LEARNING BRIEF

Cost Effectiveness of School WASH Interventions: Learnings from Kolkata & Addis Ababa

From 2013-2025, Splash has been working to improve WASH services and behaviors across multiple contexts including Addis Ababa in Ethiopia and Kolkata in India through Project WISE.

In Kolkata, Splash has worked with 361 primary and secondary schools across with over 136,000 students. In Addis Ababa, Splash has worked with 485 schools with over 572,000 students.

As the project draws to a close, the team conducted a cost-effectiveness analysis to understand the project costs per student and school, and to explore the extent to which costs changed over time.

This brief explores Splash's cost effectiveness in these two branches of the program and aims to compare how costs are influenced by external and structural patterns. The brief also includes data from a literature review to contrast these costs with benchmarks.

Driven by economies of scale, improvements to sanitation and water storage designs, as well as greater efficiency of staff resources, Splash improved per-student costs from Year 1 to Year 3 by 44% and 46% in Addis Ababa and Kolkata, respectively. While costs reached their low point with Group 3, they rose slightly in Group 4 due to a lower volume of new schools and students served. Collectively, our innovations and associated cost reductions were largely able to offset macro-economically driven cost increases.

Broadly speaking, it remains difficult to compare cost effectiveness across programs due to variations in cost categorizations and fluctuating inflation rates. Nonetheless, Splash's software and hardware expenditures are cost-effective when compared to other school WASH activities.

BACKGROUND

With the growing need to assess the cost-effectiveness of water, sanitation, and hygiene (WASH) programs, researchers and practitioners have begun to standardize calculation approaches. Likewise, school WASH programs are increasingly required to show cost-effectiveness and financial sustainability.

A review study of costing in school WASH programming from 2017 identified a set of common hardware, software and operational costs from both rural and urban settings as summarized in **Table 1** [1]. The authors highlight that most programs only describe hardware (infrastructure) costs and that there is a lack of standardization in indicators. It is recommended that projects use **per person, per facility,** and **per year** reporting.

The review also highlighted three main mechanisms for funding interventions [1]: government funded, private or donor funded, and user fees.

With the reduction in global development assistance and tightened government budgets, opportunities for schools to cover their own costs through fees are increasingly seen as the most sustainable option. However, there are limited examples of this in practice and there are an increasing number of governments, particularly in sub-Saharan Africa, with "free education for all" policies, which prohibit the school from raising money for needed supplies through fees.

Within Splash, broadly speaking, the operations and maintenance costs have been borne by the schools through fees in Kolkata, while the capital hardware and software expenditures have been borne by the project. This unique model makes it more complex to compare Project WISE cost effectiveness of recurring costs with literature estimates.

Table 1: Summary of common costs in school WASH programming. Summarized from from [1]

Category	Subcategory	Example Components	Example Cost Range (2015 USD)
Hardware (Capital / Infrastructure)	Water Supply	Boreholes, wells, rainwater harvesting, house connections, handpumps, spring sources	$15–$130 per person
	Water Treatment & Storage	Filtration systems, biosand filters, ceramic filters, chlorination, water tanks, jars	$3–$20 per person
	Sanitation	Pit latrines, VIP latrines, septic systems, sewer connections	$13–$1200 per facility
	Hygiene Infrastructure	Handwashing stations, vessels, menstrual hygiene facilities	$1–$60 per facility
Software (Education, Training, Admin)	Hygiene Education / Promotion	School hygiene training, community campaigns	$1–$17 per person
	Program Administration	Health clubs, promotion, staff, monitoring	$1–$3 per person
	Capacity Building	Training of teachers, partner-teacher associations, government officials	$0.80–$1 per person
Operational / Maintenance (Recurring)	Water Supply Operation & Maintenance	Pump repairs, energy, guards, replacement	$2–$12 per person/year
	Water Treatment & Storage	Disinfection, filter replacement, cleaning tanks	$1–$5 per person/year
	Sanitation	Cleaning supplies, pit emptying, latrine repairs	$0.5–$10 per person/year
	Hygiene Supplies	Soap, sanitary pads, toilet tissue, scoops	$0.1–$0.8 per person/year

KOLKATA - COSTS OVER TIME

In Kolkata, Project-WISE was implemented in three groups or cohorts. The cohorts lasted between 12 and 15 months and were sequential. Key parameters of the schools and interventions can be found in **Table 2**, and an illustrative school from Kolkata is shown in **Figure 1**. It is important to note that schools in Kolkata were smaller, with fewer students, and most of the infrastructure and pipe network was indoors.

As seen in **Figure 2**, costs per school, student, and beneficiary decreased over time across the groups. This includes both U.S. and in-country costs. There was a greater decrease in costs between Groups 1 and 2, and between Groups 2 and 3, indicating that costs were stabilizing over time. However, the costs per school had an even larger decrease between Groups 1 and 2, reflecting significant learning during the first round of activities. Notably, there were very similar values between costs per student and per beneficiary because there was a limited number of teachers, administrators, or support staff in each school. Overall, costs nearly halved between the first and last groups, indicating a strong improvement in cost-effectiveness over time.

Figure 1: Illustrative school in Kolkata

Table 2: Key parameters in Kolkata

Handwashing Stations	Drinking Water Stations	Water Filters	Number of Schools	Average Number Students/School	Average Cost/Student	Average Cost/School
904	780	267	361	378	$ 41	$ 16,814

Including US expenses

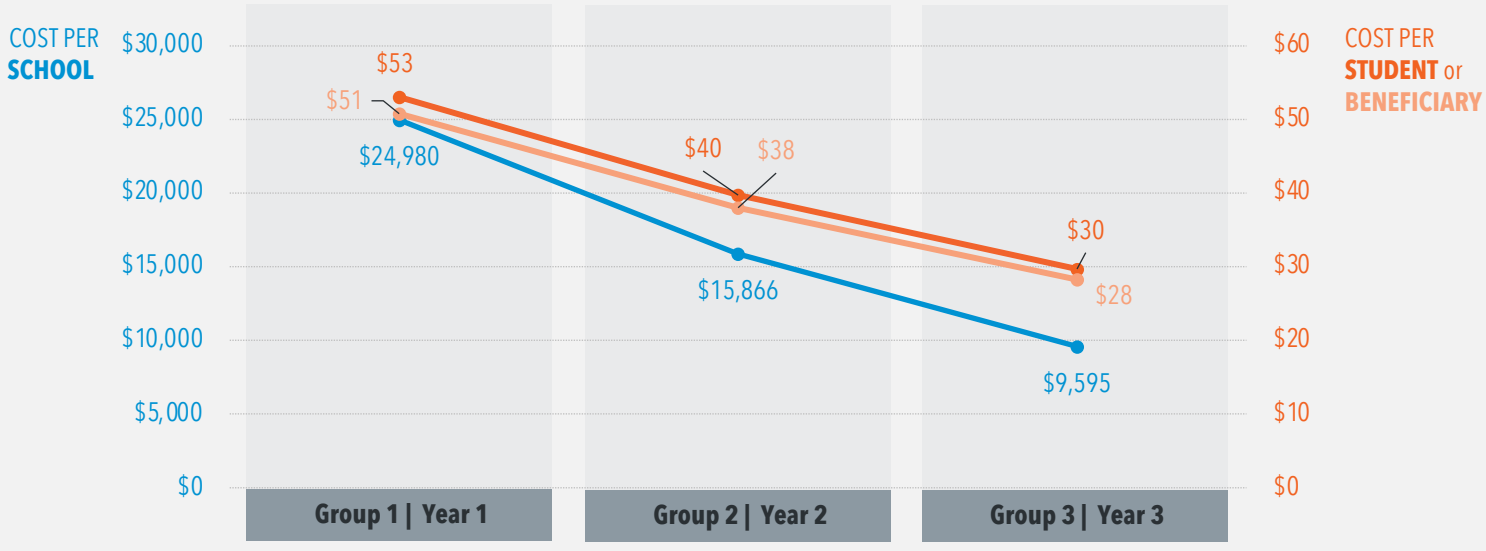

Figure 2: Splash Cost-effectiveness in Kolkata, by Project WISE Group (Inflation Adjusted). Including US Expenses

ADDIS ABABA - COSTS OVER TIME

In Addis Ababa, Project-WISE was implemented in four groups or cohorts. The cohorts lasted between 11 and 16 months and were sequential. As in Kolkata, it was expected that project costs would decrease over time. Key parameters of the schools and interventions can be found in **Table 3**, and an illustrative school from Addis Ababa is shown in **Figure 3**.

Unique to Ethiopia, there were also 16,367 adult students in these schools. Compared to Kolkata, schools in Addis Ababa were much larger, required considerable water storage, had multiple buildings on a single campus, and much of the infrastructure and pipe network was outdoors with greater exposure.

As seen in **Figure 4**, costs per school, student, and beneficiary dipped in Group 3 but increased again in the final Group 4 due to a decrease in economies of scale. The cost per school rose between Group 1 and Group 2 and then continued in the same trend as the other indicators. Overall, costs decreased by approximately 20% between the first and last groups, indicating an improvement in cost-effectiveness over time.

Figure 3: Illustrative school in Addis Ababa

Table 3: Key parameters in Addis Ababa

Handwashing Stations	Drinking Water Stations	Water Filters	Number of Schools	Average Number Students/School	Average Cost/Student	Average Cost/School
3,053	2,957	482	485	1,181	$ 33	$ 37,626

Including US expenses

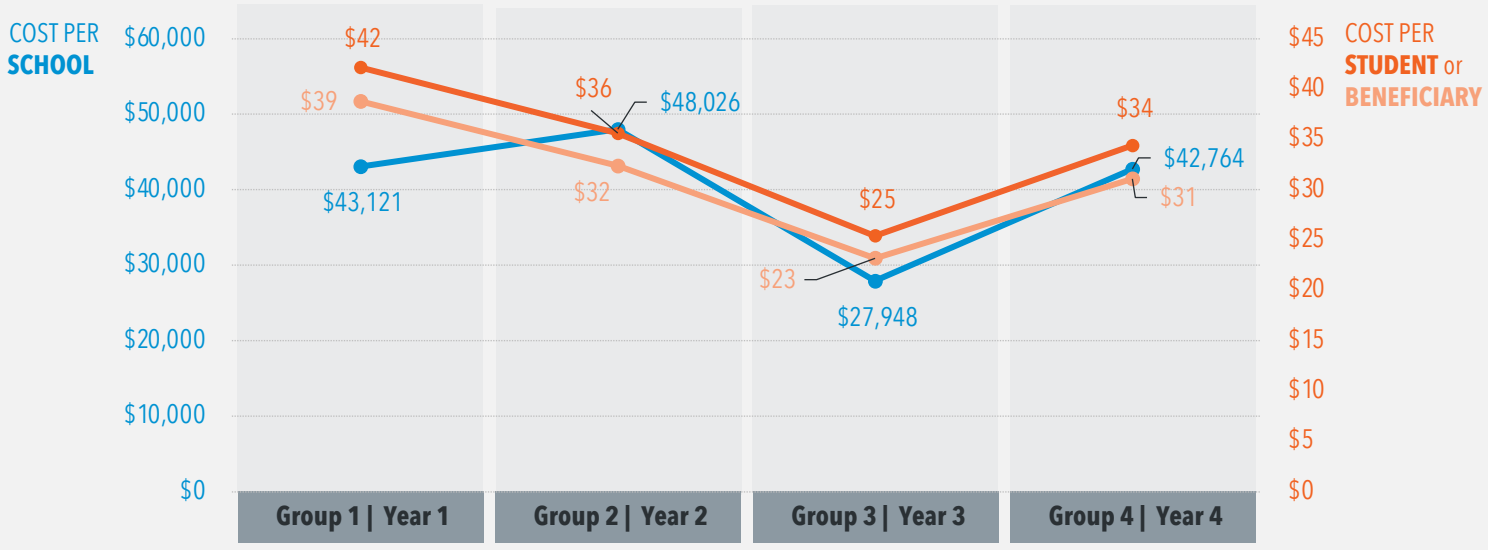

Figure 4: Splash Cost-effectiveness in Addis Ababa, by Project WISE Group (Inflation Adjusted). Including US Expenses

PROPORTIONAL COSTS

When comparing India and Ethiopia, it is useful to examine the differences in proportional costs between the two contexts, as illustrated in **Figures 5 and 6**. The cost per school was more than double in Addis Ababa compared to Kolkata, primarily due to more costly infrastructure requirements.

In Kolkata, infrastructure hardware costs represented 51% of all costs across the three project cohorts, while in Addis Ababa this figure was 69%. Hardware costs are strongly influenced by the context and the existing infrastructure in each school. Schools in Addis Ababa had a larger physical footprint, required more infrastructure, and were spread across multiple buildings on a single campus. In contrast, schools in Kolkata were mainly in multi-story buildings. Additionally, Addis Ababa schools had significantly more students than those in Kolkata.

Administrative costs accounted for 25% of total costs in Addis Ababa, compared to 38% in Kolkata. These costs are broadly fixed, as they are spread across the number of supported schools; more supported schools reduce the proportional share.

Lastly, software costs represented the smallest proportion in both contexts—11% in Kolkata and 6% in Addis Ababa. These costs included a mix of fixed and variable expenses, such as printing and video design. Staff time is closely tied to behavior change activities, as many of these activities are conducted by staff. However, staff time is categorized under program costs in the administrative category. As such, these figures may not fully capture the complete cost structure for behavior change activities.

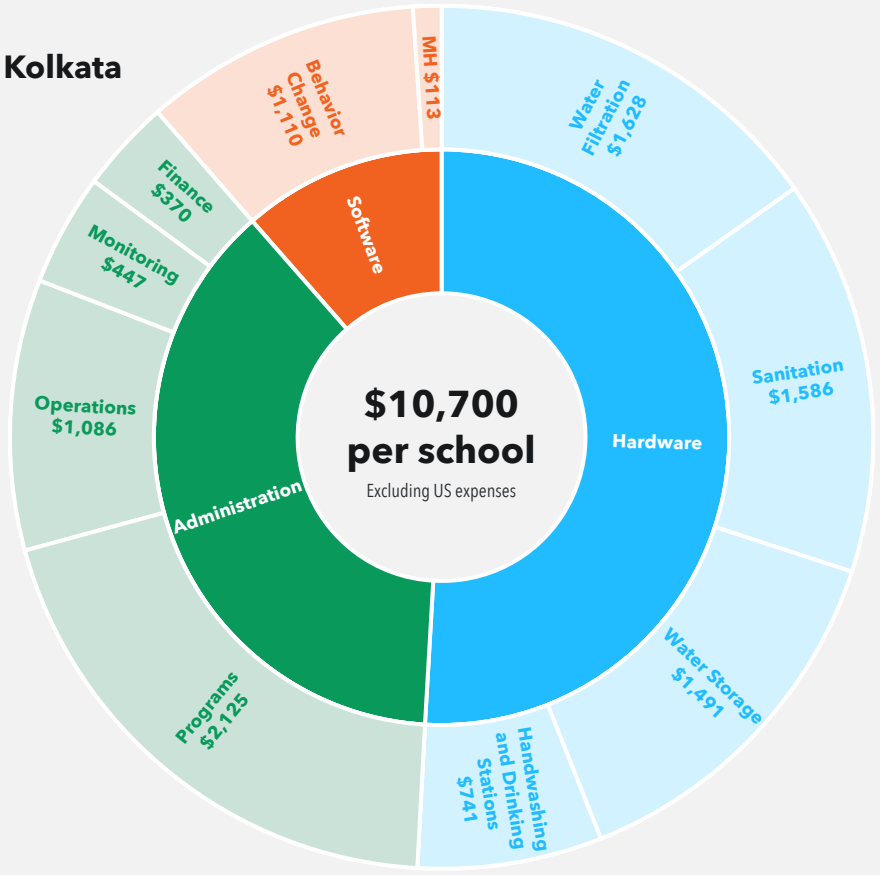

Figure 5: In-country cost per school in Kolkata (Inflation Adjusted).

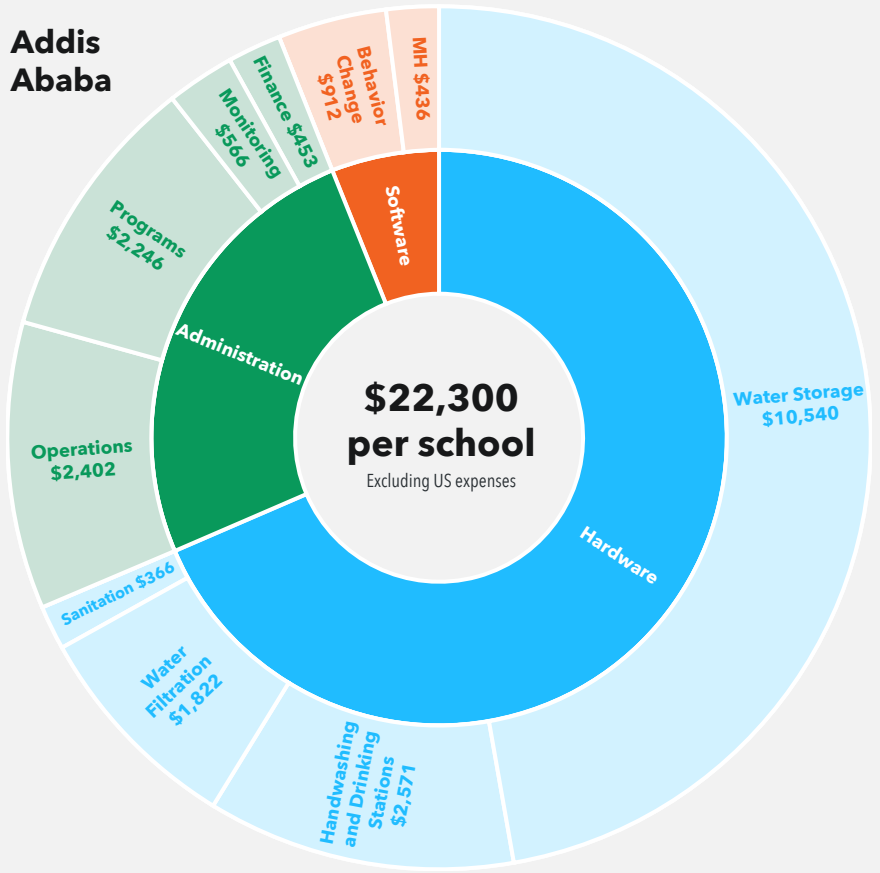

Figure 6: In-country cost per school in Addis Ababa (Inflation Adjusted).

COSTS COMPARISONS WITH EXTERNAL ESTIMATES

To examine the relative cost effectiveness of Project-WISE interventions, results from the estimations were compared with the results from the 2017 literature review [1]. Two indicators showed comparability with literature: 1) water treatment and storage; and 2) hygiene education. Results have been inflation adjusted to 2023 dollars as costs per student and are illustrated in **Figure 7**.

- **For water treatment and storage**, Project WISE costing includes water filtration, water storage, drinking water stations and handwashing stations. The cost of handwashing stations are are included in this estimate as they could not be as these costs could not be disaggregated. The literature estimates ranged from $4 to $26, with the Project-WISE estimates at $10 and $13 for India and Ethiopia respectively.
- For **hygiene education**, Project WISE costing includes the hygiene promotion materials including menstrual health topics as well as all the staff time for in-country programmatic support. For hygiene education, the literature estimates ranged from $1 to $23, with the Project WISE estimates at $3 and $9 for Ethiopia and India respectively.

The Project-WISE indicators are conservative, as they include additional sophistication and aspects not captured in the literature review estimates. As such, while both Ethiopia (Addis Ababa) and India (Kolkata) estimates fall within the literature ranges, Project WISE interventions are considerably more cost-effective because they include more activities and support than the literature cases.

It is important to note that further breakdown of literature costing could yield additional comparable indicators. As Splash moves forward with Project WISE Phase II, the team will take a closer look at how increasing enrollment rates—driven by urbanization and population growth—and recurring student enrollment affect cost-per-student estimates over a longer period. Additionally, Splash will integrate system-wide O&M costing, as utilities and other non-school actors bear the cost of city-wide operations and maintenance.

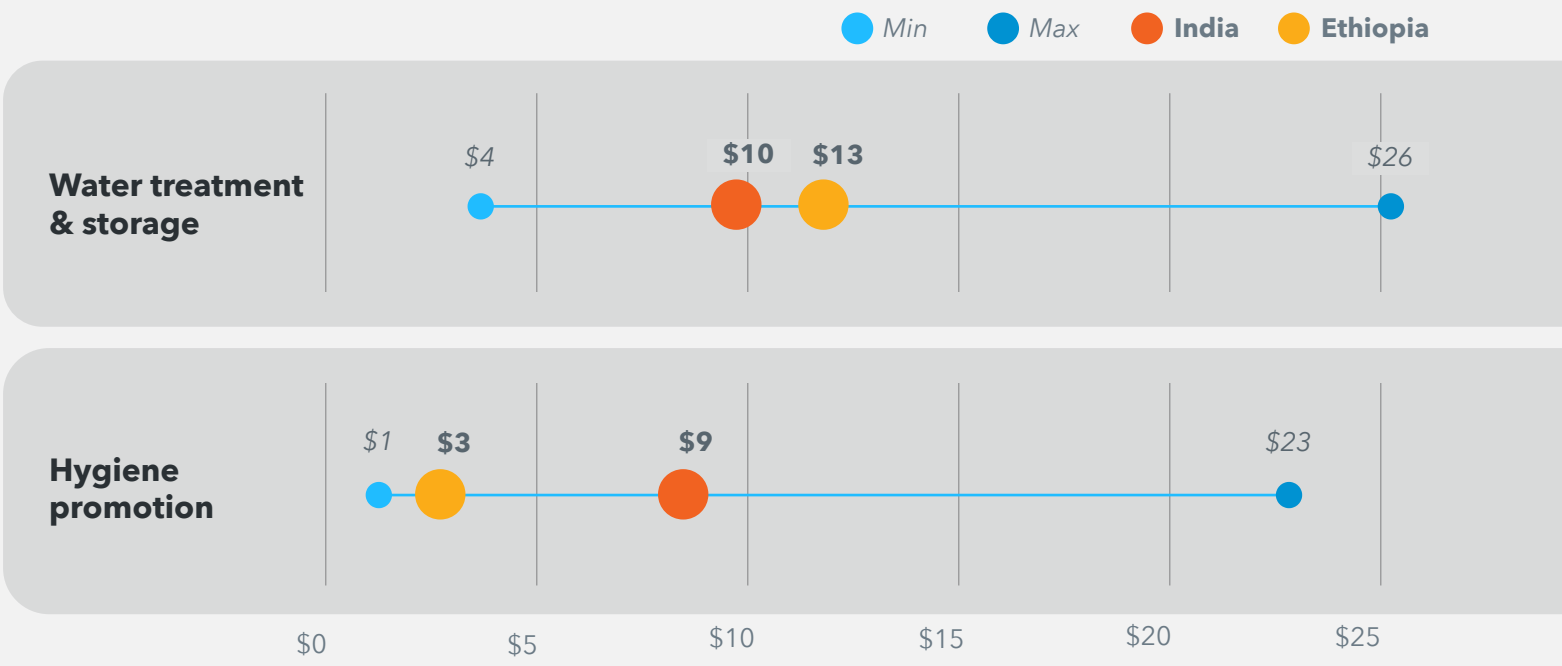

Figure 7: Splash Cost-effectiveness in Kolkata and Addis Ababa in 2023 dollars in comparison with literature ranges from [1]

RECOMMENDATIONS & LESSONS LEARNED

Drawing on Splash's conducting this cost effectiveness analysis, we have identified several key lessons and future recommendations as follow:

Variation in contextual factors complicates internal comparability – Wide variations between contextual factors such as existing water infrastructure, school size, school footprint, can create complexities in reporting cost effectiveness as overall and culminative averages. Future iterations of this work could also report ranges alongside average values.

External cost-effectiveness comparisons remain difficult – ProjectWISE had comparable results between groups and between countries, however comparability with literature estimates remains more complex. Future work could support the development of further standardized cost comparison modules and an update of the 2017 literature review.

Macro-economic constraints such as inflation limited further increases in cost effectiveness – Project-WISE operated over a season of significant inflation in both Ethiopia and India, driving up costs. The cost-effectiveness calculations have included parameters for inflation, but these macro-economic influences are unpredictable and do influence programmatic costs

Recurring operation and maintenance costs require further analysis – Reoccurring costs which are not borne by the project or are shared by schools or government partners could be included in future iterations of the costing estimates.

Cost effectiveness was influenced by strategic programmatic decisions – Cost reductions related to the cost of toilet blocks (from $14,000 to $1,800/stall in Ethiopia), costs of drinking and handwashing stations (14% reduction in Ethiopia and 48% reduction in India), and water storage costs ($0.54 to $0.30 per litre) significantly improved cost effectiveness over length of Project-WISE.

Economies of scale have driven improvements in cost effectiveness – Beyond the strategic decisions of the program to reduce costs, the program also was able to reach economies of scale by supporting a larger number of schools over time. These economies of scale were mostly due to bulk purchasing and fixed programmatic costs are spread across more schools.

REFERENCE

1. McGinnis, S. M., McKeon, T., Desai, R., Ejelonu, A., Laskowski, S., & Murphy, H. M. (2017). A Systematic Review: Costing and Financing of Water, Sanitation, and Hygiene (WASH) in Schools. *International journal of environmental research and public health*, *14*(4), 442. https://doi.org/10.3390/ijerph14040442

Further information:
splash.org/our-work/project-wise

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