

# Cost-effectiveness Research Report: The WASH on Wheels Project

Maintaining water infrastructure in primary schools in Ethiopia  
to achieve the 2030 SDGs



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May 2023



**Effective Altruism**  
Israel

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## Executive Summary

**This report analyzes the cost-effectiveness of the WASH<sup>2</sup> on Wheels (WOW) project implemented by NALA**, an international public health non-governmental organization (NGO), specializing in the elimination of diseases of poverty associated with the lack of clean water. The WASH on Wheels was funded by the Bill & Melinda Gates Foundation and Shalom Corps.

### The Intervention

- The WOW project aims to restore access to safe water in schools in Ethiopia, to decrease the prevalence of hygiene-related diseases among schoolchildren and the local community, therefore reducing mortality, suffering and poverty. This, in alignment with the United Nations Sustainable Development Goal (SDG) #6 - *Ensure availability and sustainable management of water and sanitation for all*.
- The project consists of expert local technicians with vehicles carrying maintenance tools and spare parts, which travel to fix existing, non-functional water infrastructures on school premises. To ensure sustainability, the project also includes basic maintenance training of representatives from the district's water sector ("WASH Fellows"), enabling them to fix WASH infrastructure malfunctions in their respective districts.

### Data

- The data used to conduct the following cost-effectiveness analysis is mainly primary data, collected and documented by the project's team in the field. Detailed documentation of the project's expenses was provided by NALA. Other data, regarding the schools and the beneficiaries, was either provided by local government representatives, or gathered from secondary sources.
- The analysis considers the outcomes of the intervention between May and December 2022, and all the costs that contributed to these results.
- The total inflation-adjusted cost of the project is estimated at 265,900 USD, with 159,300 USD for the set-up phase (May 2021 to May 2022) and 106,600 USD for the first implementation phase (May-December 2022).

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<sup>2</sup> WASH - Water, Sanitation and Hygiene.

- Based on follow-up visits to 20 of the treated schools, the mean time for which WOW fixes are expected to provide water access until failure (MTBF) is at least 600 days (95% confidence level), and most likely around 1500 days (4 years).

## Cost-effectiveness Analysis

- Given various constraints and considerations, we focused the analysis scope on the project's outcome of providing water access for schoolchildren, without assessing the effect on prevalence of hygiene-related diseases.
- The analysis considers the number of fixes conducted, number of direct beneficiaries, the MTBF, number of school days per year, the school attendance rate, and the costs of the WASH on Wheels project.
- The first phase of the WASH on Wheels project provided water access to 215 schools, for approximately **170,000 children**. **For each child**, the project is expected to provide, **on average, water access at school for 640 attended school days**, and with a 95% confidence level - an average of *at least* 250 school days. Both, considering no additional fixes after failure (e.g. by the WASH Fellows).
- Thus, we estimate that **every 1 USD invested in the WASH on Wheels project, is equivalent to providing water access for about 400 attended school days for 1 child**, and with a 95% confidence level - for *at least* 160 school days.

## Externalities

We discovered effects that were not expected, and therefore were not measured.

- The surrounding school community unexpectedly engaged with the WOW team, contributing labor and materials.
- Schoolchildren often use the water for drinking purposes as well, which might result in negative or positive impact, based on the quality of the water provided.
- We hypothesize water availability in schools allows improved cleaning of toilets, which may lead to more schoolchildren using them. Thus, potentially reducing open-defecation and decreasing prevalence of hygiene-related diseases.

## Limitations and Uncertainties

- The MTBF (Mean Time Between Failures) calculation is derived from a relatively short follow-up period and a limited sample size. Therefore, the variance of these results are relatively large.

- The number of school days per year and the children's school attendance rate are currently based on a single secondary source. This may lead to an underestimation or an overestimation of the project's impact.
- The usage of the WASH facilities by the wider community was not assessed, and future fixes by the already-trained WASH Fellows were not considered. By not considering these outcomes, it is probable that the assessment underestimates the cost-effectiveness of the project.
- We assumed no counterfactual impact. Meaning, we assumed maintenance of WASH infrastructures would not have occurred in the given time and places by other partners. If this assumption is wrong, it could result in an overestimation of the cost-effectiveness of the project.

## Room for More Funding

- Given that water access in schools in many countries in the global south is scarce, funding for continued implementation is significant. Next steps for the project include additional research and scale-up at the regional, national and international level, with implementation by the local government and technical support provided by NALA. These steps will require funding of approximately 505,000 USD.

## Conclusions

- The cost-effectiveness analysis revealed that low investment is needed to achieve substantial progress towards achieving the UN Sustainable Development Goal #6.
- Moreover, by repairing existing infrastructures, the WOW project enhances the sustainability of investments made in water infrastructure. Thus, allowing these investments to yield more substantial and enduring impact.
- We plan to conduct additional data collection and research regarding the project - to further validate our current assessments, to assess the impact on diseases prevalence, poverty and education, and to improve the cost-effectiveness of the project.
- Furthermore, we have identified impact measurement and cost-effectiveness assessments as essential for NALA, and we intend to apply them in more projects.

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## Introduction

### The Need for Improved WASH Access

**Clean water, adequate sanitation, and proper hygiene practices are vital in reducing disease prevalence.** Often referred to as hygiene-related diseases, these diseases encompass a wide range of infectious pathogens, including parasitic worm infections and bacterial trachoma. Hygiene-related diseases can cause blindness, malnutrition, stunting, impaired cognitive development, and in severe cases disease-induced mortality (1,19). Yet, these diseases can be significantly reduced with improvements in WASH<sup>3</sup> (2,3,20).

According to the World Health Organization (WHO), the leading causes of death in children under-5 living in low-income areas, globally, are respiratory tract infections and diarrheal diseases (4), associated with a lack of proper hygiene, unsafe sanitation, and limited access to clean water. Moreover, WHO assesses that in 2016, inadequate WASH facilities and practices contributed to over 1.9 million deaths worldwide, accounting for 3.3% of the global health burden and 13% of deaths of children under the age of 5 (5).

The absence of access to clean water and the high prevalence of diseases also inflicts substantial financial damage to individuals and communities, both immediately and in the long-term. This damage is primarily driven by escalating healthcare expenditures, the diversion of workforce hours towards caring for ailing children and the collection of water, as well as diminished educational efficacy resulting from increased student absenteeism and the incidence of ill children attending school (6). It is estimated that the economic burdens from water scarcity and insecurity amount to 260 billion USD globally, per year. (7). As for the economic benefits of WASH investments, WHO estimated in 2014 that for each dollar invested in WASH, globally, there is a return of 4.3 USD in reduced health care costs (8).

Acknowledging the critical importance of clean water and efficient sanitation systems in driving global progress, the United Nations had set Sustainable

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<sup>3</sup> WASH - Water. Sanitation and Hygiene

Development Goal (SDG) 6 - *Ensure availability and sustainable management of water and sanitation for all* (9).

**In Ethiopia, the burden of hygiene-related diseases is high**, with 60-80% of all infectious diseases associated with limited access to safe water, sanitation, and hygiene practices (10,11). Additionally, Ethiopia is endemic to several neglected tropical diseases (NTDs), also highly associated with lack of WASH. Notably, Ethiopia bears 49% of the global burden of trachoma, with 17% of preschool aged children in the country exhibiting clinically active trachoma (20). Ethiopia also has the second-highest burden in Sub-Saharan Africa of both ascariasis and hookworm, along with high prevalence of Helminths and schistosomiasis infections (12,13).

For decades, governments, international NGOs, and the private sector have invested billions of dollars into improving WASH infrastructure in developing countries. However, the coverage of basic drinking water in Sub-Saharan Africa is still below 50%, with Ethiopia presenting 15% 'basic water access' in rural schools. Similarly, the coverage of basic sanitation services in primary schools in Ethiopia is 39%, whilst basic hygiene services are as low as 16% (14). Therefore, **the gap may lie in the maintenance of the existing WASH infrastructures.**

## NALA

NALA<sup>4</sup> is an international public health organization that aims to break the poverty cycle by eliminating neglected tropical diseases (NTDs), often termed diseases of poverty. Specializing in the prevention of hygiene-associated diseases, and with over a decade of experience on the ground in Ethiopia NALA has presented evidence-based success in sustainably eliminating parasitic worms (15).

NALA's holistic approach aims to address the root causes of disease, breaking the chain of transmission, leading to sustainable disease reduction. Working in partnership with the World Health Organization (WHO) as well as with the Ethiopian Ministry of Health and the Deworming Innovation Fund (DIF), and in the private sector, with Merck, NALA has made strides in the field of NTDs, and is recognized as an innovator of change across the sector.

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<sup>4</sup> NTD Advocacy, Learning, Action

## WASH on Wheels - Project Overview

The “WASH on Wheels” (WOW) project presented in this report aims to address the maintenance gap of WASH infrastructure in a cost-effective and sustainable way, ensuring the availability of water in schools in Ethiopia, by restoring non-functional WASH infrastructure that was previously constructed from large-scale investments. The project’s first phase was funded by the Bill & Melinda Gates Foundation and Shalom Corps.

### Preliminary Assessment

In November 2021, NALA conducted a preliminary assessment ([link](#)) of WASH infrastructure in 25 schools in the SNNP<sup>5</sup> region. Of the respective schools, 18 (72%) had a water supply facility out of which only 9 (36%) were functional. In addition, from interviews conducted with district representatives overseeing all the 144 schools in these districts, it was reported that 62.5% of schools had non-functional water supply facilities and 19% had no water supply. Alarming, certain educational institutions have been without water access for up to two decades, despite the existence of the required infrastructure.

Furthermore, the assessment identified poor inspection of the infrastructures by the local water authorities, along with the absence of a structured method to report issues concerning damaged water facilities. Moreover, we found almost no documentation as to when the facilities were built and by whom.

The preliminary assessment revealed a significant deficit in the functionality of water infrastructure within schools in the region. This, most probably due to limited technical expertise, inadequate tools and materials, lack of documentation and inspection, and suboptimal communication between the local government water authorities and their respective communities. During the preliminary assessment and to this point, we did not identify additional similar WASH interventions within the respective regions.

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<sup>5</sup> Southern Nations, Nationalities, and Peoples region.

## The Intervention

The WOW project began operating in May 2022, after a year-long set-up phase. The project consists of vehicles carrying maintenance tools and spare parts, with expert local technicians, which travel to schools to fix existing, non-functional water infrastructures on school premises.

To ensure sustainability, the project also includes basic maintenance training of representatives from the district's water sector (“WASH Fellows”), enabling them to fix WASH infrastructure malfunctions and ensure continued and increased availability of water access in their respective districts. In line with NALA’s value of ownership and partnership at all levels, government engagement was a key component of the project.

By fixing and maintaining water infrastructures in schools, we aim to decrease the prevalence of hygiene-related diseases among schoolchildren and the local community, therefore reducing mortality, suffering and poverty.

The project is currently operating in two regions of Ethiopia (Amhara and SNNP).

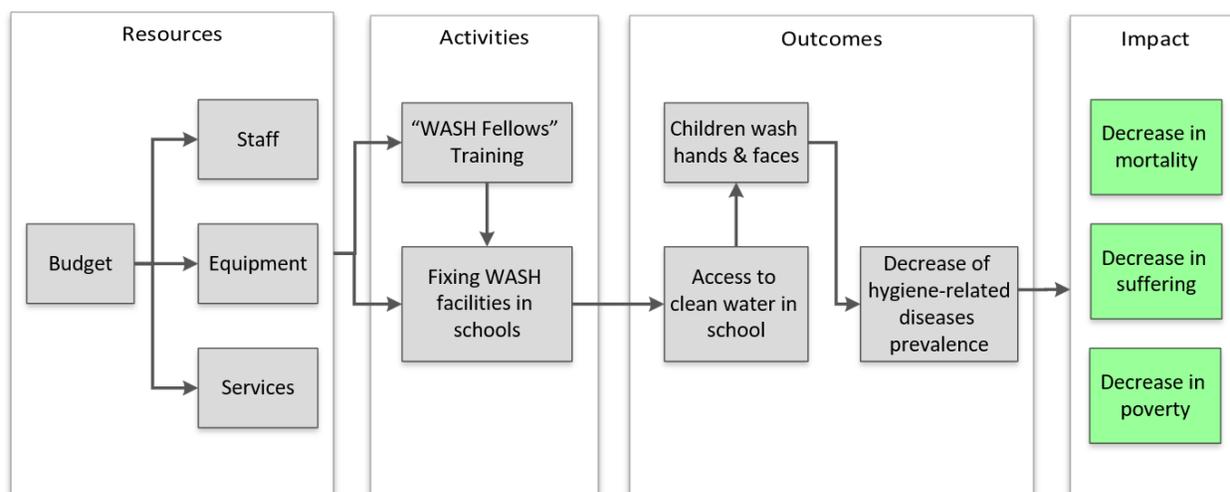


Figure 1. The WASH on Wheels Theory of Change

Between May and December 2022, the WOW team restored water access in a total of 202 schools in 10 districts, affecting approximately 160,000<sup>6</sup> schoolchildren ([link](#)).

<sup>6</sup> Considering only schools treated by the WoW team.

10 WASH Fellows were trained, and restored water in 13 schools, affecting approximately 10,000 more schoolchildren.<sup>7</sup> Common failures included broken faucets, disconnected pipes, and non-functional hand-pumps ([link](#)).

## Methodology and Data

### Scope and Measures

The aim of the WOW intervention is to decrease hygiene-related diseases among schoolchildren and the local community, leading to reduced mortality, suffering and poverty. However, due to time and budget constraints, the complex nature of causal inference, and the need for presenting accurate results, we adopted a narrow scope of analysis and assessed the association between WOW implementation and water access for schoolchildren.

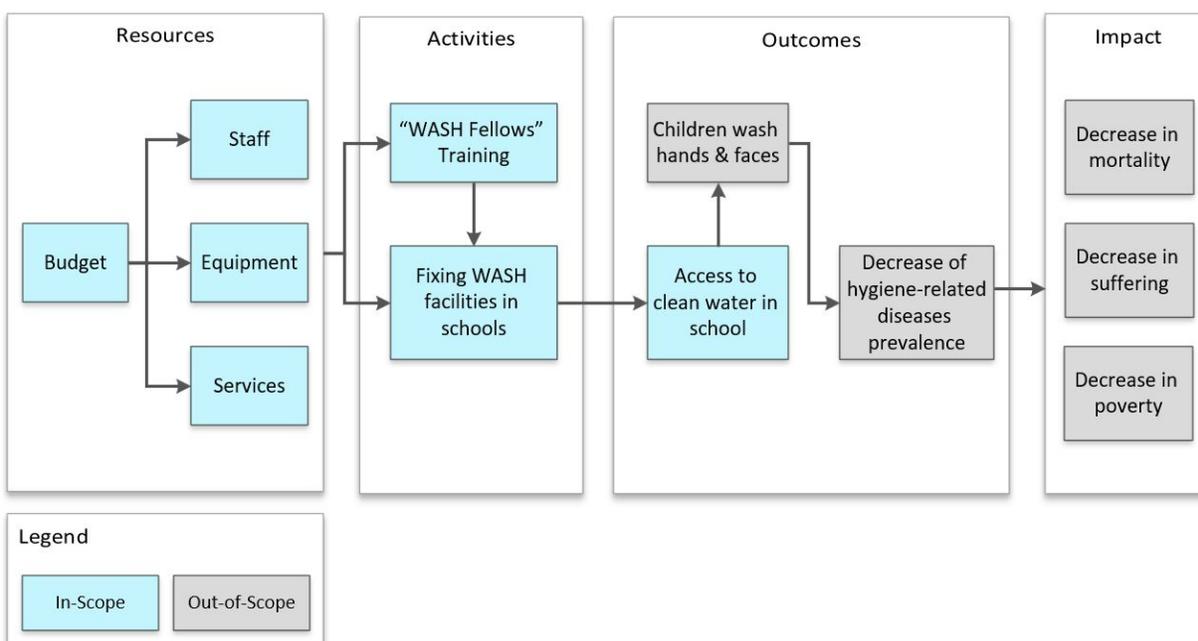


Figure 2. The WASH on Wheels Theory of Change including out of scope reach.

To quantify the number of days water access was available for each child following WOW, we set the measure CWD - Child’s Water Days. This measure stands for the

<sup>7</sup> The calculations below include 215 schools that were visited by the WOW team as well as the 13 additional schools maintained by the WASH fellows. Although the projection is for them to visit 38 more schools, we did not include the potential additional 38 schools in this assessment.

estimated number of beneficiaries - attending schoolchildren in the treated schools (C), times the estimated number of school days with water access that each child gained due to the intervention (WD).

$$CWD = C \times WD$$

The number of attending schoolchildren in the treated schools (C) is calculated by multiplying the number of fixes conducted (F), with the average number of enrolled schoolchildren in a treated school (EC).

$$C = F \times \overline{EC}$$

The number of fixes (F) consists of fixes by the WOW team (WT) and the WASH Fellows (WF) combined. One fix stands for one visit in one school, in which water access is changed from non-functional to functional. This may consist of repairing multiple failures.

$$F = WT + WF$$

The WD (estimated number of school days with water access that each child gained) is calculated by multiplying the estimated number of days a fix lasts called the Mean Time Between Failures (MTBF), with the percentage of school days within a year (SD) and the estimated school attendance rate of the schoolchildren (AR%).

$$WD = MTBF \times SD\% \times AR\%$$

$$SD\% = \frac{\text{School Days/year}}{365} = \frac{365 - \text{Vacations} - \text{Weekends}}{365}$$

$$AR\% = \frac{\text{Days of Attendance}}{\text{Days of School}}$$

## MTBF - Methodology

For the purpose of quantifying the sustainability of WOW fixes (and the WD parameter), we estimated the time a water facility remains functional after being fixed, i.e. until failing, using the MTBF<sup>8</sup> measure. The MTBF estimation is based on the total operating time (T) and the number of observed failures (r). Under the assumption of constant failure rate (CFR), the times between failures are

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<sup>8</sup> MTBF - Mean Time Between Failures. In the following analysis we assume a maximum of 1 failure per facility, and therefore we practically use the MTTF measure - *Mean Time To Failure*.

exponentially distributed. Denoting the point estimate for the MTBF is given by  $T/r$ , with a one-sided confidence interval given by the following equation, where  $1-\alpha$  is the confidence level (16,17).

$$\left( \frac{2T}{\chi^2(\alpha, 2r)}, \infty \right)$$

## Data Sources

The data used to conduct the cost-effectiveness analysis is mainly primary data, collected and documented by the project's team in the field. This, by using a monitoring and evaluation tracking tool which was developed by NALA. The tracking tool allowed the WOW team to document WASH infrastructure available in schools, including the activities done by the WOW team during their visit.

Additional data, namely regarding schools and beneficiaries, was provided by local government representatives or gathered from secondary sources ([Table 1](#)).

## Costs

To estimate the total cost of the WOW project, all data regarding NALA's expenses in the past few years was provided by NALA's Head of Operations. The data was collated, and each expense was examined. Selected expenses that contributed or aimed to contribute to the project were considered. For expenses partly related to the project, only part of the expense was considered.<sup>9</sup>

Given that all expenses were paid in USD, costs were adjusted for inflation in USD inflation rate from the initiation of the project and April 30th, 2023.

For analytic purposes, expenses were divided into two types - costs required for the set-up of the project, and costs required for the project implementation.

**Set-up costs** (May 2021-May 2022) - Costs required to assess, design and prepare the project, including technical elements (most of these costs are specific for set-up

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<sup>9</sup> Costs that were not included in this analysis - Costs for marketing and donor relations for fundraising; Costs that were canceled - Purchase of two vehicles (Toyota Land Cruiser) that were eventually not used for the projects, and were returned.

and are a “one time” investment). The total set-up cost is estimated at **159,300 USD** (adjusted).

**Operational costs** - Costs that enabled the implementation of the project between May 2022 - December 2022, including operations on the ground and support of administrative costs and technical recurring throughout the project. The total operational cost is estimated at **106,600 USD** (adjusted).

The total cost of the first phase of WOW was **265,900 USD** (adjusted).

*The aggregated expenses’ data and calculations sheet is attached ([link](#))*

## Results

### MTBF - Estimation

In order to assess the total operating time (T) and the number of failures (r) required to the estimation, NALA conducted follow-up visits in 20 schools, during April-May 2023. Schools were selected based on the longest follow-up times, yet subjected to the WOW team location and mobility constraints. The assessment form used for the follow up visits is attached ([link](#)). Follow-up times (between first visit and follow-up visit) ranged from 62 days to 335 days (median: 256 days). 10 schools were assessed both in Amhara and in SNNP regions.

**Out of the 20 schools assessed, the water facilities remained functional in 17.** In the other 3 schools, the WOW team provided maintenance during the follow-up visit.

Deducted from the 20 follow-up visits, a total operating time of  $T=4,714$  days with  $r=3$  failures was observed. Thus, leading to an MTBF point estimate of 1,571 days, and with a 95% confidence level - an MTBF of *at least* 608 days<sup>10</sup>. This means **the average time WOW fixes are expected to last is at least 600 days, and most likely around 1500 days - about 4 years.**

*The MTBF calculation and data is attached ([link](#))*

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<sup>10</sup> Two-sided test, 95% confidence interval:  $538 < \text{MTBF} < 7620$  (days).

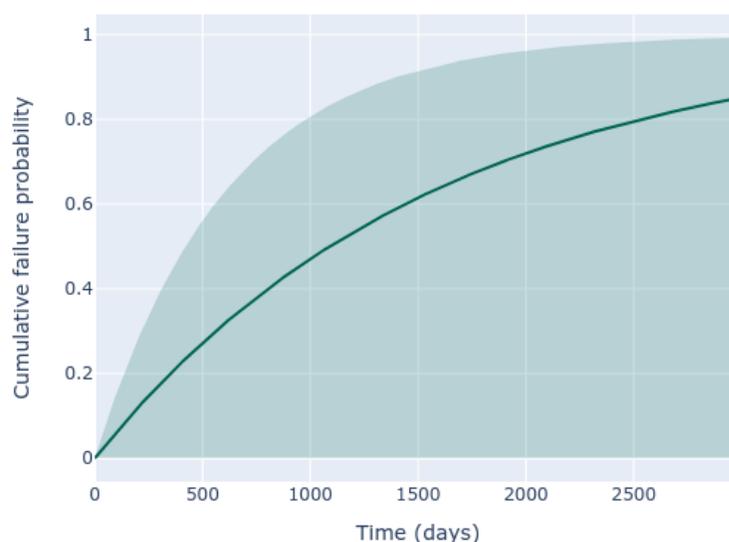


Figure 3. Cumulative failure probability distribution of one WASH on Wheels maintenance activity, based on the data from the follow-up visits, and assuming an exponential distribution. The green area represents the one-sided 95% confidence interval.

### Cost-Effectiveness Assessment

To assess the cost-effectiveness of the WOW project, the measured impact presented by CWDs was divided by the costs of the project (measured in USD, adjusted by inflation rates). Thus, the cost-effectiveness is presented by CWDs/\$. Moreover, by dividing CWDs by operational costs only (excluding set-up expenses), we could roughly estimate the impact of marginal investment in the project.

*The cost-effectiveness model is attached ([link](#)).*

The first phase of the WASH on Wheels project provided water access at school for approximately **170,000<sup>11</sup> children**. **For each child**, the project is expected to provide, on average, **water access at school for 640<sup>12</sup> attended school days**, and at a 95% confidence level - an average of *at least* 250 school days. Both, considering no additional fixes after failure (e.g. by the WASH Fellows).

Thus, we estimate that **every 1 USD invested in the WASH on Wheels project, is equivalent to providing water access for about 400 attended school days for 1 child** (400 CWDs), and at a 95% confidence level - for *at least* 160 school days.

<sup>11</sup>  $C = (WT + WF) * EC = (202+13) * 795.7 = 171070$

<sup>12</sup>  $WD = MTBF * SD\% * AR\% = 1571 * 0.48 * 0.85 = 640$

When deducting the set-up costs, we estimate in low confidence that for an investment of 1 USD, the WASH on Wheels project is expected to restore water for 1 child for about 1,000 attended school days (1,000 CWDs).

$$CWDs = 109,525,000$$

$$Costs = 265,900 \text{ USD}$$

$$Present \ CWDs \ per \ USD = 412$$

$$Marginal \ CWDs \ per \ USD = 1027^{13}$$

Considering all parameters, the CWD equation and calculation is the following:

$$CWD = (WT + WF) \times \overline{EC} \times MTBF \times SD\% \times AR\%$$

Parameter	Value (05-12/22)	Based on
WT (Fixes by WOW team)	202	NALA's Tracking Tool data
WF (Fixes by Wash Fellows)	13	Local governmental data
EC (Enrolled Children/school)	796	Local governmental data
MTBF (Mean Time Between Failures)	1,571	Data from follow-up visits, NALA's Tracking Tool
SD% (School days/year)	48%	USAID Report (18)
AR% (Attendance Rate)	85%	

Table 1. Variables of the cost effectiveness analysis and data sources

## Externalities

**The surrounding school community unexpectedly engaged with the WOW team** from the project's initiation, contributing labor, providing materials and in some cases fencing to support the activity of the WOW team. A summary of the community contribution to the project and estimated costs is attached ([link](#)).

Early during the implementation, we observed **schoolchildren using the water for drinking purposes**. This may result in negative or positive consequences:

- **Negative** - if the water is not safe for drinking, this might lead to increased illness. However, in the project implementation scheme, WASH Fellows are

<sup>13</sup> Considering only operational costs, estimated at 90,600 USD.

required to examine the quality of the water once water is restored and before water is used by the school community. Moreover, The water in most cases originates from protected aquifers where water examination is regularly conducted by the local water sector.

- **Positive** - Assuming the water is safe for drinking, positive effects may be increase in health, school attendance and class engagement.

Nevertheless, NALA is planning to further examine the conditions which allow the safety of water sources, in the near future.

Finally, we hypothesize that availability **of water in schools allows improved cleaning of the schools' latrines** (toilets). This may lead to more schoolchildren using them, thus potentially reducing open-defecation and hygiene-related diseases prevalence. However, this hypothesis is yet to be validated.

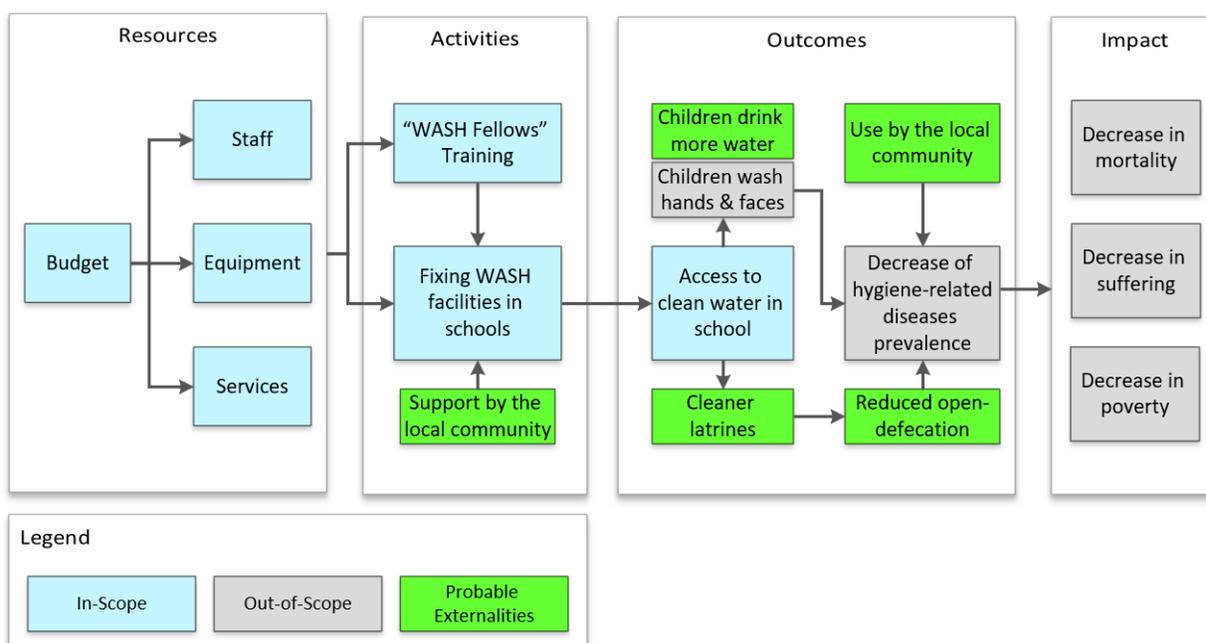


Figure 4. The WASH on Wheels Theory of Change including externalities

### Limitations and Uncertainties

The cost-effectiveness analysis is subject to the following limitations and uncertainties, which **may result in an underestimation or an overestimation of the cost-effectiveness** of the WASH on Wheels project.

1. The MTBF calculation is derived from a relatively short follow-up period and a limited sample size, leading to **considerable variance in the results**.
2. Given the short follow-up time, we presumed a constant failure rate, meaning we assume that the probability of a functional facility to fail within a certain period, is independent of its last repair date.<sup>14</sup> This may lead to an underestimation of the cost-effectiveness results (if the facilities are more prone to failures during the first period of their operation), or to an overestimation of the cost-effectiveness results (if the facilities are more prone to failures over time).
3. The number of school days per year and the school attendance rate are currently based on a single secondary source.
4. **Three limitations are probable to cause an underestimation of the project's cost-effectiveness.** First, although it is known that schools' WASH facilities are often used by the wider community, this was not considered in the analysis. Second, the analysis considers usage of the facilities only during school days. Third, the assumption that already-trained district WASH Fellows will conduct future fixes was not considered in the analysis.
5. No counterfactual impact - we assumed that maintenance of the WASH infrastructures fixed by WOW would not have occurred in the given time by other partners. This is based on reports from district and school representatives, and NALA's knowledge of the field. If this assumption is wrong, it could result in an overestimation of the cost-effectiveness of WOW.
6. The confidence interval for the cost-effectiveness assessment was calculated considering uncertainties in the MTBF assessment, yet not considering the mentioned uncertainties and limitations regarding other parameters.
7. **The association between water access in school and reduced disease prevalence is yet to be known.** This is due to uncertainties regarding the usage of the repaired water facilities by the schoolchildren<sup>15</sup>, their hygiene practices in school and outside of school, and lack of reliable data regarding disease prevalence over time in the respective schools and districts.

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<sup>14</sup> For example, two functional facilities that were repaired in different times, have the same probability to fail in a given day. Alternatively, The probability of a facility to fail on day  $n$  is equal to its probability to fail on day  $n+100$ . However, its probability to fail by day  $n+100$  is exponentially higher - because it considers the chances for failure in each one of the days between  $n$  and  $n+100$ .

<sup>15</sup> Furthermore, the MTBF of the facilities and their usage levels might be correlated.

## Moving Forward

### Additional Research

**Enhancing the cost-effectiveness of WASH on Wheels** - We aim to further analyze the collected data and offer recommendations for enhancing the cost-effectiveness and impact of the WASH on Wheels project.

**Assessing the cost-effectiveness of training “WASH Fellows”** - Although the trained district WASH Fellows are an essential component of the long-term success of the WOW project, within the given time frame it was not possible to assess the effectiveness and impact of this modality. An assessment planned to be conducted later this year among the WASH Fellows and district administration representatives, will examine the challenges and barriers of conducting maintenance visits in schools and the components that may lead to long-term ownership and sustainability of WASH infrastructure by the district government.

**Improving the current cost-effectiveness assessment** - By considering the use of water for drinking, the association between water access and latrine cleaning, the local community engagement in the project and their utilization of the water facilities and re-estimating the facilities’ MTBF based on longer follow-up periods, an improved cost-effectiveness assessment will be conducted.

**Evaluating the outcomes of providing water access at school** - We aim to assess the WOW project cost-effectiveness with respect to its primary objective - decreasing the prevalence of hygiene-related diseases, and therefore reducing suffering, mortality and poverty (as described in [Figure 1](#)). Moreover, we plan to assess the association between water access in school and school attendance and engagement. The methodologies of these analysis studies are yet to be determined.

### Room for More Funding

The WASH on Wheels pilot phase served to prove the concept, and create great interest by local government and grassroots partners following on the ground. Requests for support in launching similar projects were received from other regions of Ethiopia, as well as from grassroots partners in Uganda and India. Given that

water access in schools in Ethiopia is scarce, **the need for funding for continued implementation is significant**, combined with the potential impact of a national and international scale-up. Below are the planned steps to ensure the most effective scale-up. The potential plan for WOW has so far been able to secure **less than 20% of the required funding**.

#### **Review of lessons learned and improvements to the model (June-Aug 2023)**

During the pilot phase, and to find the most effective tools and materials, NALA equipped the vehicles with a broad array of tools, some locally available while others were obtained from international sources. The utility of these tools will be continually evaluated during the project's execution to develop a cost-effective toolkit capable of addressing over 80% of encountered issues. Moreover, a 'Pause and Reflect' session, involving community-level and institutional stakeholders, will be conducted to evaluate the project's operational model, with a focus on ensuring the sustainability and maintenance of local infrastructure. The total expenditure for this activity is estimated to be 33,000 USD.

**Creation of standard scalable materials (July-Dec 2023)** - Based on the lessons learned process, a set of guiding documents for the project including equipment specifications, an updated maintenance manual with video tutorials on main fixes, as well as programmatic templates and modalities by context (i.e cultural, environmental) is suggested for adoption and scale-up by government and partners. If adopted, NALA will provide training. The cost of the expert designer to lead this is estimated at 12,000 USD.

#### **Scaling of new modalities of WOW by NALA and 2 external partners in Ethiopia and outside of Ethiopia (Sept 2023-Aug 2024)**

- The aim of this activity is to scale the program learnings within and outside of Ethiopia. In this activity, we will design the implementation based on the manual. This will deepen the understanding of the project's replicability for scale-up. The cost of this component is estimated at 110,000 USD per WOW vehicle per year including all costs, and 440,000 USD for operating 4 vehicles per year - 2 in Ethiopia, and 2 in other countries.

**Advocacy with institutional WASH partners on adopting the maintenance scheme (ongoing)** - This element includes evaluation, research, and direct advocacy with decision makers. Discussions are already underway with the Ethiopian Government as well as with several international NGOs and donors that have expressed interest in availing resources for piloting WOW as part of their operations. This could serve to change the sector in the long term. The cost of this element is 20,000 USD per year.

## Conclusions

- Assessing the cost-effectiveness of the first phase of the WASH on Wheels project, enabled NALA to understand the broader potential of the project.
- The project highlighted a severe lack of communication between schools, communities, and the local government over the responsibility of WASH infrastructure, resulting in facilities remaining inoperable for months to decades. The introduction of WASH Fellows in schools aimed to bridge this gap, opening a channel of communication between the school and government, making the community aware of the government's responsibilities.
- The cost-effectiveness analysis revealed that low investment is needed to achieve substantial progress towards the UN Sustainable Development Goal #6 - *To ensure availability and sustainable management of water and sanitation for all.*
- By prioritizing the repair of existing infrastructure, the WOW project enhances the sustainability of investments made in water infrastructure. Consequently, this approach allows these investments to yield more substantial and enduring impact.
- We have identified impact measurement and cost-effectiveness assessments as essential for NALA, since they allow us to identify more efficient ways to allocate our resources and to maximize our impact. Therefore, we intend to apply them in more projects.

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## Appendix

Please find below the provided hyperlinks to the internal data and models utilized during the course of this study.

- [Preliminary assessment of WASH infrastructure in the SNNP Region \(2021\)](#)
- [Maintenance data of the WOW project](#)
- [Schools and direct beneficiaries reached by WOW in May-December 2022](#)
- [WOW's Aggregated expenses' data and calculations](#)
- [WOW's Mean Time Between Failures \(MTBF\) data and calculations](#)
- [WOW's cost-effectiveness model](#)
- [WOW - Contribution and estimated resources received from the community](#)
- [WOW's follow-up assessment form](#)