Boosting business: why investing in water, sanitation and hygiene pays off

Technical note

WaterAid

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Technical note contents

Section 1: How to use this Technical note

The purpose of this technical note is to accompany the *Boosting business: why investing in water, sanitation and hygiene pays off'* impact report series – providing the rationale and detail on the approach and methodology for the project and enabling each report to focus on the key outcomes, impacts and findings, without getting bogged down by the detail. It includes an overview of each pilot project, the method, approach, calculation of return of investment (ROI), project data collection and the overall learnings. The nuances for each project are detailed in the impact reports.

Section 2: Introduction

Boosting business: why investing in water, sanitation and hygiene pays off is a research project measuring the ROI and analysing business benefits of improving water, sanitation and hygiene (WASH) services and behaviours in the workplace and employees' communities. In collaboration with Diageo, Gap Inc., HSBC, Twinings and ekaterra (which was part of Unilever when this project started), WaterAid conducted the research project. The research spans four countries (Bangladesh, Kenya, India, Tanzania) and ten workplace settings, including factory/manufacturing, as well as field-based contexts (from garment factories and tanneries to tea plantations and agricultural contexts).

While the role of WASH in economic development and resilience is relatively well documented,[1] its impact on workplace performance through employee health and wellbeing is less well evidenced. Through this research, we aim to build a strong case for action and investment in WASH in corporate supply chains and communities.

The overall objectives for the different workplace settings are:

- Improve WASH services and hygiene behaviours for factory employees, tea pickers or small-scale farmers, both in their place of work and in the communities where they live.
- Build the business case for WASH investment in different workplace settings (for factory employees, tea pickers or small-scale farmers), by calculating the ROI and analysing benefits from business indicators
- Identify broader social benefits such as decreased out of pocket expenses, and improved morale for factory employees, tea pickers and small-scale farmers.
- Influence the broader ready-made garment (RMG) industry, leather tannery sector, tea sector and small-scale farming sector by building the evidence base to provide people with a safe and hygienic work environment.

[1] Vexler C, Walker O, Mortlock C, et al (2021). *Mission-critical: Invest in water, sanitation and hygiene for a healthy and green economic recovery.* WaterAid and Vivid Economics. UK. Available at: washmatters.wateraid.org/ sites/g/files/jkxoof256/files/mission-critical- invest-in-water-sanitation-and-hygiene-for-a- healthy-and-green-economic-recovery_0.pdf (accessed 15 Aug 2022).

For each workplace setting, the aim is to define the WASH outcomes, and business impacts via a Project ROI and a Projected ROI (ROI to understand the project long-term effects for a period of 10 years). The business benefits will be analysed for each workplace setting and broader social and sectoral benefits will be outlined, as well as learnings. The only workplace setting which was not possible to derive any clear outcomes, impacts, business benefits or ROI was the smallholder farming in Tanzania. Methodological elements for this project are therefore not included in this note, please see project report for further insight and learnings on this smallholder farming project.

The pilot projects were focused on various supply chains in different geographies that have varying contextual settings – so each pilot had different types of WASH intervention. Therefore comparability between the projects was challenging.

Note: Some conclusions have been added based upon reasoning and WaterAid's contextual understanding of the situation to help draw a more complete story.

While ROI results overall are positive, not every individual workplace generated a positive ROI. Analysis suggests this is due to external factors (including COVID-19 and wider market fluctuations in demand for product), the nuances of each business, and the scale of the initial investment (see individual reports for more information). However, qualitative evidence showed that WASH interventions had a positive effect, particularly on business indicators like absenteeism, employee health and productivity across each sector.

Section 3: Outcome and impact pathway

A generalised outcome and impact pathway was developed for the project as follows:

- **Inputs/Investments:** The time/resources/costs that go into the project, and the provision of WASH services and exposure to hygiene behaviour change (HBC) interventions.
- **Outputs:** The direct deliverables generated through the implementation of a project, such as (number of facilities, people reached, time with HBC etc.).
- **Outcomes:** The short- and medium-term changes (functional WASH services, change in behaviours) resulting from the delivery of a project.
- **Impacts:** The long-term, lasting changes (functional WASH services, change in behaviours) in people's lives (benefits to people and benefits to supplier).
- **ROI**: The ultimate ROI (Project ROI and Projected ROI) resulting from functional WASH services and change in behaviours.

This was tailored for the specific context, business and sector for each pilot project – the specific details of which can be found in the impact reports. Both qualitative and quantitative data was gathered to help build the picture of benefits and impacts for people and businesses. Please start reading the diagram from stage '1. Investment/inputs'.

Generalised outcome and impact pathway

1 Investment/inputs

- Capital cost
- Operations and maintenance cost
- Training cost
- Opportunity cost
- Hygiene intervention package costs

2 Outputs

Workspace level

Capital:

Installation/renovation/restoration of WASH facilities:

- Handwashing points
- Drinking water units
- Sanitation blocks
- Rainwater harvesting system

Training:

- Hygiene behaviour change promotion and training (sanitation, menstrual health and hygiene, hand hygiene, food hygiene)
- Specific hygiene sessions on COVID-19 protection and prevention
- Exposure with hygiene behaviour change intervention

Community and household level

Capital:

Installation/renovation/restoration of WASH facilities:

- Overhead tanks
- Handpumps
- Community-managed/household toilets
- Handwashing stations

Training:

- Training/orientation on operation and maintenance of WASH facilities
- Hygiene behaviour promotion and training (sanitation, menstrual health and hygiene, hand hygiene)
- Specific hygiene sessions on COVID-19 protection and prevention

3 Outcomes

Employee level

Employees have:

- Access to improved WASH facilities
- Improved knowledge of hygiene
- Improved practice of hygiene

Community and household level

Employees and family have:

- Access to improved WASH facilities
- Improved knowledge of hygiene
- Improved practice of hygiene

4 Impacts

Benefit to people

- Improved health of employees and family members
- Increased job satisfaction
- Improved safety and dignity
- Improved employee morale and commitment
- Time saved
- Decreased personal medical cost
- Improved personal income

Benefit to supplier

Quantitative:

- Improved productivity
- Improved quality
- Decreased medical cost
- Decreased absenteeism
- Decreased attrition
- Improved punctuality
- Decrease in operational cost of water/decreased groundwater use (environmental benefit)

Qualitative:

- Better reputation

5 ROI

- Project ROI
- Projected ROI

Overall project ROI and projected ROI

Interventions: See each pilot impact report for details of specific WASH interventions.

Section 4: Methodology

This section provides detail on the generalised approach to the project methodology. Some elements that are specific to each project can be found in this section.

4.1 Study design

The project used a before and after comparison to show the WASH improvements, change in hygiene behaviours and the business impact of the intervention on employees and their households. Two out of four sub-projects collected cross-sectional data (Tea, Kenya and RMG, Bangladesh), whereas one project (Tea, India) collected longitudinal data. Leather, India project started with the collection of longitudinal data and later collected some cross-sectional data.

Hence, at endline, data was collected in a new random sample of the same source population, using the same sampling approach as for the baseline survey. The final study design was that of two cross sectional surveys with the intervention in between, allowing causal inference by maintaining the same sampling approach. Avoiding resurveying the same respondents at baseline and follow up may have the additional advantage of reducing responder bias.[2]

However, due to high attrition in the baseline sample of RMG, Bangladesh and leather, India projects due to COVID-19 pandemic (related to employee migration), it was realised that the dropout rate was higher compared to what was anticipated and may have led to a sample size inadequate for comparative analysis.

4.1.1 Sample size for primary research

Varied sampling techniques and sample sizes were used for each project based on context. Generally, sample sizes were determined assuming 95% confidence interval (Z=1.96) and 5% margin of error, allowing for a certain percentage of probable non-response and drop out.

Tea, Kenya project
A 7% margin error was used for this project, with 25% expected prevalence for behaviours.

[2] Schmidt W-P, et al. (2020). Cluster-randomised trial to test the effect of a behaviour change intervention on toilet use in rural India: results and methodological considerations. *BMC Public Health*. 2020 Sep 11. vol 20, no 1, pp 1389.

Leather, India project

Purposive sampling was done. The employees were selected in proportion to the population, 43% from Kings International Ltd and 29% and 27% from Superhouse I and II, respectively. The sample of permanent employees who lived in similar clusters were given a preference for selection so that the impact of community interventions could also be seen. The same sample that was selected for the baseline was selected for the endline as well except for the attrition and consequent replacement of 70 respondents.

One limitation is that the baseline survey was delayed by six months due to the COVID-19 pandemic and thus, recall questions had to be included to ensure that baseline data was collected. This could have potentially led to a too short timeline between baseline and endline, to observe tangible changes.

Ready-made garment (RMG), Bangladesh project

Multi-stage sampling was done in the RMG, Bangladesh project using the following 3 stages:

- Stage 1: Mahalla identification and selection
- Stage 2: Selection of clusters (a road or a low-income settlement with at least 10 employees from the target factory)
- Stage 3: Selection of employees/households for the survey

In the RMG, Bangladesh project, sampling frame was prepared independently for all factories for two types of employees (employees receiving intervention at factory only and employees receiving intervention at both factory and in community). The frames were used to select a random sample of beneficiaries using the following selection criteria:

- The employees receiving intervention at factory only:
    - Employees working in the target factories for at least 12 months
    - Willing to participate in the survey
- Employees receiving intervention at both factory and in community:
    - Employees working in the target factories for at least 12 months
    - Employees living in a household/home for at least six months where WaterAid provided benefit

Tea, India

Simple random sampling was undertaken with 266 surveys at baseline and 239 at endline. Same respondents were surveyed for endline, as for baseline, except for the attrition of 27 respondents.

Table 1: showing project-wise sample sizes

	Project			
	Leather, India	**RMG, Bangladesh**	**Tea, India**	**Tea, Kenya**
Sampling technique	Purposive sampling	multi-stage random sampling	simple random sampling	management shared list of respondents
Population	325	20,000 approx	1417	796
Sample size	253*	800**	239	140

*due to an attrition rate of 27% during the project, 70 new respondents were added to the sample.

**Around 10% of employees were found to have received community intervention as well as factory intervention. The sample size of such employees receiving community intervention was increased to 200 to ensure there were at least 30 such respondents from each factory in the endline.

4.1.2 Methods for primary data collection

The following qualitative and quantitative research methods, tools and approaches were used:

Table 2: Data collection tools and methods for each project

Methods/Tools		**Project**			
		Leather, India	**RMG, Bangladesh**	**Tea, India**	**Tea, Kenya**
Quantitative tools	Survey for employee and household – close ended questionnaires	✓	✓	✓	✓
	Diary entry method		✓ (800)		
Qualitative tools	Focus group discussion (Management, employees) – guided questions	✓ (3 at baseline and 4 at endline)	✓ (6 at baseline)	✓ (none)	✓ (1,4 at baseline, 4 employee FGDs at endline)
	Key informant interview (KII) (Management, employees) – guided questions	✓ (2,9 at baseline and 2,15 at endline)	✓ (9 at baseline)	✓ (6 at endline)	✓ (5-7 at baseline; 3,5-7 at endline)

Observation	Structured observation to assess the hygiene behaviour (in sub-sample) – direct observation more than 3 hours	✓	✓ (3 each at baseline and endline)	✓ (82 at baseline, 62 at endline) (KAP study which included some observation)	✓ (70 households at baseline; 0 at endline)
	Spot check to assess the availability and functionality of the WASH services and hygiene products – spot-check checklist	✓	✓ (3 each at baseline and endline)	✓ (All WASH infrastructure at household level was assessed at both baseline and endline. Institution and public WASH infrastructure was assessed)	✓ (70 households and 70 plantation sites at baseline; 0 at endline)

All the tools were pre-tested. For example, in case of the RMG, Bangladesh project, the tools were pre-tested at a location near the target factories, and the respondents of the pre-test were not included in the final sample. In case of the tea, Kenya project, at baseline, 20 test surveys were done in one village and 20 additional test interviews were done in two villages (x10 in each), and at endline, 10 test surveys were done. Feedback sessions were held between the data collectors and WaterAid project leaders at the end of pre-testing and feedback both in tools and methods are adjusted after the pre-test. In case of Tea, India project, pilot testing was done during enumerator training. Each enumerator did one household survey in those households which were not selected in sample. After testing, the findings were incorporated in final study tool.

Quantitative data:

- Employee surveys were undertaken using a mobile-based survey platform, which covered the following top-line components:
    - WASH access assessment of employees at workplace and household level.
    - Impact of WASH gap (as identified) on employees' health, productivity, absenteeism, error rates, attrition, motivation, expenditure on health etc.
    - Operations and maintenance cost of WASH to employee at household level.
    - The knowledge of the employees on hygiene.
    - The social norms/values/attitudes of employees on hygiene.

- Employee performance was recorded using the diary method of chosen indicators for two weeks. Indicators include absenteeism, productivity, punctuality, health, etc.

Qualitative data:
Focus group discussions (FGDs) and Key Informant Interviews (KIIs) were conducted with management and employees for each project. The third-party consultants conducted the FGDs in all projects using the guided questions, except the Tea, India project, where FGDs were not done. However, even in the Tea, India project, the attribution and interpretation interviews were conducted by the third-party consultant. These included broad components like:

- Information about WASH facilities and hygiene products
- Attitude towards improving WASH facilities and behaviours
- Knowledge on the importance of WASH and hygiene behaviours
- Impact of WASH on employees' health, productivity, absenteeism, error rates, attrition, motivation, expenditure on health etc.
- Management responsibilities and operation and maintenance (O&M) plan
- Possibilities for future improvements – WASH service and HBC

Observation:

- Structured observations of key hygiene behaviours in key locations where these behaviours need to happen.
  For example, in the RMG, Bangladesh project, observations regarding handwashing behaviour were done at factories during the lunch break. Structured observations took place at the handwashing stations in the factories during lunch hours. Each of the observers was placed near a handwashing location in the dining space. Each observer selected a group of 20–30 employees to observe their handwashing behaviour (washed one or both hands; used cleaning agents such as soap or not; used soap or water only, etc.). The observers tallied the behaviour records. 3–4 observers were deployed to observe multiple points. The purpose of the observation to assess behaviours never revealed and rather consented to observe their daily routine order to avoid any biases. In Tea India project, structured observation was done as part of the Knowledge Attitude Practice (KAP) survey.
- Spot check of WASH facilities and hygiene products to check whether facilities and products are in place. Such as presence of water points, drinking water storage and cleanliness, availability of toilets, functionality and cleanliness, availability of handwashing facilities and locations, availability of soap, water closer to the handwashing facility, any nudge/cues, and food hygiene management practices – were undertaken when possible (considering the situation with COVID-19).

4.2 Methodological approach for the 'outcomes' measurement

This part details the methodological approaches adopted to ensure validity of results, this includes methods, sensitivity, attribution, best and worst case results; net present value and payback period and projections.

Importance of this approach

The calculations in Section 6 indicate the ROI assuming 100% attribution to WASH. However, this is not always the case. Most of the business outcomes are impacted by business decisions. For example, increase in punctuality in one of the tanneries from the leather, India project, was because of a decision to not allow late arrival to shifts. Further, after the intervention ends, it is proven through multiple studies that the outcomes reduce unless the activities are re-enforced. These factors need to be considered to provide an accurate understanding of what the WASH-related ROI is at that date and projected for a longer period of time. Please note that an experimental or quasi experimental study design would be needed to more accurately assess attribution. However, these study designs are beyond the resourcing capacity of many businesses.

4.2.1 Methods for business data collection

Data was collected from the businesses to feed into ROI calculations. The details of these indicators and how attribution to WASH to determine is outlined in more detail below.

Business indicators

Table 3: Business indicators used to calculate ROI and their financial proxies

No	Aspect	Indicator	Financial proxy
1	Attrition	Number of employees leaving	Average cost of recruitment and training per employee
2	Absenteeism	Number of sick leave days taken due to WASH-related diseases	Average per employee per day salary cost (overtime cost excluded)
3	Punctuality	Number of late hours or hours left early	Average per employee per hour salary cost (overtime cost excluded)
4	Quality	Number of rejected/downgraded units which have been sold or discarded due to human error	Average sales price per unit
5	Productivity	Ratio of achievement vs target of units produced	Total sales value
6	Medical expenses in the in-house clinic	Number of patients in the clinic with WASH-related conditions	Average cost of treatment per disease incidence in the clinic and expenditure borne by the factory in Employee State Insurance (ESI) hospitals or reimbursement etc
7	Rainwater harvesting (RWH)	Amount of rainwater that has been harvested (cubic meter)	Water cost (cubic meter)
8	Value of tax benefits	N/A	Value of tax benefits if received

Please refer to Appendix A for more details on indicators.

Business indicator data was collected monthly at a factory/unit level. Data was not tracked at an individual employee level because of two reasons:

- The calculations were done in an aggregate manner at factory/unit level. So, it would not have been useful to collect data at employee level.
- For some indicators, factories/units did not maintain data at employee level.

Data was collected for at least one year before the project, one year during the project, and in some cases for a few months after the project – which varied for each. Please see the individual impact report for specifics. This helped us understand the following:

1. Trends in the business indicators over the period, accounting for seasonality.
2. Change in the business outcomes before and after the project.

Details about the costs borne directly by the project were taken from the WaterAid team.

A third party directly collected the data from the management, with support from WaterAid. The management provided most of the data and it was entered into the excel based VBA (Visual Basic for Application) tool for analysis. There was frequent communication with the management team whenever the data was not adequate. This process of frequent checking and updating was then used to verify the data.

Attribution interviews

The process mentioned in Section 6 helps calculate the ROI and the value of business outcomes and analyse the trends. However, this process does not tell us how much change occurred due to the WASH intervention and why that change took place. To understand this, we conducted qualitative discussions with the management team. These discussions with management and expert judgement from the researchers helped answer the questions on attribution of the changes to WASH interventions and understand the reasons for trends i.e., if it has changed because of a business decision or the cultural context.

4.2.2 Sensitivity analysis

Sensitivity analysis is undertaken for each of the business indicators. It provides insights on the contribution of each of the business indicators to the WASH ROI and the business ROI. Calculations are carried out to understand if the business indicator (like the attrition rate or absent days) changes by 25% and 75%, the proportion by which the ROI changes. The table below explains with an example:

Table 4: Example of sensitivity analysis on ROI for change in attribution percent

		Sensitivity analysis – 1 (positive means improvement, negative means worsening)		Sensitivity analysis – 2 (positive means improvement, negative means worsening)		Final	
Serial number	**Indicator**	**Attribution %**	**% Change from the original ROI**	**Attribution %**	**% Change from the original ROI**	**Attribution %**	**ROI based on attribution**
1	Attrition	25%	0.01%	75%	0.03%	75%	-0.05700
2	Absenteeism	25%	2.22%	75%	6.65%	75%	
3	Punctuality	25%	1.34%	75%	4.03%	75%	
4	Productivity	25%	161.76%	75%	485.27%	10%	
5	Quality	25%	0.00%	75%	0.00%	0%	
6	Medical Cost	25%	0.00%	75%	0.00%	0%	
7	Others – Tax	25%	0.00%	75%	0.00%	0%	
8	Others – RWH	25%	0.00%	75%	0.00%	0%	

The ROI before attribution is -1.37. The second row tries to understand that if absenteeism is 25% lower than what it is currently, the ROI would increase by 2.22% to -1.34. Similarly, if it was 75% lower than the current value, it will reduce by 6.65% to -1.28. Thus, we can conclude that productivity has the most impact on the ROI and should be controlled more. The information from this analysis combined with the stakeholder interviews will feed into the attribution for each project and business indicator.

Sensitivity analysis was also used to see how much the ROI itself changes when attribution percentages of all indicators are adjusted a certain percentage up/down. The sensitivity analysis then shows what the results look like if the input estimates are different, considering that attribution percentages are imperfect, given that they were derived mainly from management data and researchers' understanding of the context.

Please see Appendix B for information on how the Project ROI changes on increasing/decreasing attribution precents of various indicators by 10% percentage points.

4.2.3 Attribution

This process helps us understand the attribution of the business outcomes to WASH and the WaterAid intervention. The following methods can be used to arrive at the % to be used:

- Understanding the trends in the business indicators before and after the project
- Interviews with the factory management
- If the research design included a comparison group, then findings from that analysis

As in the table above, these need to be added to each of the business indicators to arrive at the project and business ROI after attribution. These will be used for projections going forward.

For more details on the attribution percentages and the reasons for choosing them, please refer to Appendix C

4.2.4 Best case and worst case

Best-case and worst-case scenarios are assumed in the Projected ROI. It helps us understand the range in which the benefits are likely to be experienced if businesses invest in sustainability of WASH intervention in differing proportions during the course of projected period.

For the worst-case scenario, it is assumed that no costs are borne after the project ends. As a result, there is a continuous drop-off in benefits every year. In the best-case scenario, it is assumed that continuous costs are borne by the businesses in the infrastructure maintenance and in re-enforcement of behavioural change communication. Because of these efforts, there is a continuous increase in outcomes.

The best-case scenarios have been reported on in the impact reports, because we have assumed continued investment.

4.2.5 Drop-off – best-case and worst-case

Drop-off is used to understand the rate of increase of the business outcomes in a best-case scenario and the rate of decrease in these outcomes in a worst-case scenario. The data used for these calculations is derived from various sources, including WaterAid data from other projects, which seek to understand the impact on WASH outcomes once the interventions end. Please see the table below for drop off rates, its variables, and source of data for these variables.

Table 5: Drop off rates, its variables, and source of data for these variables

Scenario	**Assumed drop-off rates**		**Variables used to derive assumed rates**	**Data source for these variables**
	Value (in %)	Description		
Worst-case	3.5%	The drop-off rate without top-up promotion once the project is fully completed is expected to be in-between 0.6% to 4%. Since the variation is huge and very limited data is available on this, we have assumed 3.5% as the worst-case scenario.	- Between reported knowledge, practices and observed practices, the latter (observed practice) was decided to be more accurate for describing behaviour and therefore, chosen as one of the two factors for deciding drop-off rate. - Between presence (functionality) of handwashing facilities (having soap and water) in households and institutions, the latter was decided to be more accurate for describing access at an institutional level (we are calculating ROI at institutional level) and therefore, chosen as one of the two factors for deciding drop-off rate.	- Source for data on knowledge/reported practices, presence (functionality) of handwashing facilities (having soap and water) at households and at institutions, is PIMS data (WaterAid). - Source for data on observed practices is sectoral data based on best practices in the sector and analysed by WaterAid.
Best-case	12.5%	The rate of progress is expected to be in-between 10% to 15% (with mean of 12.5%) only if top-up promotion and functionality of services are ensured.		

Note:

- Since the rate of progress and drop-off varies depending on the intensity of the project, quality of service and behaviour change, the proportionate fraction of these drop-off % are accounted with the actual rate of progress and drop-off while assuming/estimating the precise outcomes.
- The rate of progress after 90% is expected to be low (1% to 3%) and no change is expected after reaching 95%.

It is evident that there is huge lack of longitudinal data to reflect the precise rate of progress in the sector with top-up promotion, as many large-scale interventions don't publish longitudinal data to reflect cumulative progress (with some exceptions with small scale trial and studies). This assumed mean rate of progress is, with subject to continued top-up promotion of hygiene behaviours, continued functioning of hardware and availability of hygiene products, due to investment in operations and maintenance costs.

The drop off % rates are used to calculate the projected business indicators. The financial proxies are assumed to increase at inflation rate every year. A product of the financial proxy and the business outcome gives the benefit for the selected month.

Please refer to Appendix D for how the drop-off percentages have been derived.

Calculating benefit % for best-case scenario

This section explains the calculations.

- While a set of assumptions have already been developed for projections on behavioural outcome, it is acknowledged that business indicators may not change with the same % figure. For instance, increment in uptake of behaviours may not be equal to reduction in absenteeism. While behaviour outcomes might contribute to reducing absenteeism, they may not contribute to absolute same ratio.
- Therefore, with guidance from WaterAid experts, we have developed a formula for calculating separate benefit % for each indicator using the proportionate factors.
- Formula -> benefit % = change from baseline * behaviour increment from top up promotion (in %).
- Behaviour increment from top-up promotion is assumed to 12.5% till the outcome value is 90%. It is then assumed to increase by 2.5% till the outcome is at 95%. It is assumed that there is no change after the outcome reaches 95%.

Table 6: Illustrative example of calculations done to calculate increase in benefits in best-case scenario

Number of sick leave taken due to WASH-related diseases at baseline (A)	10 days
Number of sick leave taken due to WASH-related diseases at endline	8 days
% change from baseline at endline (B)	2 days i.e. (-20%)
Behaviour increment from top up promotion (C)	12.50%
Fraction of reduced absenteeism due to top up promotion (benefit %) (D)	= B*C = -(20*12.5%) = -(2.5%)
Projected Year 1: % change from baseline (E)	= B + D = (-20) + (-2.5) = (-22.5%)
Projected Year 1: Number of sick leave taken due to WASH-related diseases	= A-(A*E)
We are applying 2.5% as absolute attribution to reduce absenteeism.	

Table 7: Calculations to attribute absenteeism in the Mabroukie Tea, Kenya project study (showing increase in benefits in best-case scenario, as an example)

	Absenteeism (sick days due to WASH diseases as % of total man days)	Behaviour increment from top up promotion (C)	Fraction of change due to top up promotion (benefit %) (D)	Change from baseline (taking absolute value change) (E)	Number of Sick days due to WASH diseases
Baseline	0.0043%				13.00 (A)
Endline	0.0176%			-307.66% (B)	
Projection Year 1		12.50%	-38.46%	-269.20%	48.00
Projection Year 2		12.50%	-38.46%	-230.75%	43.00
Projection Year 3		12.50%	-38.46%	-192.29%	38.00
Projection Year 4		12.50%	-38.46%	-153.83%	33.00
Projection Year 5		12.50%	-38.46%	-115.37%	28.00
Projection Year 6		12.50%	-38.46%	-76.92%	23.00
Projection Year 7		12.50%	-38.46%	-38.46%	18.00
Projection Year 8		12.50%	-38.46%	0.00%	13.00
Projection Year 9		12.50%	-38.46%	38.46%	8.00
Projection Year 10		12.50%	-38.46%	76.92%	3.00
These are overall values. Attribution to WASH intervention has not been considered.					

With the projected cost spent on top-up promotion and WASH services, if the rate of progress continues, the absenteeism (with attribution to WASH intervention not considered) is projected based upon calculations only to be reduced by approximately 77% at the end of 10 years of projected period.

Calculating drop-off % for worst-case scenario

This section explains the calculations.

- Drop-off % calculations have been carried out in the similar manner as benefit %, but reversed.
- It is possible that the over time, the behavioural outcomes, and the corresponding improvement in indicators might reduce. For example, every year (or every month), new employees might be recruited by the factory, and if they are not provided with training and not exposed with the hygiene intervention, it is possible that they may not exhibit good WASH behaviours, even though the necessary WASH facilities are available in the factory premises. This factor could also be considered while calculating drop-off %.
- The drop-off % is assumed to be 3.5% every year.
- Drop-off % was applied as an absolute % change from baseline and not as proportional change.
- The table below demonstrates the calculation of the drop-off % based on dummy data. Here the rationale is that an increase in behaviour outcome due to the intervention will impact a business indicator by a specific percentage, and conversely, a reduction in the behaviour will also result in a corresponding reversal in the indicator.

Table 8: illustrative example of calculations to decrease in benefits in worst-case scenario

Number of sick leave taken due to WASH-related diseases at baseline (A)	10 days
Number of sick leave taken due to WASH-related diseases at endline	8 days
% change from baseline at endline (B)	(-20%)
% drop-off in handwashing behaviour/facilities post the intervention year (C)	(-3.5%)
Fraction of increased absenteeism due to no top up promotion (D)	= B*C = 0.7%
Projected Year 1: % Change from baseline (E)	= B+ D = (-19.3%)
Projected Year 1: Number of sick leave taken due to WASH-related diseases	= A+(A*E) (for E is +ve) A -(A*E) (for E is -ve)
We are applying 0.7% as absolute attribution to increase absenteeism.	

Table 9: Calculations to attribute absenteeism indicator in Mabroukie Tea, Kenya study showing decrease in benefits in worst-case scenario

	Absenteeism (Sick days due to WASH diseases as % of total man days)	% drop- off in handwashing behaviour/ facilities post the intervention year (C)	Fraction of increased absenteeism due to no top up promotion (D)	Change from baseline (taking absolute value change)	Number of Sick days due to WASH diseases
Baseline	0.0043%				13.00(A)
Endline	0.0176%			-307.66%(B)	
Projection Year 1		3.50%	-10.77%	-318.43%	54.40
Projection Year 2		3.50%	-10.77%	-329.20%	55.80
Projection Year 3		3.50%	-10.77%	-339.96%	57.20
Projection Year 4		3.50%	-10.77%	-350.73%	58.60
Projection Year 5		3.50%	-10.77%	-361.50%	60.00
Projection Year 6		3.50%	-10.77%	-372.27%	61.39
Projection Year 7		3.50%	-10.77%	-383.04%	62.79
Projection Year 8		3.50%	-10.77%	-393.80%	64.19
Projection Year 9		3.50%	-10.77%	-404.57%	65.59
Projection Year 10		3.50%	-10.77%	-415.34%	66.99
These are overall values. Attribution to WASH intervention has not been considered.					

With the projected cost **not** spent on top-up promotion and WASH services, if the rate of decline continues, the absenteeism will be increased by approximately 415% at the end of 10 years of projected period.

These are used to calculate the business outcomes for each year in the projected period. Financial proxies are assumed to increase every year at the rate of inflation. The product of the financial proxy and the business outcome is the benefit for the year. Net benefits are calculated as a difference of the benefits in the year to benefits at baseline. Please note that attribution of change to WASH intervention is to be done on these benefits after calculations.

Please refer to Appendix E for the drop off % and benefit % for all indicators in all projects

4.2.6 Net present value

It is a known concept that with increasing inflation, the value of the USD today is more than it will be two years in future. This accounts for time value of money and accounts for uncertainty risks which are associated with long-term projects. Hence, to understand the value of the costs and benefits accrued in the future, they have to be brought to the present day. Present value is used for the same wherein both costs and benefits are brought to the present day using a discount rate of government debt free rates. This is used to calculate the net costs and benefits, and the Projected ROI.

Benefit for a specific outcome O =

$V1+(O1*[(1+B\%)(1+D)_2]*FP1*(1+i))+(O1*[1+B\%)^2(1+D)_3]*FP1*(1+i)_2)+..+(O1*[1+B)^n(1+D)_n]*FP1*(1+i)_n)$

V1 = Value of outcome at the end of the project
B% = Rate of increase of benefits
D% = Discount rate OR risk free govt bond rate
n = Year till when the ROI is being calculated
i = Inflation rate
FP1 = Value of financial proxy at the end of the project

WaterAid

Section 5: Data collection, quality control and analysis

This section provides an overview of how data was collected and managed, detail is also provided demonstrating validity of results where data points were missing.

5.1 Data collection

A comprehensive list of business indicators, for which the data was needed to calculate ROI, was shared with the businesses. The indicators were classified broadly into 'must-have' and 'good-to-have'. All the indicators under 'must-have' were essential for the ROI calculation and the businesses were requested not to miss any data for those indicators. Whereas those indicators under 'good-to-have' were not mandatory as they did not contribute directly to the estimation of ROI, and thus the businesses could decide to provide the data for it or not. For some projects, this list was directly shared by the consultant to the businesses, while in some cases, support was taken from WaterAid. The data shared by the businesses was reviewed and checked for missing and/or inaccurate data. If any data/indicator was found missing or inaccurate, the consultants undertook discussions with the businesses for clarification and to ensure quality control of the data. The data of the various indicators was collected monthly at a factory/unit level. Individual employee level data was not collected because a) it was not readily available, and b) aggregate calculations as were done, did not require employee level data.

Data was collected for at least one year before the project, one year or longer during the project. It was important to be able to study the trends in the business indicators over the period and to understand the change in the business outcomes before and after the project. The data for costs of the businesses were majorly taken from WaterAid, however in some cases, for example in the case of ekaterra (formerly Unilever), the data was directly taken from the business as it had directly undertaken project implementation, with only project design support from WaterAid. Additionally, other costs like opportunity costs are also taken directly from the businesses.

The initial idea was to collect the data from the businesses monthly. However, it could only be collected all at once, or in 2–3 batches, for the entire project period.

5.2 Accounting for missing data

It is important to have data for every indicator for every month that the data is being collected. However, there are often chances that some data is not available. If an indicator itself was not available, it was not used for calculations. If information was missing for a specific indicator in selected months, it was replaced using an average for the period. If the information was missing for the period before the intervention, the average before the intervention was taken. If it was missing for the period after the intervention, the average for the other period was used. This ensured that the outcomes before and after the project were maintained. An important drawback of this method is the loss of seasonality. For example, if the missing data for the first three months is replaced with an average for the next seven months, any changes owing to seasonality will be lost. Other techniques for replacing missing data were used where this technique could not be used. These include regression analysis and filling missing cells with gradually increasing or decreasing data.

5.2.1 Alternative data points used

Profit and surplus data were not available from most of the workplace units, either for a specific month or a defined period. Hence, sales or turnover information was used as a proxy to understand the financial performance of productivity. Other proxy indicators used are part of the tool and could be selected during data entry. These include:

a. If the **total turnover and the total products sold** were not available or shared, the **average cost per product** was used.
b. **Target vs actuals** was to be used for the unit which is likely to be impacted by productivity of employees. For example, in case of tea factories, it included **target vs actuals for tea picked**. However, in absence of this data, **target vs actuals for the tea made (finished products)** were used.
c. Where clinics are part of the business setting and data is maintained, the **total number of walk-ins in the clinic and the number of walk-ins which were because of WASH-related conditions** were used. In the absence of this disaggregation, results from **the household survey** were used to understand **the incidence of WASH-related diseases** and for calculations.

5.3 Accounting for seasonality

There were multiple seasonal factors that impacted the costs and the benefits. These include monsoons and the ensuing health conditions, harvesting season, etc. Please note that these seasonal factors are regular factors, and not one-off events as mentioned in 'Weather' subsection of 'External factors' section. Therefore, performance on selected indicators were compared month on month before and after the project was initiated. Similar trends during the period helped us account for any seasonal changes and not attribute the change to any other external or internal factors. To be able to do this, it was ensured that a minimum of 1 year of management data each for baseline and project period, was collected.

Seasonality was considered to ensure that the same number of months were used for comparison between the baseline and endline. These were understood from the trend graphs for each business indicator available in the ROI file. These were also probed and understood from the interviews with the stakeholders after the calculations were done.

Section 6: Calculating the ROI

This section provides detail on how the different ROI calculations and outputs have been generated based drawing on gross data and best- and worst-case scenarios to enable communication of an overall ROI. This shows a generalised approach to the project methodology. Elements that are specific to each project can be found in the individual impact reports.

6.1 Return on investment

ROI of an intervention is defined as an increase in benefits due to additional costs of the intervention. The Project ROI is calculated as an aggregate ROI right from the end of the baseline period. This means that we started calculating ROI right after the baseline period and there was no gap. For example, in case of the tea, India project, the following was the period for which ROI was calculated:

Baseline period	January 2019 – December 2019
Project period	January 2020 – August 2021

In addition, there is a Projected ROI, which is a modelled/assumed ROI based on anticipated costs and benefits up to the 10th year, in line with the asset lifetime of some of the longer-lived and more expensive assets.

Please refer to Appendix E for calculation details.

The study compared the costs in the project period to the baseline and same for benefits as per the equation below.

Costs before intervention = $\sum Costs(M\_0)$

Costs after intervention = $\sum Costs(M\_1)$

Benefits before intervention = $\sum Benefits(M\_0)$

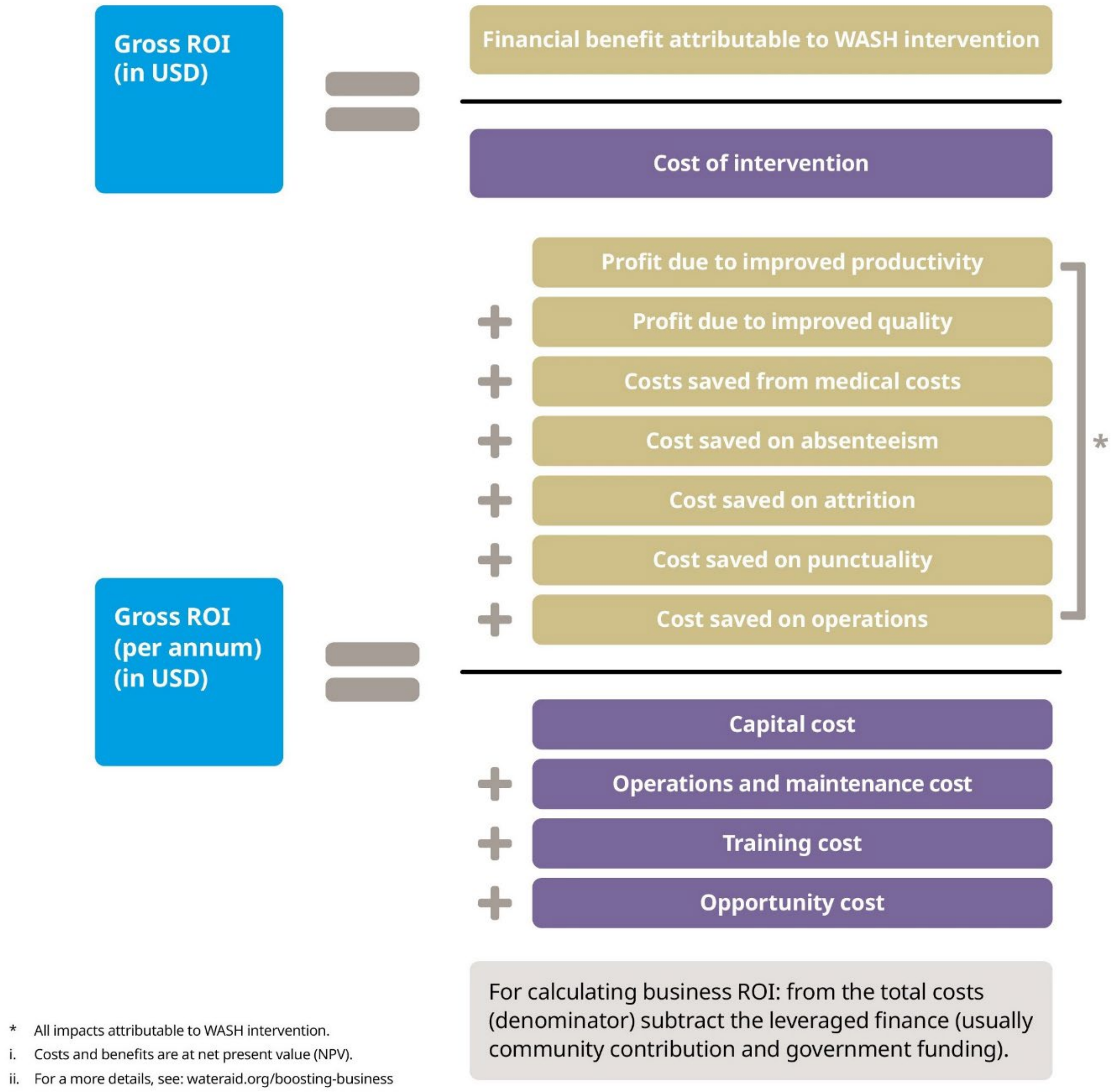
Benefits after intervention = $\sum Benefits(M\_1)$

ROI = $(\sum Benefits(M\_0\ ) - \sum Benefits(M\_1))/(\sum Costs(M\_1\ ) - \sum Costs(M\_0))$

(Denominator is cost post-intervention subtracted by cost pre-intervention. Numerator follows an opposite formula because the benefits were calculated as pre-intervention subtracted by post-intervention, so overall benefits follow the same method).

The visual depiction below indicates firstly, the general high-level ROI formula, and secondly, a more detailed breakdown of that same generic ROI formula, highlighting the components of the formula.

ROI formula



(*NOTE: there may be some nuances for each project based upon context, but aim was to report on all of above to enable consistency and comparability between projects)

The aggregate of costs and benefits for a year before the intervention was compared with the aggregate after the intervention was initiated. This was to limit the effect of factors owing to seasonality on the results.

Each project was able to pick and choose from this list of indicators based on their specific context.

This section presents the formulas and calculations used in calculating ROI.

In the current context, costs include:

- costs of infrastructure and O&M;
- cost of project design and printing/production of HBC promotion materials/HBC package materials;
- cost of training and implementation;
- opportunity cost for the employees to conduct and participate in the training;
- productivity-based and attendance-based bonus given to the employees.

6.2 Calculating the monthly costs of the interventions

This section provides a breakdown of the calculation for monthly costs:

$$Costs\_(M) = ([\![Costs]\!]\_I(M) + [\![Costs]\!]\_T(M) + [\![Costs]\!]\_B(M) + [\![Costs]\!]\_PD(M) + [\![Costs]\!]\_HC(M) + [\![Costs]\!]\_C19(M) + [\![Costs]\!]\_IC(M) + Costs\_Other(M) + Costs\_CI\ (M))$$

Costs (M) = Monthly project costs
Costs_I(M) = Monthly business infrastructure cost
Costs_CI(M) = Community and household infrastructure cost
Costs_T(M) = Monthly costs of employee behaviour change training and sessions
Costs_B(M) = Monthly cost of bonuses
Costs_PD(M) = Monthly project design costs
Costs_HC(M) = Costs of health camps (external medical practitioners visiting the workplace)
Costs_C19(M) = COVID-19-related training costs
Costs_IC(M) = Costs related to community and household infrastructure
Costs_Other(M) = Other costs borne in the month

The projected costs for all projects include the following. Please note that the ROI calculations include projections for 10 years, including cost for the 10th year (the benefits will go on to the 11th year):

- Top-up promotion cost – refers to the refresher HBC training. This is estimated at 10% of the training cost per year, as taken from WaterAid data from

Ethiopia.[3] Based on an Ethiopia case study, the top-up promotion planned for 10 years after the initial hygiene behaviour promotion costs was as follows:

- On average per year, 10% of initial overall promotional costs (the actual values fluctuate between 8%–14% every year based on when certain activities would be promoted).
- In total (for nine years), 86% of initial overall promotional costs (this is based on the activities that were planned to be repeated to reinforce behaviour over time, O&M of services).

- O&M cost – for maintaining the new infrastructure set-up in the business, community and household settings.
- Hygiene promotion package re-production – every three to five years, the full promotional package needs to be reviewed, re-adjusted and re-produced for continuous reinforcement.
- Recurring cost – spent by the businesses on running the existing and new WASH infrastructure.

Source for both the O&M cost and recurring cost is the *WASH SDG Costing Tool* published in 2020 by Sanitation and Water for All.

Table 10: Project-wise and unit-wise cost of WASH intervention in project and projected period (in USD)

Projects	Unit	Cost at the end of project year (in USD)	Cost at the end of 10th year (in USD)	Cumulative cost for 10 years of projection (in USD)
Leather, India	Kings International Ltd.	376823.70	5195377.71	4818554.01
	Superhouse I	236162.66	4674445.79	4438283.13
	Superhouse II	1341101.97	13571838.52	12230736.55
	Total	1954088.34	23441662.02	21487573.68

[3] Government of Ethiopia (2022). *National Hand Hygiene for all Roadmap 2022*. Available at: cmpethiopia.org/content/download/7263/27420/file/Draft%20HH4A%20strategic%20road%20map%20Sep%202021.pdf (accessed 15 Aug 2022).

RMG, Bangladesh	Esquire Knit Composite Ltd.	129163.33	4912284.91	4783121.58
	Fakir Fashion	59521.34	2243995.93	2184474.59
	Next Accessories	34620.22	491059.50	456439.28
	Total	223304.89	7647340.34	7424035.46
Tea, Kenya	Mabroukie	11758.13 *	142033.87	130275.73
Tea, India	Barnesbeg	34828.98	552610.18	517781.20
	Nagrifarm	59290.75	802701.91	743411.16
	Total	94119.73	1355312.09	1261192.36
Total		2283271.09	32586348.32	30303077.23

* The annual cost at the end of the project period is low as there was low Capital Expenditure. There was no big spending on capital cost, and the only spending of capital costs was for 32 handwashing points.

6.3 Calculating the monthly benefits from the interventions

The section below describes the calculations for benefits in a selected month:

Benefits (M) = Benefits_A(M)+ Benefits_Ab(M)+ Benefits_P(M)+ Benefits_Q(M)- Benefits_I(M)+ Benefits_C(M)- Benefits_Others(M)

Benefits_A(M) = Benefits from reduced attrition
Benefits_Ab(M) = Benefits from reduced absenteeism
Benefits_P(M) = Benefits from increased punctuality
Benefits_Q (M) = Benefits from improved quality
Benefits_I(M) = Benefits from increased productivity
Benefits_C(M) = Benefits from reduced medical cost to business
Benefits_Others(M) = Value of benefits from others

Please note that:

- For benefits, it is expected that all the indicators (except productivity, costs saved due to RWH, and tax benefits) will reduce from baseline to endline, thus leading to increased savings. Hence, these indicators are marked as negative, and the rest are positive.

- Post calculation, the implementing teams reflected on the data and insights to highlight and understand outlier issues. These include sharp changes in absenteeism or productivity trends. These fed into understanding the context and learnings about what does and does not work, and an understanding of the external factors that impact business processes. This improved understanding and learnings can be extended to other similar workspace contexts.

6.4 WASH ROI vs. business ROI

This calculation gives us the ROI for the intervention period for all costs borne irrespective of where the money came from. This ROI is called the **WASH ROI**. It represents the benefits to the business from all investments made in the project. However, as this model is replicated in future, businesses may not be expected to bear costs – which may include monetary contributions by the community/household and funds leveraged from the government. It is envisaged that the costs for maintaining the community and household infrastructure will come from the community/household itself. Hence, a **business ROI** was also calculated. This is an important indicator because it is representative of what it means for businesses to invest in the cause and may include the same benefits as the WASH ROI. However, the costs will be edited as shown in the formula below:

$$Costs\_(M)(Business\ ROI) = (〚Costs\_(M)(WASH\ ROI)〛\_ - \text{monetary contributions by the community or household} - \text{funds leveraged from the government})$$

Costs (M) = monthly project cost

The new benefits to cost ratio as calculated above is the business ROI.

It is important to highlight that these are the benefits before attribution i.e., it is assumed that 100% of the benefits are due to WASH. However, this is often not the case, and the results need to be adjusted accordingly.

6.5 Project ROI and Projected ROI

The ROI calculated before and after the attribution is for the project period, so it is called the Project ROI. As explained previously, the outcomes are often not visible in the short timeframe of the project. To understand the project long-term effects, it is projected for a period of 10 years and is called Projected ROI. Although the life of many the infrastructure built is beyond 10 years, projecting for a period longer than that was out of the scope of this project.

Projected ROI is the ratio of total benefits to total costs, similar to the ROI at the end of the project. Projected ROI is calculated based on the net present value (NPV) of investments and benefits. The NPV was used to measure the costs and the benefits at the present day i.e., at the end of the project. The costs borne for capital investment were accounted for based on cashflow principles and hence when accrued. For the calculation of the NPV, it was assumed that the discount rate is the risk-free government bond rate for the selected country and the same was used.

Costs in a specific year include the following:

1. Operating cost of the infrastructure
2. Maintenance cost of the infrastructure
3. Capital cost of the infrastructure
4. Top-up promotion cost

Future costs have been estimated using three techniques:

- For infrastructure cost, the cost spent in project period was multiplied with various percentages and at varied year intervals (refer Appendix E) for calculation of future operation costs, maintenance cost and capital cost for each asset type.
- For Behaviour Change Communication (BCC) costs, 10% of project HBC promotion materials design and printing, project design, trainers and opportunity cost of training was considered to be borne every year in future.

6.6 Gross ROI

The ROI is calculated as a proportion of net benefits to net costs and is called gross ROI. It provides insights into the overall returns from the investment. Net ROI will include net benefits after removing the costs borne. This helps us understand the returns after the cost of intervention is covered. For all calculations, we use gross ROI.

Why gross ROI: Gross ratio expression is commonly used for cost-benefit analysis, where 110% gross ROI would be 1:1.1. This was thought to be more readily understood and easy to adjust for different audiences.

6.7 Overall ROI and range

Overall ROI is an artificial construct in the case of the study of garment factories and tea estates, where they are owned by different businesses, but may represent the situation for a business considering investing in WASH over multiple operational locations.

For ROI and business indicator results, overall ROI was discussed with indication of the range. Let us assume there are two factories – A and B. ROI for A is $3 and for B is $5. We reported the results as follows: ‘For every $1 invested in WASH, there was a return of $4 (overall ROI; range: $3 [Factory A] to $5 [Factory B]), attributable to WASH intervention.'

6.8 Payback period

Payback period helps to understand the number of years in which the intervention will break-even and start generating profits. A yearly cash-flow table showing the progress every year and cumulatively, helps us understand this. It will help inform factory management and decision makers about their WASH investments and therefore is an important communication output. The table below summarises the cash-flow template

Table 11: Template of a cashflow table for a single workplace

Cash flow – best case scenario													
		Actual (project)		Forecast									
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Costs (in $)	Capital Expenditure - Factory												
	Capital maintenance expenditure - Factory												
	Operations expenditure - Factory												
	Capital Expenditure – community/household												
	Capital maintenance expenditure – community/household												
	Operations expenditure – community/household												
	Community/household contribution												
	Government contribution												
	Training expenditure												
	Opportunity cost												
	Miscellaneous cost												
	Total cost in a year												
	Total adjusted cost in the year												
	Cumulative cost												
Benefits (in $)	Business medical cost												
	Absenteeism												
	Attrition												

	Punctuality												
	Quality												
	Productivity												
	RWH												
	Tax benefits												
	Total benefit in a year												
	Total adjusted benefits in the year												
	Cumulative benefit												
Gross ROI per $ for a year													
Cumulative gross ROI per $													

This table helps understand the following:

a. Trend in the value of business outcomes and hence benefits
b. Trend in costs through the projected period
c. Periods when there will be higher ROI in the year
d. Trend in the overall ROI through the projected period

This table has to be visualised as in the payback period graphs below:

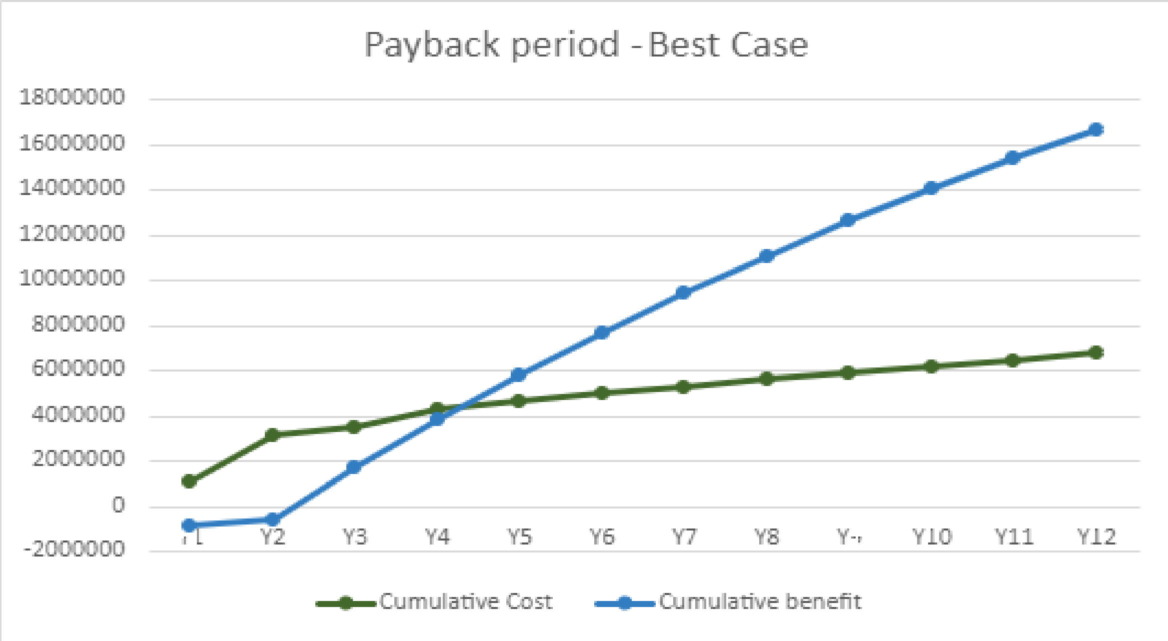


Figure 1: Payback period – Tea estate, India

This graph for one of the Tea estates from the India projects summarises the cumulative costs and benefits over the projected period and it breaks even. As you can see, initially from Year 1 to Year 4, the cumulative benefits are lower than cumulative costs. This means the intervention costs are more than the benefits generated. After Year 4, lines for cumulative benefits and costs intersect at the breakeven point. This means the benefits generated from the intervention have become equal to the costs. After this point, the cumulative benefits remain higher than the cumulative costs and the gap between the two lines keeps increasing, which reflects the profits generated from the WASH intervention.

This process was repeated for best-case and worst-case scenario for both the WASH ROI and the business ROI.

Section 7: External factors and limitations

Not all benefits can be attributed to WASH. We have attempted to isolate the effect of external factors by accounting for attribution to WASH intervention. As part of Attribution and Interpretation Interviews, data was collected on how much change in business indicators could be attributed to the WASH intervention, and not how much change could be attributed to individual external or combination of external factors. Moreover, due to the limited scope of this study, the business impacts of a post/non-COVID pandemic scenario are not fully understood or discussed.

7.1 COVID-19

The global COVID-19 pandemic impacted the implementation of the intervention and the research in all the four projects leading to unforeseen challenges and research implications and limitations in the following ways:

a) Project implementation was either delayed or changed

In the case of all projects, the complete lockdown for a few months during the project period meant that the project had to be paused and restarted only after the lockdown was lifted. In the case of Twinings, this led to serious delays because only the summer months and partially winter months are viable for infrastructure given the hilly and treacherous terrain of the estates, and by the time the lockdown was lifted it was already rainy season, so the work was delayed even further. In case of ekaterra (formerly Unilever), the plan was to hold carefully structured behaviour change sessions and household visits, but due to a prohibition on social gathering, the sessions had to be smaller and only targeted the employees as the household visits were cancelled.

COVID-19 also impacted project implementation work as there was a restriction on movement within tea estate – which could have led to underestimation of results.

b) Delayed data collection

In the garment factories in India, the COVID-19 pandemic delayed the baseline data gathering by six months and led to the revision of the assessment in terms of timelines, length, detail, and the inclusion of recall questions. This delay and the revision of timelines meant that the duration between the baseline and endline assessment was potentially too short to observe tangible changes. The delay only affected the survey data which was used to study the WASH behaviours and the details for the missing months were collected through the recall method. The evaluation was performed with the management data which was not affected by the delay.

c) Change in study design

Due to the pandemic-related closure of factories and migration of employees back to villages, it was estimated that there may be more than 50% attrition in the sample for Bangladesh factories. This necessitated the change in study design from longitudinal to cross-sectional because there was possibility of an inadequate sample for appropriate comparison in a longitudinal study.

d) Interference of COVID-19 with the study results

Interference was at four levels:

a. The primary prevention measure for COVID-19 is handwashing, wearing of masks and social distancing, which are expected to bring similar results in terms of health outcomes of employees and family members. In fact, handwashing is a key component in WaterAid's hygiene intervention too. This was likely to have caused an over-estimation of the ROI.
b. Employees and their families were also more cautious of their hygiene through fear of catching COVID-19, which led to improved hygiene and better health outcomes. This was likely to have caused an over-estimation of the ROI.
c. COVID-19 impacted the reporting of WASH-related diseases. In the early part of the pandemic there was widespread fear, stigma and uncertainty, so employees and their families under-reported incidences of WASH-related diseases. As a result, the findings on indicators around incidence, sick days and loss of work may have been inaccurate. This was likely to have caused an over-estimation of the ROI.
d. COVID-19-related lockdowns and government regulations affected business operations through the disruption of orders, closure of business operations, reduction in workforce, etc. During the first wave, the Twinings tea estates worked with minimum numbers of staff on a rotation basis, which affected their overall tea production during first flush. This was likely to have caused an under-estimation of the ROI.

It is not possible to assess the overall interference on ROI because the weightage of different interferences when combined, is not understood.

7.2 Weather

Weather is an important factor in tea estate settings. In Nagrifarm, no/less rainfall in February–March 2021 caused a drought, leading to a loss of crops.

For ekaterra (formerly Unilever), the usual rainy season in Kenya is October, November and December, and the dry spell is from late January to March. However, in December 2019 and January 2020, there were unexpected heavy rains, which led to an increase in crops – so the target was exceeded in those months. This was not accounted for through the year-on-year seasonal comparison, but through attribution percentages.

7.3 Internal company policies

In February 2022, the Superhouse management team changed its internal policies on punctuality. Before the intervention, employees were given a 15-minute leeway to be late. During the project, a policy change was brought in, specifically for tannery I, wherein any late arrivals would be counted as a half-day. Therefore, there was a drastic increase in punctuality during the project which was not related to WASH.

Section 8: Lessons learnt on ROI calculations and data collection

The process of approach and framework development for ROI involved multiple workshops with each of the implementing partners. These are some key learnings from the ROI data collection and calculation process:

1. Consultations with the implementing partners before and after defining the framework and approach is particularly important. A buy-in from all the stakeholders on the indicators to be collected ensures reduced data collection time.
2. Definitions need to be universal and standardised for each setting. Grade, unit, absenteeism, productivity, quality etc needs to be used in the same way for each unit. This will ensure comparability for these indicators, if and when needed.
3. Like for other workplaces, profit data was not shareable. A key learning across each of the projects is that profits are considered confidential, so most businesses are not willing to share this information. So, the framework and other planning going forward should account for this.
4. Settings in which the data is collected is also particularly important. Many of these are big operations with various systems in place. While this makes data collection and creation of the business case easier, there should be mechanisms where it is tested in smaller factories to understand the intended benefits.
5. A key ask was to be able to attribute the changes to WASH through the design of the tool. An experimental/quasi-experimental evaluation design, which can show the attribution, would be best fit for a good business case. This can be accounted for when designing the project and the evaluation. This will also help pinpoint which WASH interventions work better and how can these be scaled-up. However, there is a trade-off in terms of time and costs. Not many businesses may be willing to pay for this level of research which can better test causality.
6. Data privacy was a key concern raised by multiple business entities and WaterAid during the design and data collection phase. As we plan to scale this model, it is imperative that we solve this problem. One of the simpler solutions would be to create a simple local web application where the entities can enter the data and it shows the analysis, and the results are only shared with other stakeholders. These options need to be explored as this is replicated. This will also reduce the dependency on excel.
7. Data collection should be carried out at regular short cycle intervals, preferably monthly or quarterly. This will help reduce the work involved and also provide more regular insights to the business entities. It also reduces the efforts in data cleaning and engaging with business, who often do not have time to understand the data in more detail.

8. Rapport with the partners is equally important. The efforts to analyse the data to feed into the indicators is a very intensive process so a strong relationship will help.
9. Attribution interviews are difficult to administer. While the interviews help understand specific trends, the management is often not able to associate an increase in productivity or reduced absenteeism to WASH. The business case vis a vis business indicators is not clear to them. This process needs to be rethought.
10. Two years is a short timeframe to make the business case for WASH. WASH outcomes take a longer period to manifest and show results like increased loyalty, reduced absenteeism etc. Firstly, the data does not show a change to support the business case and secondly the management are also not able to associate with the changes. Therefore, if replicated or scaled, there is a need for longer term projects.

Appendix

Appendix A: List of indicators and their financial proxies

List of cost indicators

Serial number	Category	Indicator	Financial proxy	Calculation	Comment
1	Factory – total capital cost for new infrastructure	Number of infrastructures set up			
2		Name of each infrastructure			This should be for each infrastructure
3		Capital cost of each infrastructure		Sum (capital infrastructure)	This should be for each infrastructure
4		Administrative and overhead costs		Sum (admin and overhead costs)	This should be for each infrastructure
5		Life span of the infrastructure	to be done in consultation with management		This should be for each infrastructure To be done in consultation with management

6		Recurring costs for each infrastructure		Sum (recurring costs for each infrastructure)	This should be for each infrastructure
7		Other costs associated with the specific Capital Expenditure (mention)		Sum (other costs)	This should be for each infrastructure
8	Factory – recurring cost for existing infrastructure	Number of existing infrastructures			
9		Name of each existing infrastructure			This should be for each infrastructure
10		Recurring costs for each existing infrastructure		Sum (recurring costs for each infrastructure)	This should be for each infrastructure
11	Productivity based bonus	Number of people given productivity-based bonus	Total productivity-based bonus given	Total productivity-based bonus given	
12	Attendance based bonus	Number of people given attendance-based bonus	Total attendance-based bonus given	Total attendance-based bonus given	
13	Opportunity costs for training	Person hours spent in training in the workplace (for WASH champions and factory employees)	Average per employee per hour cost (overtime cost included)	C*D	Financial proxy has to be calculated from the profile – (total salary paid-salary paid in overtime)/(number of working days in the month*number of

					working hours in a day)
14		Management person hours spent on organising the training	Average per hour management cost	C*D	
15	Actual costs of training	Number of trainings organised in the period	Total cost of organising the training (room/stationary/food etc)	Total cost of organising the training (room/stationary/food etc)	
16		Cost of HBC promotion materials and BCC materials on WASH	Total cost of HBC promotion materials and BCC materials on WASH (COVID-19 not included)	Total cost of HBC promotion materials and BCC materials on WASH (COVID-19 not included)	
17		Cost of trainers		Cost of trainers	
18		Cost of designers for HBC promotion materials		Cost of designers for HBC materials	
19	Cost of BCC	Cost of project design		Cost of project design	
20	Costs of health camp	Number of health camps organised	Total cost of setting up health camps or booths/other training-related services for each camp	Total cost of setting up health camps or booths/other training related services for each camp	

21	Cost of waste management exercise	Total cost of waste management exercises taken up in the month		Total cost of waste management exercises taken up in the month	
22		Cost of soap, hand wash, bathroom cleaner (i.e., harpic, phenyl), brush (for toilet cleaning), mops, wipes (for floor cleaning), bin, basket (for toilet and handwashing station), toilet paper, hand wipes, salary to cleaners		Cost of soap, hand wash, bathroom cleaner (i.e., harpic, phenyl), brush (for toilet cleaning), mops, wipes (for floor cleaning), bin, basket (for toilet and handwashing station), toilet paper, hand wipes, salary to cleaners	
23		Cost of sanitisers		Cost of sanitisers	
24	Operating costs	Cost of masks		Cost of masks	
25		Cost of HBC promotion materials developed for COVID-19	Cost of HBC promotion materials developed for COVID-19	Cost of HBC promotion materials developed for COVID-19	
26	COVID-19-related training	Person hours spent in training in the workplace on COVID-19 related protocols	Average per employee per hour cost (overtime cost included)	B*C	Financial proxy has to be calculated from the profile – total salary paid/number of working days in

					the month*number of working hours in a day) + (total overtime hours)
27		Actual cost of training employees on social distancing etc		Actual cost of training employees on social distancing etc	
28	Cost of community and household infrastructure	Number of new community and household infrastructure set-up			
29		Cost of new community and household infrastructure (WaterAid + community and household) – capital cost		Sum (capital cost for each community and household infrastructure - WaterAid contribution + community and household contribution)	
30		Cost of new community and household infrastructure (WaterAid + community and household) – recurring cost		Sum (recurring cost for each community and household infrastructure)	
31		Lifespan of new sources (community/household) set up			

List of benefit indicators

Serial number	Aspect	Indicator	Financial proxy	Calculation	Comment
1	Attrition rate	Number of employees left in the month	Cost of recruitment per person	C*D	
2	Attrition rate	Number of employees left in the month	Cost of training per person	C*D	
3	Absenteeism – employee type	Total absent days (disaggregated by sick leave and non-sick leave and total) – permanent employees	Average per employee per day cost (overtime cost included)	C (Only sick leaves) *D	D is to be calculated as total salary paid/(total working days in the month)
4	Absenteeism – employee type	Total absent days (disaggregated by sick leave and non-sick leave and total) – contractual employees	Average per employee per day cost (overtime cost included)	C*D	The number calculated above is to be used across for this indicator
5	Absenteeism – gender disaggregated	Total absent days (disaggregated by sick leave and non-sick leave and total) – men employees	Average per employee per day cost (overtime cost included)	C*D	Not to be used for overall benefit calculation
6	Absenteeism – gender disaggregated	Total absent days (disaggregated by sick leave and non-sick	Average per employee per day cost	C*D	Not to be used for overall benefit calculation

		leave and total) – women employees	(overtime cost included)		
7	Absenteeism – number of unapproved leaves	Total unapproved leaves			Not be used for calculation
8	Punctuality – employee type	Total late hours or hours left early – permanent employees	Average per employee per hour cost (overtime cost included)	C*D	For C, the calculation done in the previous costs section is to be used
9	Punctuality – employee type	Total late hours or hours left early – contractual employees	Average per employee per hour cost (overtime cost included)	C*D	For C, the calculation done in the previous costs section is to be used
10	Punctuality – gender disaggregated	Total late hours or hours left early – men employees	Average per employee per hour cost (overtime cost included)	C*D	For C, the calculation done in the previous costs section is to be used. Not to be used for overall benefit calculation
11	Punctuality – gender disaggregated	Total late hours or hours left early – women employees	Average per employee per hour cost (overtime cost included)	C*D	For C, the calculation done in the previous costs section is to be used. Not to be used for overall benefit calculation
12	Sales	Total sales in the month			

13	Units' production	Number of units produced in the month	Average value per unit		D to be calculated based on total sales in the month/Number of units produced in the month if sales is used, otherwise market value per unit to be used directly
14	Rejection	Number of units which are rejected	Average value per unit		D to be used from the from the previous calculation
15	Rejection	% rejection owing to human error		Number of units which are rejected * % rejection owing to human error * Average value per unit	
16	Quality change	Number of units where the grading has changed	Average value per unit		This will be done for each permutation and combination of the grades
17	Quality change	% Change owing to human error		Number of units where the grading has change * % change due to human error * Average value per unit	The calculation has to be done for each type of grading change
18	Sale of rejected/downgraded products	Number of rejected/downgraded units which have been sold	Average value per unit of the original unit		

19	Sale of rejected/downgraded products		Average value per unit of the sold unit	Number of rejected/downgraded units which have been sold * (Average value per unit of the original unit - average value per unit of the sold unit)	
20	Sale of rejected/downgraded products	Number of rejected/downgraded units which have been discarded	Average value per unit of the discarded units	Number of rejected/downgraded units which have been discarded * Average value per unit of the discarded units	
21	Missed deliveries	Number of times deadline for a delivery has been missed in the month	Total penalty for missed deliveries in the month	Total penalty for missed deliveries in the month	
22	Medical expenses in the in-house clinic	Number of patients in the clinic	Total cost of the clinic	Total cost of the clinic	Medical expenses in the in-house clinic
23	Medical expenses in the in-house clinic	Number of patients in the clinic with WASH-related conditions		Total cost of the clinic * (Number of patients with WASH-related conditions/number of patients in the clinic)	Medical expenses in the in-house clinic
24	Insurance	Expenditure borne by the factory in ESI hospitals or reimbursement etc		Expenditure borne by the factory in ESI hospitals or reimbursement etc	Insurance

25	RWH	Rainwater harvested (cubic meter)	Water cost/cubic meter	C*D	RWH
26	RWH	Rainwater harvested (cubic meter)	Treatment cost/ CM	C*D	RWH
27	Value of tax benefits	Value of tax benefits if received		C to be used for calculation as it is	Value of tax benefits

Appendix B: Sensitivity analysis

The table below depicts how the Project ROI changes on increasing/decreasing attribution percentages of various indicators by 10% percentage points.

The column named 'Attribution Values' indicates the attribution values in the order – original value, value after 10% decrease and value after 10% increase. The following columns shows the ROI values and the % change in ROI values for each of these attribution instances.

For example, in the case of ekaterra (formerly Unilever), the original ROI is 5.10621. However, when the indicators such as absenteeism, productivity and medical costs are varied by adding and subtracting 10% points from the original attribution value, the ROI changes. For instance, the initial attribution value of absenteeism is 50%. When there is a subtraction and an addition of 10% points to these values, the ROI changes to 5.10614 and 5.10628 respectively. Similarly, the original attribution value of productivity is 10%. When 10% is subtracted and added to this value, the ROI changes to 0.00239 and 10.21003 respectively.

Table 12: Sensitivity analysis on change in Project ROI for changing attribution percentages by +-10 percentage points

		Fakir Fashion			Esquire Knit Composite Ltd.			Next Accessories			Superhouse II			Superhouse I			Kings International Ltd.			Tea - Mabroukie			Tea – Barnesbeg			Tea – Nagrifarm		
Indicators	Change in attribution in %points	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attrubution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI	Attribution values	ROI	% change in ROI
	Original	**10%**	9.04341		20%	-5.39938		30%	0.35322			-0.01553			3.96441		75%	-0.057			5.10621			1.198158715			-0.165521042	
	-10%	**0%**	9.08929	-0.5073%	10%	-5.36335	0.6673%	20%	0.21192	40.0034%							65%	-0.05699	0.0175%									
Attrition	**10%**	**20%**	8.99753	0.5073%	30%	-5.43542	-0.6675%	40%	0.49452	-40.0034%							85%	-0.05701	-0.0175%									
	Original	**60%**			75%			12%			50%			50%			75%			50%			10%			10%		
	-10%	**50%**	9.0421	0.0145%	65%	-5.40259	-0.0595%	2%	0.35321	0.0028%	40%	-0.01314	15.3896%	40%	3.9681	-0.0931%	65%	-0.07304	-28.1404%	40%	5.10614	0.0014%	0.00%	1.198029325	0.01%	0.00%	-0.165359994	0.10%
Absenteeism	**10%**	**70%**	9.04472	-0.0145%	85%	-5.39617	0.0595%	22%	0.35323	-0.0028%	60%	-0.01793	-15.4540%	60%	3.96073	0.0928%	85%	-0.04096	28.1404%	60%	5.10628	-0.0014%	20.00%	1.198288105	- 0.01%	20.00%	-0.165682089	- 0.10%
	Original	**75%**			75%			70%			10%			10%75%														
	-10%	**65%**	9.03496	0.0934%	65%	-5.40393	-0.0843%	60%	0.35259	0.1784%	0%	-0.01561	-0.5151%	0%	3.96081	0.0908%	65%	-0.05339	6.3333%									
Punctuality	**10%**	**85%**	9.05187	-0.0935%	85%	-5.39484	0.0841%	80%	0.35384	-0.1755%	0%	-0.01537	1.0303%	15%	3.97162	-0.1819%	85%	-0.06061	-6.3333%									
	Original	**67%**			19%			19%			10%			10%			10%			10%			25%			25%		
	-10%	**57%**	7.70072	14.8472%	9%	-2.56474	52.4994%	9%	0.39273	-11.1857%	0%	-0.01189	23.4385%	0%	-0.01482	100.3738%	0%	0.09324	263.5789%	0%	0.00239	99.9532%	15.00%	0.719601963	39.94%	15.00%	-0.098736077	40.35%
Productivity	**10%**	**77%**	10.3861	-14.8472%	29%	-8.23402	-52.4994%	29%	0.3137	11.1885%	20%	-0.01918	-23.5029%	20%	7.94365	-100.3741%	20%	-0.20724	-263.5789%	20%	10.21003	-99.9532%	35.00%	1.676715467	- 39.94%	35.00%	-0.232306007	- 40.35%
	Original	**67%**			80%			80%																				
	-10%	**57%**	9.04341	0.0000%	70%	-5.39942	-0.0007%	70%	0.35322	0.0000%																		
Quality	**10%**	**77%**	9.04341	0.0000%	90%	-5.39934	0.0007%	90%	0.35322	0.0000%																		
	Original	**50%**																		50%			10%			25%		
Medical cost	**-10%**	**40%**	9.04335	0.0007%																40%	5.1058	0.0080%	0.00%	1.19652127	0.14%	15.00%	-0.166162009	-0.39%

	10%	**60%**	9.04348	-0.0008%																60%	5.10662	-0.0080%	20.00%	1.19979616	-0.14%	35.00%	-0.164880074	0.39%
Operational cost-rainwater harvesting	**Original**	**50%**																										
	-10%	**40%**	9.03908	0.0479%																								
	10%	**60%**	9.04775	-0.0480%																								

Appendix C: Attribution percentages and the reasons for choosing them

Tea estates, India

Barnesbeg		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Medical cost	10%	The management's estimate of 30% attribution was later adjusted down to 10% based on the researcher's understanding of the context and implications of COVID-19.
Absenteeism	10%	The tea estate Manager attributed 10% of the change to WASH intervention.
Productivity	25%	From the employee case studies, it was observed that their productivity level increased with the installation of the WASH facilities through the intervention.
Attrition	-	Data not available
Punctuality	-	Data not available
Quality	-	Data not available

Nagrifarm		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Medical Cost	25%	The Medical Officer suggested that 50% of the change was due to the combined effect of WaterAid project and COVID-19. Therefore, half of this 50% (25%) was considered as attribution to the WASH intervention.
Absenteeism	10%	The Nagrifarm estate Manager attributed 10% to WASH.

Productivity	25%	The Nagrifarm estate manager observed that there was an increase in productivity per employee, partly because of the WASH intervention. According to him, this increase was seen for both the tea pickers and factory employees. The reasons behind this could be that the employees were giving their best and/or improved health.
Attrition	0%	According to the estate Manager of Nagrifarm attrition is due to natural reasons and not related to WASH.
Punctuality	-	Data not available
Quality	-	Data not available

RMG factories, Bangladesh

Next Accessories		
Indicator	**Final attribution %**	**Reasons for choosing the attribution %**
Attrition	30%	Share of change since baseline and discussions with factory officials (KIIs).
Absenteeism	12%	
Punctuality	70%	
Productivity	19%	
Quality	80%	
Medical cost	54%	

Fakir Fashion		
Indicator	**Final attribution %**	**Reasons for choosing the attribution %**
Attrition	10%	
Absenteeism	60%	
Punctuality	75%	
Productivity	67%	
Quality	67%	
Medical cost	50%	
Others – RWH	50%	Share of change since baseline and discussions with factory officials (KIIs).

Esquire Knit Composite Ltd.		
Indicator	**Final attribution %**	**Reasons for choosing the attribution %**
Attrition	20%	
Absenteeism	75%	
Punctuality	75%	
Productivity	19%	
Quality	80%	
Medical cost	54%	Share of change since baseline and discussions with factory officials (KIIs).

Tea estate, Kenya

Mabroukie		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Medical cost	50%	Reduced overall (diseases related to respiration reduced the most and therefore, patients' expenses will also go down) The reasons behind the decrease in absenteeism due to WASH include: • Fear of catching COVID-19; • Compliance with company's strict rules for the employees to prevent COVID-19, and; • Decrease in sickness due to improved hygiene. The medical services in-charge of the tea estate suggested that we could consider 50% attribution to WASH intervention.
Absenteeism	50%	The reasons behind the decrease in absenteeism due to WASH include: • Fear of catching COVID-19; • Compliance with company's strict rules for the employees to prevent COVID-19, and; • Decrease in sickness due to improved hygiene. The tea estate Manager of Mabroukie estate suggested a few figures, which approximated to 50% attribution to WASH intervention.
Productivity	10%	The reasons behind the increase in productivity include: • Increased amount of crop (major factor) • Condition in which tea leaves were received • Employee absenteeism • Employee morale WASH intervention was not suggested to be a major influencer for productivity but was expected to influence employees' morale (from KII). Therefore, a low 10% of the change is attributed to the WASH intervention.

Leather tanneries, India

Kings International Ltd.		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Absenteeism	75%	As seen in the monthly trends, the change in the indicator is similar across the months. Further, as shared by the management, some of the outlier changes are because of COVID-19 – the lockdowns and the challenges around it. However, the management noticed changes in attitude and practice among the employees, so a higher percentage is attributed to the project.
Attrition	75%	
Punctuality	75%	
Productivity	10%	The key reason for the reduction in productivity was due to COVID-19. So, the management could not attribute the change to any of the WASH-related parameters. Hence, lesser attribution to the change in productivity.

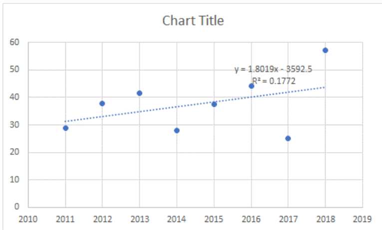
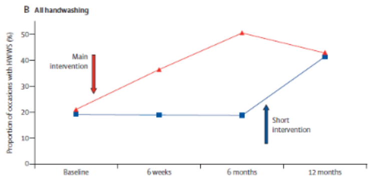
Superhouse I		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Absenteeism	50%	As discussed with the factory management, there was a change in policy in the first year of the project. Annual leave could not be carried forward to the next year, which in turn increased absenteeism. However, there was a change in the months before the policy change. So, 50% of this is attributed to the project.
Attrition	50%	COVID-19 had an impact on the business operations, employees' health, and therefore attrition. So, 50% is attributed to WASH.

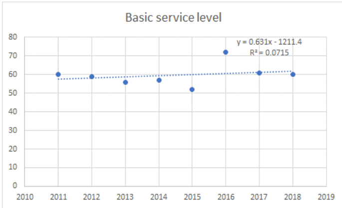
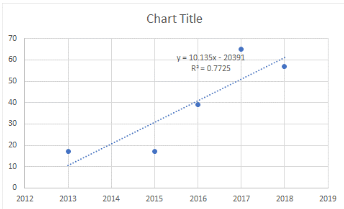
Punctuality	5%	Before the intervention, the employees were given a 15-minute leeway to be late. During the project, a policy change was brought in, specifically for tannery I, wherein any late arrival would be counted as half-day. This meant there was a drastic increase in punctuality during the project. So, only 5% is attributed to the project.
Productivity	10%	As it is impacted by market factors like market-price, planning etc, only 10% of the change is attributed to the project.

Superhouse II		
Indicator	**Attribution %**	**Reasons for choosing the attribution %**
Absenteeism	50%	Similar to Superhouse I, there was a change in policy in the first year of the project, so annual leave could not be carried forward to the next year, which in turn increased absenteeism. However, there was a change in the months before the policy change. So, 50% of this is attributed to the project.
Attrition	50%	COVID-19 had an impact on the business operations, employees' health, and therefore attrition. So, 50% is attributed to WASH.
Punctuality	5%	Unlike Superhouse I, there were no policy changes in Superhouse II. However, there were changes during the project due to COVID-19 and reduced demand, so most of the employees were moved to tannery I. Therefore, this data was reflective of a sub-set of contractual employees.
Productivity	10%	As productivity is impacted by market factors, like market-price, planning etc, only 10% of the change is attributed to the project.

Appendix D: Drop-off

Please refer to the table below for the information on the parameters described above. Some examples from existing WaterAid and sectoral data.

Option numbers	Areas	Drop-off per year without promotion (worst-case)	Reference data (indicative) but we have some other assumption	Top-up promotion and hardware continue functioning due to maintenance cost (best-case)
1	**Knowledge/reported practices:** Percent where threshold of at least four critical moments to wash hands mentioned by respondents	1.8% per year		• 65% improvement in first year (depend on the initial baseline) • 15% increment from top-up promotion each year • Assume, once reached 90% then only 2.5% improvement from each year
2	**Observed practices:** Hands are being washed with soap and water at least	3% per year		• 43% improvement in first year (depend on the initial baseline) • 10% increment from top-up promotion each year

	two critical moments when observed: after defecation and before eating			• Once reached 90% then only 1% improvement from each year
3	**Presence (functionality) of handwashing facilities at households**	0.6%		• 60% improvement in first year (depend on the initial baseline) • 10% increment from top-up promotion each year • Once reached, 90% then only 3% improvement from each year
4	**Presence (functionality) of handwashing facilities – institutional having soap and water**	4%	 Significant drop-off reported here because of lack of data for few years in-between and limited data from the institutions. We would have expected less drop-off in the institution. But please note	• 65% improvement in first year (depend on the initial baseline). • 15% increment from top-up promotion each year • Once reached 90% then only 2% improvement from each year

			these are worst-case scenario without promotion.	

Table 13: Drop off % and benefit % for all indicators in all projects

PROJECTS		Indicators	% change from baseline to endline (A)	Benefit %		Drop-off %	
				% behaviour increment from top up promotion (B)	Fraction of change due to top up promotion (benefit %) (A*B=C)	% drop-off in handwashing behaviour/ facilities post the intervention year (D)	Fraction of increased absenteeism due to no top up promotion (drop off%) (A*D=E)
Tea, Kenya		Absenteeism	-307.66%	12.50%	-38.46	3.50%	-10.77
		Productivity	11.53%	12.50%	1.44	3.50%	0.40
		Medical cost	80.79%	12.50%	10.10	3.50%	2.83
Tea, India	Barnesbeg	Absenteeism	74.14%	12.50%	9.27	3.50%	2.59
		Productivity	156.74%	12.50%	19.59	3.50%	5.49
		Medical cost	72.48%	12.50%	9.06	3.50%	2.54
	Nagrifarm	Absenteeism	-139.67%	12.50%	-17.46	3.50%	-4.89
		Productivity	26.42%	12.50%	3.30	3.50%	0.92

		Medical cost	58.21%	12.50%	7.28	3.50%	2.04
Leather, India	**Kings International Ltd.**	**Absenteeism**	53.73%	12.50%	6.72	3.50%	1.88
		Productivity	-5.95%	12.50%	-0.74	3.50%	-0.21
		Punctuality	20.67%	12.50%	2.58	3.50%	0.72
		Attrition	55.29%	12.50%	6.91	3.50%	1.94
	Superhouse I	**Absenteeism**	-67.24%	12.50%	-8.41	3.50%	-2.35
		Productivity	47.75%	12.50%	5.97	3.50%	1.67
		Punctuality	93.71%	12.50%	11.71	3.50%	3.28
	Superhouse II	**Absenteeism**	-230.39%	12.50%	-28.80	3.50%	-8.06
		Productivity	6.16%	12.50%	0.77	3.50%	0.22
		Punctuality	-46.46%	12.50%	-5.81	3.50%	-1.63
RMG, Bangladesh	**Esquire Knit Composite Ltd.**	**Absenteeism**	42.65%	12.50%	5.33	3.50%	1.49
		Productivity	-0.72%	12.50%	-0.09	3.50%	-0.03
		Medical cost	25.31%	12.50%	3.16	3.50%	0.89
		Punctuality	-10.17%	12.50%	-1.27	3.50%	-0.36
		Attrition	-12.84%	12.50%	-1.61	3.50%	-0.45
		Quality	48.70%	12.50%	6.09	3.50%	1.70
	Fakir Fashion	**Absenteeism**	42.43%	12.50%	5.30	3.50%	1.49
		Productivity	2.09%	12.50%	0.26	3.50%	0.07
		Medical cost	45.49%	12.50%	5.69	3.50%	1.59

		Punctuality	6.36%	12.50%	0.80	3.50%	0.22
		Attrition	-18.21%	12.50%	-2.28	3.50%	-0.64
		Quality	93.66%	12.50%	11.71	3.50%	3.28
	Next Accessories	**Absenteeism**	-94.34%	12.50%	-11.79	3.50%	-3.30
		Productivity	0.25%	12.50%	0.03	3.50%	0.01
		Punctuality	24.61%	12.50%	3.08	3.50%	0.86
		Attrition	59.51%	12.50%	7.44	3.50%	2.08
		Quality	-10.77%	12.50%	-1.35	3.50%	-0.38

Appendix E: ROI Calculations

The following formula is used to compute the costs for a selected period:

$$Costs\_I\ (M) = (\sum I(n) + \sum R(n)\_new + \sum R(n)\_old\ )$$

Costs_I(M) = Costs borne on infrastructure in the business in the selected month

I(n) = Cost of setting up a new infrastructure in the business

R(n)_new = Recurring costs for new infrastructure. It includes administrative and overhead costs, recurring cost/O&M cost, other costs associated with the specific Capital Expenditure

R(n)_old = Recurring costs for new infrastructure. It includes water costs for drinking water, handwashing and sanitation purposes, electricity costs for drinking water, handwashing and sanitation purposes, other recurring costs for drinking water, handwashing and sanitation purposes, other WASH-related recurring costs

$$Costs\_CI\ (M) = (\sum CI(n) + \sum CR(n)\_new\ )$$

Costs_CI(M) = Costs borne on infrastructure in the community and household
CI(n) = Cost of setting up a new infrastructure in the community and household
CR(n)_new = Recurring costs for new infrastructure in the community and household. It includes administrative and overhead costs, recurring cost/O&M cost, other costs associated with the specific Capital Expenditure

$$Costs\_T(M) = (\{TH * [((TW/WH) + (ToW/OH))/(W * WD)]\} + \{TMH * TMC\} + TC)$$

Costs_T(M) = Costs related to employee training borne in the month
TH = Person hours spent in training in the selected month
WD = Working days in the month
TW = Total wages excluding overtime paid in the month
WH = Working hours per day
ToW = Total overtime wages paid in the month
OH = Total overtime hours in the month
W = Total employees, including permanent and contractual, working in the month
TMH = Total management hours spent in organising training in the month
TMC = Per hour management cost
TC = Actual costs of organising the trainings in the month (food, stationary, room rent etc)

$$Costs\_B(M) = (PB + AB)$$

Costs_B(M) = Costs borne in the month on bonuses

PB = Productivity based bonus given in the selected month
AB = Absenteeism based bonus given in the selected month

$$Costs\_PD(M) = (PD + BM + T + [\![BM]\!]\_C\ )$$

Costs_PD(M) = Costs of project design borne in the month
PD = Project design costs
BM = Costs of designing BCC/HBC promotion materials
T = Trainer costs borne in the month
BM_C = Cost of HBC promotion materials developed for COVID-19

$$Costs\_HC(M) = ((HC * CHC))$$

Costs_HC(M) = Costs of health camps
HC = Number of health camps organised in the month
CHC = Cost of organising one health camp

$$Costs\_C19(M) = (\{[\![TH]\!]\_C * [((TW/WH) + (ToW/OH))/(W * WD)]\})$$

Costs_C19(M) = Costs borne for COVID-19-related training
TH_C = Person hours spent in training in the workplace on COVID-19-related protocols and on social distancing

$$Costs\_IC(M) = (\sum I(n)\_C)$$

Costs_IC(M) = Costs related to community and household infrastructure
I(n)_C = Investment borne by WaterAid for setting up the infrastructure in community and household settings

$$Costs\_Other(M) = (WM + WC + S + M)$$

Costs_Other(M) = Other costs borne in the month
WM = Cost of waste management like sewage cleaning undertaken in the month

WC = Cost of soap, hand wash, bathroom cleaner (i.e., harpic, phenyl), brush (for toilet cleaning), mops, wipes (for floor cleaning), bin, basket (for toilet and handwashing station), toilet paper, hand wipes, salary to cleaners
S = Cost of sanitisers
M = Cost of masks

$$Costs\_(M) = (⟦Costs⟧\_I(M) + ⟦Costs⟧\_T(M) + ⟦Costs⟧\_B(M) + ⟦Costs⟧\_PD(M) + ⟦Costs⟧\_HC(M) + ⟦Costs⟧\_C19(M) + ⟦Costs⟧\_IC(M) + Costs\_Other(M) + Costs\_CI\ (M))$$

Costs (M) = Cost borne by the project in the selected month

Number	Cost	RMG, Bangladesh	Leather, India	Tea, India	Tea, Kenya
1	Capital cost – invested by business	Yes	Yes	Yes	Yes
2	Capital cost – invested by community and household	Yes	Yes	Yes	No
3	Behavioural change training and sessions	Yes	Yes	Yes	Yes
4	Opportunity cost	Yes	Yes	Yes	Yes
5	Recurring cost – business infrastructure	Yes	Yes	Yes	Yes
6	Health camps	Yes	Yes	No	No

7	COVID-19 related expenses	Yes	Yes	No	No
8	Bonus – productivity and absenteeism	No	Yes	No	No
9	HBC promotion materials/HBC package materials	Yes	Yes	Yes	Yes
10	Project design	Yes	Yes	Yes	No

Costs for infrastructure maintenance

	Maintenance cost	Year	Capital cost	Year	Operating cost
Urban dug well	30%	5	100%	10	5%
Rural dug well	30%	5	100%	10	5%
Urban pit toilet	30%	4	100%	8	7%
Rural wet pit toilet	30%	4	100%	8	8%
Rural dry pit toilet	30%	4	100%	8	7%
Any toilet, including unimproved	30%	1	100%	2	7%
Urban station with soap and water	30%	2.5	100%	5	16%

Rural station with soap and water	30%	5	100%	10	127%
Rural tube well	30%	10	100%	20	4%
Urban safely managed water	30%	10	100%	20	18%
Rural safely managed water	30%	10	100%	20	35%
Urban septic tank	30%	10	100%	20	8%
Urban sewage with treatment	30%	10	100%	20	6%
Urban septic tank with treatment (faecal sludge management – FSM)	30%	10	100%	20	7%
Rural pit latrine with treatment (FSM)	30%	10	100%	20	5%
Rural sewerage with treatment	30%	10	100%	20	2%

The section below describes the calculations for benefits in a selected month:

Benefits A(M) = $(EL * (CR + CT))$

Benefits_A(M) = Benefits from reduced attrition
EL = Number of employees left in the month
CR = Cost of recruitment per person
CT = Cost of training per person

Benefits_Ab(M) = $(APD * [\![APD]\!]\_W * [((TW + ToW))/(W * WD)])$

Benefits_Ab(M) = Benefits from reduced absenteeism
APD = Total absent person days in the month
APD_W = Percentage of leaves (sick and non-sick included) owing to WASH-related reasons
TW = Total wages excluding overtime paid in the month
ToW = Total overtime wages paid in the month
W = Total employees including permanent and contractual working in the month
WD = Working days in the month

Benefits_P(M) = $(H * \{[((TW/WH) + (ToW/OH))/(W * WD)]\}$

Benefits_P(M) = Benefits from increased punctuality
H = Total person hours arrived late or started early
WH = Working hours per day
OH = Total overtime hours in the month

Benefits_Q(M) = $(R * RH * [|TS/U| - NS]) + (\sum GC * (OG - CG) * CH) + (RD * |TS/U|)$

Benefits_Q (M) = Benefits from improved quality
R = Number of units which are rejected
RH = % rejection owing to human error
NS = Average new selling price of the rejected goods
TS = Total sales in the month
U = Number of units produced in the month
GC = Number of units where grading has changed with each grade permutation
OG = Original price of each grade
CG = Changed price after grade change

CH = % grade change owing to human error
RD = Number of rejected/downgraded units which have been discarded

Benefits_I(M) = $((TT - AM) * TS/U)$

Benefits_I(M) = Benefits from increased productivity
TT = Target for the month
AM = Achievement for the month
Please note that if Achievement/Target is greater than 100%, then the benefits must be capped at 0. This is because the potential loss from reduced productivity is then null.

Benefits_C(M) = $((WC\_W)/W * CT) + IF$

Benefits_C(M) = Benefits from reduced WASH incidence in clinic
WC = Number of walk-ins in the clinic in the month (treatments)
CT = Total cost of the clinic in the month
WC_W = Number of walk-ins (treatments) in the clinic with WASH-related conditions. If this information is not available, % of conditions which are WASH-related as from household survey is to be used
IF = Expenditure borne by the factory in ESI hospitals or other insurance or reimbursement etc

Benefits_Others(M) = $WRH + VT$

Benefits_Others(M) = Value of benefits from others
WRH = Value of water saved due to RWH
VT = Value of tax benefits if received


WaterAid/Anindito Mukherjee

Front cover image: Moushumi Akter now has clean water at work and in her community. Narayangonj, Bangladesh. October 2021.

Back cover image: Shri Ram's health improved after the installation of handwashing facilities and drinking water points at the Superhouse tannery. Unnao, Uttar Pradesh, India. April 2022.

WaterAid is an international not-for-profit, determined to make clean water, decent toilets and good hygiene normal for everyone, everywhere within a generation. Only by tackling these three essentials in ways that last can people change their lives for good.

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WaterAid