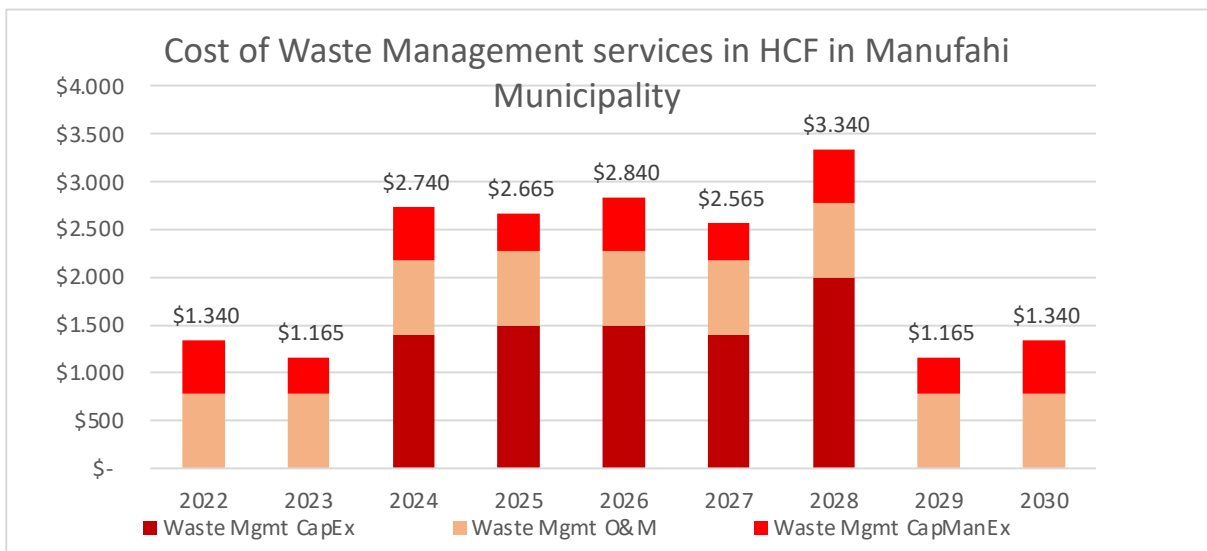


Figure 11- Separate waste bins for general waste, infectious waste and sharps at the Tutuluro Akadiru Tetuk health post

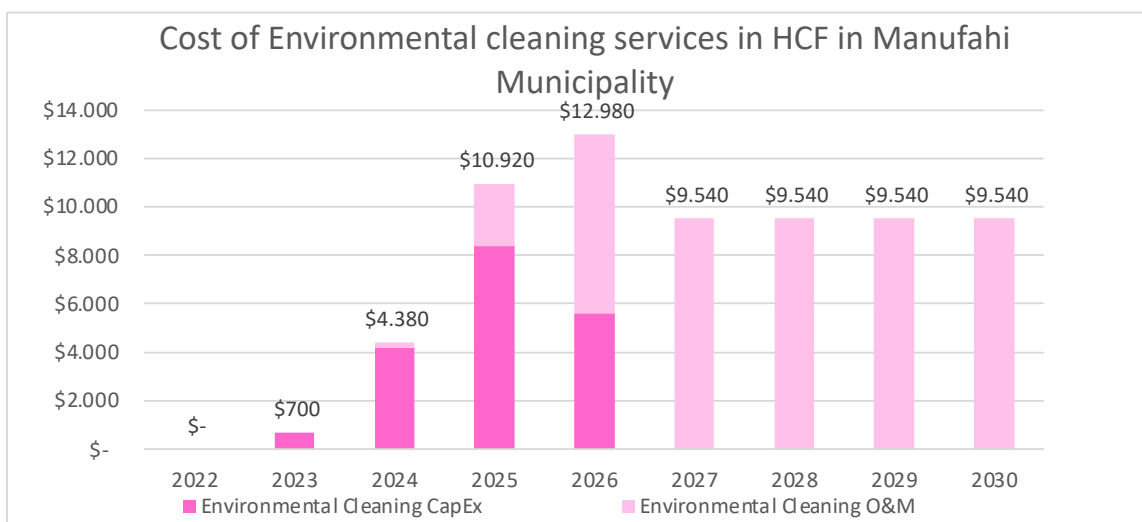


Figure 12- Incinerator at the Turisca community health centre

Environmental cleaning costs

The annual costs of providing basic JMP environmental cleaning services which need to be budgeted are presented in Figure 13. The JMP basic definition for environmental cleaning relates to healthcare facility cleaners having training and protocols for cleaning and disinfections. While new infrastructure is not required, the start-up costs for this service (CapEx) consist of providing a full set of cleaning equipment and materials to healthcare centres, providing training and establishing the cleaning protocols and quality assurance checklists and processes to ensure infection prevention and control. The CapEx costs here have assumed a phased training of trainers model in which the community health centre cleaning staff are trained and establish protocols and then train cleaners in the health posts. From 2024 onwards the expected operation and maintenance costs (O&M) for replacing cleaning equipment and materials stabilise at around US\$9500 for all 27 health care facilities in the municipality. Most of the ongoing environmental cleaning relate to the time and salaries of cleaners and health centre staff for quality control and are covered already under the support costs.

Figure 13- Full life cycle costing estimates for environmental cleaning in HCF in Manufahi 2022 – 2030, USD



6. Limitations

When interpreting and using the results of the life cycle costing analysis in this report, the following limitations should be taken into consideration.

- We have presented total and average costs for WASH in HCFs, but there is considerable variation in the costs in each health care facility. For facility-level planning and budgeting, budget-holders are encouraged to refer to the facility-level calculations in the assessment spreadsheet.
- The data on WASH in health care facilities was drawn from Municipal-wide surveys conducted in 2020-2021. Some facilities may have become non-functioning in the time between the survey and the calculation, there may have been staffing changes, and there may have been some construction of new facilities in that time. The survey data was mostly complete for the purposes of conducting the LCCA with the exception that the year of construction of physical infrastructure was not always recorded. For the purposes of estimating the timing of rehabilitation costs (CapManEx) based on asset lifespans, a smaller sample of healthcare facilities were contacted and the years of construction assumed based on the range of years in the sample.
- The cost of new facilities/assets (CapEx) were estimated based on actual bills of quantities, labour transport and construction costs from WaterAid's projects which have typically been at the WASH facility scale. Actual costs of construction for WASH facilities may vary if completed by other actors using other procurement processes, or at a different scale.
- There is no standard or universally agreed guideline for the ideal number of staff and hours required for WASH in HCFs. The current staffing has been used, and future ideal staffing rates based on inputs from workshop participants. There are significantly more staff working on WASH in the Community Health Centres compared to the Health Posts, and the establishment of cleaning protocols and training to achieve environmental cleanliness would go some way to ensuring that dedicated staff time is used for maintaining and cleaning facilities.
- To date, the detailed budgets for WASH in HCF from relevant actors funding WASH in HCF from various government departments, NGOs and community, have not been made available for detailed comparison and estimation of the budget gap. It is hoped this report will prompt discussion about the differences between available and required budgets.
- This costing considered only the government health care facilities. There are private clinics operating in the municipality which have not been included in this study.
- No inflation has been applied in this costing analysis. Inflation in Timor-Leste has varied significantly year-to year from as low as -1.4% to +8.9% in the past three years.⁶ When interpreting the results readers should consider that the actual costs in future years may be impacted by inflationary changes to actual costs of goods and services.

⁶ World Bank (2021) Inflation, GDP deflator (annual %) – Timor-Leste <https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG?locations=TL> Accessed 10 December 2021

7. Discussion and recommendations



At the 2015 census, Manufahi had a population of 53,615 people. Based on the life cycle costing results above, the per capita cost of providing WASH in all HCFs in the Municipality is US\$7.74 for capital investment, and US\$2.05 per annum for recurrent spending (including support costs). This upfront capital investment is substantially higher than the global average estimated by the Global Taskforce on WASH in health care facilities but the ongoing recurrent costs are likely to be slightly below the global average.

The total investment cost per HCF of US\$14,863 for Community Health Centres and US\$15,467 for Health Posts is substantially lower than the US\$50,250 from the national-level UNICEF-WHO-Ministry of Health estimates. This may reflect different unit costs based on procurement and construction approaches, or the current WASH

in HCF status of Manufahi may be slightly better than the national average. The national-level UNICEF-WHO-Ministry of Health estimates of \$1,492.50 for recurring costs are substantially lower than our calculation of US\$9,855 for Community Health Centers and US\$3,074 for Health Posts, however those estimates did not include personnel support costs or environmental cleanliness and would otherwise be relatively comparable.

While detailed budget figures for WASH in HCF at the Municipal level in Manufahi are not yet available, it is almost certain that they are less than the costs calculated in this assessment to provide minimum basic JMP level. Until there is sufficient investment in WASH in HCF the health of patients, especially mothers and newborns is at risk.

WaterAid recommends the following:

1. The national budget, prepared by the Ministry of Health, and approved by the National Parliament, should allocate at least US\$7.74 per capita for capital investment in WASH in health care facilities, and US\$2.05 per capita for recurrent costs of sustaining WASH in health care facilities.
2. Within financing, priority needs to be given to adequately staffing support to WASH services in health care facilities, including cleaning, operation, maintenance, behaviour change promotion and capacity development.
3. The national Ministry of Health and Ministry of State should work together to clarify the roles and responsibilities for financing the various components of WASH in health care facilities to ensure finance flows are more effective and transparent.
4. The Manufahi Municipality Administration should use these costings to prepare an updated costed plan with annual budget allocations needed to achieve universal WASH in health care facilities for the whole municipality.
5. A national protocol/guideline and associated municipality-wide roll-out program should be developed to establish cleaning protocols, responsibilities and training for environmental cleanliness in every health care facility, linked with quality assurance processes.



8. References

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9. Appendices



Appendix 1 – JMP

Water	Sanitation	Hygiene	Health care waste	Environmental cleaning
Advanced service To be defined at national level	Advanced service To be defined at national level	Advanced service To be defined at national level	Advanced service To be defined at national level	Advanced service To be defined at national level
Basic service Water is available from an improved source located on premises.	Basic service Improved sanitation facilities are usable with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for people with limited mobility.	Basic service Functional hand hygiene facilities (with water and soap and/or alcohol-based hand rub) are available at points of care, and within 5 meters of toilets.	Basic service Waste is safely segregated into at least three bins and sharps and infectious waste are treated and disposed of safely.	Basic service Basic protocols for cleaning available, and staff with cleaning responsibilities have all received training.
Limited service An improved water source is within 500 meters of the facility, but not all requirements for basic service are met.	Limited service At least one improved sanitation facility, but not all requirements for basic service are met.	Limited service Functional hand hygiene facilities are available at either points of care or toilets, but not both.	Limited service There is limited separation and/or treatment and disposal of sharps and infectious waste, but not all requirements for basic service are met.	Limited service There are cleaning protocols, or at least some staff have received training on cleaning.
No service Water is taken from unprotected dug wells or springs, or surface water sources; or an improved source that is more than 500 m from the facility; or the facility has no water source.	No service Toilet facilities are unimproved (pit latrines without a slab or platform, hanging latrines and bucket latrines), or there are no toilets or latrines at the facility.	No service No functional hand hygiene facilities are available at either points of care or toilets.	No service There are no separate bins for sharps or infectious waste, and sharps and/or infectious waste are not treated/disposed of.	No service No cleaning protocols are available, and no staff have received training on cleaning.

Appendix 2: Inputs to the analysis Capital Costs (CapEx) and Rehabilitation Costs (CapManEx):

Table 8 – Unit costs for new services and rehabilitation

Component	Item	Unit costs of new services (CapEx)	Expected life cycle	Rehabilitation unit costs (CapManEx)
		\$US	Years	\$US
Water	Connection to piped water system	\$ 1350 +\$750 for new storage tank	5	\$ 500
	Manual borehole	\$ 2700	5	\$ 2700
	Borehole with electric pump	\$ 2300	5	\$ 1000
	Water Tank (1000L)	\$ 750	5	\$ 250
	Protected well	\$ 1300	5	\$ 500
	Protected spring	\$ 1250	5	\$ 200
	Full water package (borehole, electric pump, tank and pipework)	\$ 4800	5	\$ 3200
Sanitation	Standard toilet	\$ 3700	5	\$ 300
	Accessible toilet (package)	\$ 4600	5	\$ 500
	Septic Tank	\$ 600	10	\$ 350
	Incinerator for menstrual hygiene management	\$ 350	0.5	\$30
Hand hygiene	Alcohol handrub	\$ 0	1	\$ 0
	Bucket or tub with tap	\$ 50	2	\$ 50
	Sink with tap	\$ 200	10	\$ 100
	Bucket without tap	\$ 20	1	\$ 20
Waste management	Waste bins (set of 3 separate bins)	\$ 100	2	\$ 35
	Waste incinerator (2 chambers)	\$ 500	5	\$ 175
	Waste incinerator (from bricks)	\$ 300	5	\$ 30
	Lined protected pit	\$ 200	10	\$ 200
	Regular collection of municipality and transport for public disposal	\$ 0	n/a	\$ 0
Environmental cleaning	Box of full cleaning equipment and materials	\$ 300	2	\$ 0
	Training of all staff	\$ 200	n/a	\$ 0
	Establishing cleaning protocols and QA	\$ 200	n/a	\$ 0

Note: all costs include materials, transportation and labour for installation

Operation and Maintenance Costs (O&M):

Table 9 – Unit costs for operation and minor maintenance

Component	Cost item	Explanation	Unit cost	Notes
Water	Payment for water (piped water)	Typical cost per cubic metre (1000L) to purchase water from BTL.	US\$0.25	
	Payment for water (carted water)	Typical cost per cubic metre (1000L) to purchase water from truck supplier.	US\$30	
	Electricity for pump	Typical cost per month for electricity or diesel for generator to run water pumps.	US\$10	
	Water treatment	Typical cost per month to treat water using chlorination or boiling.	US\$10	
	Water testing	Typical cost per month to test water quality.	US\$30	Not currently possible as there is no municipal water quality testing facility
	Water supply maintenance	Typical cost per month for maintenance of taps, tanks and pipework.	US\$5	
Sanitation	Cleaning	Typical cost per month for products and equipment for cleaning.	US\$10	
	Payment for water	Typical cost per month for water used for toilet flushing and cleaning.	Included in water costs	
	Menstrual hygiene products	Typical cost per month for provision of pads and other menstrual hygiene products.	US\$5	
	Toilet and plumbing maintenance	Typical cost per month for maintenance of toilets, septic tanks and bathrooms.	US\$5	
Hand hygiene	Soap and alcohol rub	Typical cost per month for supplying soap and/or alcohol rub at each handwashing station.	US\$5	
	Payment for water	Typical cost per month for water used for handwashing.	Included in water costs	
	Handwashing facility maintenance	Typical cost per month for maintenance of sinks, taps and buckets used for handwashing.	US\$10	
Waste management	Collection service to treat waste off site	Typical cost per month for municipal or private service to collect, treat and dispose of waste offsite. Total covering infectious waste, sharps and general waste.	US\$20	Average monthly cost based on \$5 for infectious waste, \$10 for general waste and \$5 for sharps
	Maintenance for on-site incinerator	Typical cost per month for incinerators used for waste management.	US\$5	
Environmental cleaning	Cleaning equipment and materials	Typical cost per month for replacement of cleaning equipment and materials	US\$15	This assumes a detailed cleaning protocol and checklists which are yet to be rolled-out

Support Costs:

Table 10 – Estimated current support costs

Position	Current number of people in this position in Municipality	Average salary per day worked (US\$)	Estimated number of days worked per month per person					Transport/per diem per person per month (US\$)
			Direct support			Indirect support		
			WASH construction supervision	Training and health promotion	WASH facility operation, maintenance and cleaning	WASH in HCF planning, monitoring and coordination	Other (WASH in health related)	
Cleaner	16	\$5.75	0	0	10	0	0	0
Maintenance staff	1.5	\$8	5	0	5	0	0	0
Facility manager or administration staff	1	\$10.20	0	0	0	3	0	0
Healthcare workers	62.5	\$18*	0	1	0	0	0	\$0
Municipal health department staff	5	\$12	2	1	0	4	0	\$20

* The salary of healthcare workers used is the average of the salaries of nurses and doctors.

Table 11 – Estimated future (desirable) support costs

Position	Current number of people in this position in Municipality	Average salary per day worked (US\$)	Estimated number of days worked per month per person					Transport/per diem per person per month (US\$)
			Direct support			Indirect support		
			WASH construction supervision	Training and health promotion	WASH facility operation, maintenance and cleaning	WASH in HCF planning, monitoring and coordination	Other (WASH in health related)	
Cleaner	34	\$5.75	0	0	10	0	0	0
Maintenance staff	7.5	\$8	5	0	5	0	0	0
Facility manager or administration staff	2	\$10.20	0	0	1	0	0	0
Healthcare workers	62.5	\$18*	0	1	0	0	0	\$0
Municipal health department staff	5	\$12	4	1	0	4	0	\$20
Proposed year in which new human resources could be available to provide support								2026

* The salary of healthcare workers used is the average of the salaries of nurses and doctors.

