Executive Summary

Cost Effectiveness of the Zimbabwe Handwashing Campaign

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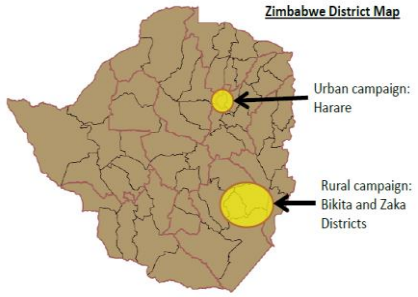
1 Introduction and Background

Hygiene promotion, specifically handwashing, is reported to be amongst the most cost-effective water, sanitation and hygiene (WASH) interventions. Within the Global Programme Water of the Swiss Agency for Development and Cooperation (SDC) and in cooperation with the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) and the Zimbabwe Handwashing Campaign Alliance (ZHCA), the Zimbabwe Handwashing Campaign (ZHWC) was implemented between 2015 and 2017.

Figure 1 Area of implementation



The goal of the handwashing campaign was to promote handwashing with soap at critical times among school children, primary caregivers and policy makers, and to disseminate the results among international actors in the WASH sector. A key component of the campaign was the application and evaluation of an innovative approach to behaviour change; the Risks, Attitudes, Norms, Abilities, and Self-regulation (RANAS) approach. Based on this RANAS approach, previously identified relevant psychosocial factors for handwashing behaviour were targeted using the training of trainers approach and media and information campaigns and events to enhance motivation for and practice of safe hand hygiene. The campaign was implemented in peri-urban and rural schools (via training of teachers) and households (via visits by health care workers) of Zimbabwe (see Figure 1) with the urban campaign preceding the rural campaign by almost one year.

In 2017, the HAFL/BFH was mandated by SDC to conduct an economic assessment of the campaign with the goal to develop a tool to assess software interventions based on a review of existing methods. The tool was to be elaborated based on primary and secondary data from the ZHWC on costs and benefits. Beyond this specific case, recommendations on the economic analysis of SDCs' Global Programme Water projects (with a strong software component) were formulated. This summary presents the key findings of this mandate.

2 Assessment of Cost Effectiveness

Measuring cost effectiveness means measuring the relation between costs and benefits of a project, using different indicators: costs per unit of observed / measured benefit (for the Cost Effectiveness Analysis (CEA)), or Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit Cost Ratio (BCR) for the Cost Benefit Analysis (CBA). This analysis considers all the costs that are necessary to

Table 1 The steps for cost effectiveness analyses

Step 0	Deciding on the method to be used: CEA or CBA or a combination of both?
Step 1	Defining the boundaries of the project or component that is to be analysed
Step 2	Identifying impact hypothesis / theory of change
Step 3a	Deciding whose costs count
Step 3b	Deciding which benefits to take into account
Step 4	Selecting measurement(s) and measure all cost and benefit elements.
Step 5	Calculation of Costs per Unit of Major effect (CEA) or Benefit Cost Ratio etc. (CBA)
Step 6	Interpretation of results

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achieve a given benefit or set of benefits. The purpose of doing a cost effectiveness analysis is to provide quantitative information on the way resources were invested in a project (for an ex-post analysis) or it serves as an aid for decision making when the analysis Is done ex-ante. Table 1 shows the stepwise procedure for conducting a cost effectiveness analysis of a project. The decision to choose CBA or CEA (step 0) depends essentially on the possibility to quantify benefits (in monetary terms) or not.

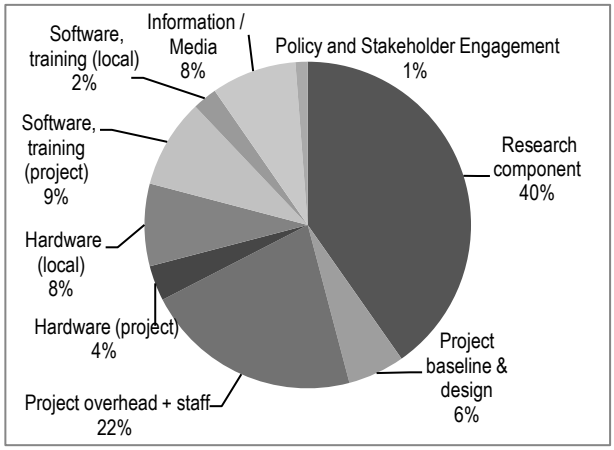
For the ZHWC, the authors, together with the local stakeholders, chose to conduct a CEA rather than a CBA, as the main benefits cannot reasonably be expressed in monetary values. The CEA was designed in a participatory process including key project stakeholders for the steps 1 – 4. Then the research team designed and implemented the data collection, calculated the costs per unit of benefits and interpreted the results (which are presented below). They were then discussed with the project stakeholders in a series of workshops in Zimbabwe.

2.1 Costs

Project costs are divided in three categories: "Before" the campaign the costs corresponding to the research component, project baseline and design (46%, or 677'179 USD); "during" the campaign the costs corresponding to the project implementation (54%, or 777'340 USD, including 10% local costs); and "after" the campaign, the costs corresponding to local costs only (see Figure 2 for shares of total cost).

The local costs are mainly for hardware (handwashing stations, soap, buckets) as a necessity for the software components of the campaign. Salaries of school and health centre staff are not additional costs (as no additional staff was hired beyond the trainings provided by the project) and thus not included in the calculation.

Figure 2 Project costs divided in cost categories (%)



2.2 Benefits

The ZHWC reached a total of 68'059 direct beneficiaries at school and household levels (see Table 2). Direct beneficiaries (DB) are teachers, learners, health centre staff, primary caregivers and their household members. Indirect beneficiaries (IB) are teachers' household members and neighbours and primary caregivers' neighbours. The results presented in this summary only take into consideration direct beneficiaries to avoid an over-estimation of effectiveness. Measured benefits are the process outcome (quality and frequency of handwashing), health impact (cases of diarrhea averted) and non-health impact (reduction of school absenteeism for learners). Impact on local policy was described qualitatively. Improved knowledge and capacities (both of handwashing practice and the RANAS model) were also mentioned as benefits by the local stakeholders during the workshop, but in the CEA they can only be considered if they lead to tangible (= measurable) benefits such as behaviour change, health and non-health benefits.

Table 2 Beneficiaries reached through schools and health centres

	N° of beneficiaries reached		
	Total	Urban	Rural
DB Schools	48'957	30'913	18'044
DB + IB Schools	88'060	60'699	27'360
DB Households	19'102	7'662	11'439
DB + IB Households	41'433	14'979	26'453
Total DB	68'059	38'575	29'483
Total DB + IB	129'493	75'678	53'814

The process outcome was captured through a Quality-Frequency Index (QFI)[3], which converts partial adoption into full units of adoption, using an effectiveness ladder (Figure 3). The net behaviour change was calculated by deducting the behaviour at baseline (or before the intervention), which was available from previous project evaluations (Friedrich, Mosler 2016; Lilje 2017).

Table 3 summarises the measured benefits. Overall, the net behaviour change is an increase of 1.78 out of 5 points (or 41 % on average) through the campaign, 61'363 cases of diarrhea were averted, and 202'213 days of school absenteeism avoided.

The estimated reduction in cases of diarrhea is very high when compared to meta-studies on the impact of handwashing on diarrhea: The survey achieved an average reduction rate of 60,7 %, while a meta-analysis of 42 impact studies reports a 23% - 40% reduction of diarrhea due to handwashing (Freeman et al. 2014).

Figure 3 Quality-Frequency Index

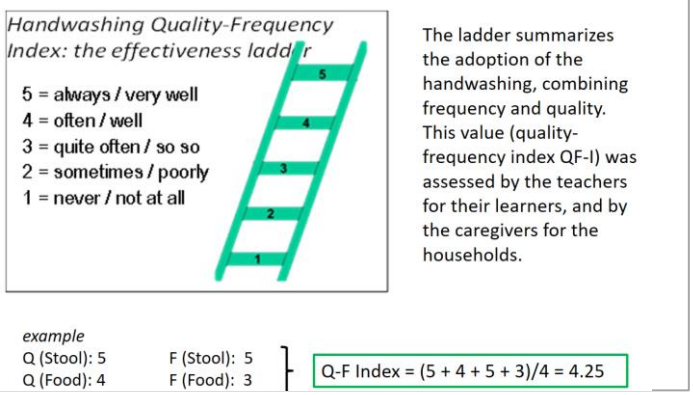


Table 3 Measured benefits of the ZHWC

	Households and Schools		
	Total	Urban	Rural
Process outcome			
Quality-Frequency Index reached	4.39	4.27	4.53
Net behaviour change	1.78 (41%)	1.48 (35%)	1.95 (43%)
Health impact			
Reduction cases of diarrhea, (Total: 60% reduction)	50'658	21'384	26'346
Reduction cases of diarrhea, (cases/beneficiary/year)	0.90	0.84	0.95
Non-health impact (only schools)			
Total reduction in days	202'213	115'728	67'269
Reduction of school absenteeism (days/learner/year)	4.50	5.60	5.60

As to the impact on policy of the campaign, the results are mixed. At national level, there has been a reported notable success for the campaign in terms of policy influence, with the experiences of the campaign being integrated into the Sanitation and Hygiene Policy and the School Health Policy (in April 2017 it was still being finalised), mandating schools to promote health and hygiene behaviours and to meet minimum standards for WASH infrastructure.

At district level, opinions diverted among the Health and WASH stakeholders on the policy influence of the campaign. Handwashing with soap has been included in Health Club Syllabuses and school infrastructure and activities (notably also beyond the project schools). At the same time, some policy stakeholders cautioned that it was still too early to clearly see whether policy changes will be made as a consequence of the campaign, as policy change is a lengthy process. Some further indicated that there was no need for policy changes as the campaign was already implementing what was within existing policies.

2.3 Cost-effectiveness results

As depicted in Table 4, the cost-effectiveness ratio of reaching all direct beneficiaries lies at 11.73

[3] based on aggregated self-reported estimates for stool and food-related handwashing collected through surveys

USD excluding research costs and at 2.30 USD when considering only local costs.

If adapting benefits to *behaviour changed* as opposed to *beneficiaries reached*, the cost-effectiveness ratio for the number of beneficiaries with an improved hygiene behaviour amounts to 32.93 USD excluding research and 9.22 USD local costs.

The cost per case of diarrhea averted is 15.76 USD. Further, school children didn't miss a total of 202'212 days of school because of the campaign corresponding to a unit cost of 3.95 USD / day of school that was not missed.

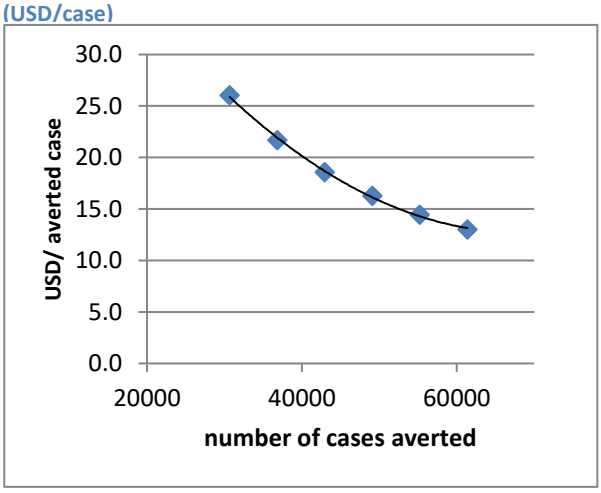
Table 4 Cost effectiveness rates per unit of benefit

	Total	Urban	Rural
Per beneficiary reached (=output)			
Research + implementation costs / unit	21.68	19.63	24.37
Implementation costs / unit	11.73	9.77	14.31
Local costs / unit	2.30	2.58	1.18
Per behaviour changed (=outcome)			
Research + implementation costs / unit	60.85	66.19	62.47
Implementation costs / unit	32.93	32.92	36.67
Local costs / unit	9.22	10.50	9.01
Per health impact (= reduced cases of diarrhea)			
Research + implementation costs / unit	29.13	23.41	25.68
Implementation costs / unit	15.76	11.65	15.08
Local costs / unit	4.42	3.71	3.70
Per non-health impact (= reduced day of school absenteeism)			
Research + implementation costs / unit	7.30	6.54	10.68
Implementation costs / unit	3.95	3.26	6.27
Local costs / unit	1.11	1.04	1.54

2.4 Sensitivity analysis

Risks of uncertainty due to assumptions in the study could influence local costs, the number of beneficiaries counted, and the extent of the health and non-health impact. The sensitivity analysis is straight forward: higher costs with constant numbers of beneficiaries, or constant costs with lower number of beneficiaries will result in higher unit costs, whereas reduced costs or increasing number of beneficiaries will result in lower unit costs. As the costs are not entirely linear (project costs are mostly fixed while local costs are mostly proportional to the number of beneficiaries), the response to changes of key parameters is not a linear function. This is illustrated with the key variable "number of diarrhea cases averted", and correspondingly the unit costs per case, excluding research costs (Figure 4). This shows that with increasing number of cases averted, the unit costs per case tend to decrease under proportionally.

Figure 4 Unit costs per case of diarrhea averted (USD/case)



3 Discussion

This chapter starts with a comparison of the ZHWC with a similar project in Burkina Faso where cost effectiveness indicators were also calculated. This is followed by a review of the DAC criteria for project evaluation (relevance, efficiency, effectiveness, impact and sustainability) and discusses the contribution of the cost effectiveness analysis to improved perception of these criteria.

3.1 Comparison of the results to other studies and approaches

Literature on cost-effectiveness analyses of handwashing and hygiene promotion campaigns are

very few a far. Table 5 compares the campaign to a similar study from Burkina Faso, in which Borghi et al (2002) assessed a program that promoted handwashing amongst mothers after handling child stool. As the campaigns were different in many aspects, the numbers can't be compared one to one but they can give indications on the campaigns effectiveness.

Table 5 Comparison ZHWC to similar campaigns

	ZHWC	Burkina Faso (Borghi et al. 2002)
Costs		
Costs measured	Provider, research, local;	Provider, household, society;
Implementation costs (USD)	798'522	442'780
Benefits		
Total number of DB	68'059	37'319
% washing hands	Self-reported: 88%	31.30%
% behaviour change	Observed: 41%[1]	18.50%
% diarrhea cases averted	Self-reported: 60% Literature: 40%	Literature: 41%
Cost-effectiveness (USD)		
Cost / beneficiary reached	11.73	9.07
Cost / changed behaviour	32.93	64.00
Local costs / beneficiary	2.30	1.04
Cost / diarrhea averted (excl. research)	Self-reported: 15.76 Literature: 23.65	51.00

The calculation of the cost-effectiveness rates from Burkina Faso consider the society perspective, which includes direct medical costs/benefits and indirect income and productivity costs/benefits at household and provider (incl. government) level. Thus, it includes more detailed costs than the ZHWC.

The ZHWC had relatively high project costs but was able to achieve higher effectiveness levels at overall lower costs per behaviour changed.

3.2 Relevance

The relevance of the programme can be assessed by the high level of participation of the target groups and their commitment to continue after the end of the campaign. The key stakeholders of the project seem convinced of the importance of handwashing in the context of Zimbabwe, where the cholera outbreaks in 2008 and 2009 are still in all memories. The survey conducted within the framework of the CEA provides valuable information on these aspects. However, the CEA results (unit costs) are not directly useful for assessing the relevance of the project.

3.3 Efficiency

Are we doing things right? The efficiency measures the link between resources and outputs (both quantitative and qualitative) and answers the questions of the optimal use of the available resources to produce the planned outputs. While doing the CEA, a careful analysis of costs (as illustrated in Figure 2) provides some important information on the use of resources. In the case of the ZHWC, the high costs of research and development (mainly in the preparation phase of the project, but also the close monitoring with a strong research component during the project) is an issue. In our opinion, these costs are justified if the concept developed in Zimbabwe can be replicated elsewhere with substantially lower costs. And apparently this is the case as similar campaigns are planned or being implemented in other countries, such as Burundi and Bangladesh.

3.4 Effectiveness

Are we doing the right things? To what extent are the objectives achieved? The effectiveness looks at the link between the outputs and the outcomes / impacts.

Here the CEA provides the most useful information: with the present study, we have reference values (as shown in Table 4) on the costs per beneficiary reached, behaviour changed, case of diarrhea

averted and school absenteeism averted. Taken as absolute values, these figures may seem difficult to interpret. The comparison between groups (here rural vs urban, households vs schools) as well as the comparison with other similar projects allow a proper interpretation of the data. This information will be useful for the planning of similar actions in the future (in the same country or in a different context) and will serve as a benchmark to assess those upcoming projects. Of course, it would be nice to know more about the benefits in money terms, i.e. what are the monetary benefits of the reduced number of cases of diarrhea – expressed in health costs saved – and the monetary value of the time saved by the parents who do not have to care for their sick children, measured as additional income. Unfortunately, this is not possible with the data that is available, and it would be very difficult to obtain accurate data, even with more resources for data collection.

3.5 Impact

In the case of the ZHWC, outcomes and impacts were considered together. The outcomes (number of people with changed handwashing behaviour) leads to the impact (number of cases of diarrhea averted), which leads in turn to increased income, reduced health expenditures, etc. Another outcome would be policy change towards improved handwashing at large scale (e.g. nationwide) as a result of the ZHWC. However, such benefits should again be measured at the level of the number of people changing their behaviour, and additional number of cases of diarrhea averted on a larger scale.

3.6 Sustainability

Are the activities promoted by the project likely to continue after the end of the donor funding?

The question of the sustainability was included in the survey and asked to key stakeholders during the interviews, as well as during the final workshops. Several elements support the sustainability of the project, including the fact that the costs per beneficiary reached and the costs per case of diarrhea averted will be considerably lower after the project (with only local costs). Other supporting elements include strong local buy-in, reports of intention to continue the promotion, and literature on the sustainability of behaviour change that all speak in favour of the sustainability of the campaign. Moreover, health centres and schools all reported a high likelihood of continuing the activities introduced by the campaign, as did primary caregivers. At the same time, threats that were mentioned to the sustainability were local funding and water supply, high staff turnover with new teachers and staff (untrained and not sensitized to the issue of handwashing).

4 Beyond the CEA, sketch of a CBA

The CEA results, which are based on comparatively solid results, are a good basis to assess the effectiveness of the intervention, especially when compared to similar studies conducted in different contexts. However, these results are not yet what the study was aiming at: assessing the ratio between costs and benefits of the ZHWC.

4.1 Sketch of a CBA

For a CBA, it is not sufficient to measure the change of behaviour of the project beneficiaries: the impact of the newly adopted behaviour on health, and its monetary value are required to perform a CBA. From Table 3 (benefits) we have an estimate of the number of cases of diarrhea, as well as the days of absenteeism prevented. Preventing diarrhea means reducing health costs (this is a benefit), preventing school absenteeism means improved performance of learners, better qualification and better jobs, and at the same time saving parents time for not having to look after their sick children. By monetising these factors (average cost of a case of diarrhea), a full CBA could be made (Table 6).

This would allow calculating the standard CBA results, namely the Net Present Value (NPV), the Internal Rate of Return (IRR) and the Benefit Cost Ratio (BCR).

We did however intentionally not do this calculation because of the uncertainty of the relation between the handwashing behaviour and the health and socio-economic impacts, as well as the uncertainty on the monetary value of those impacts[4]. Note that the proposed model assumes that the campaign lasts only one year, and that in the subsequent years, only local costs are paid. On the benefits side, we assume that benefits will continue sustainably.

Table 6 Sketch of a CBA for the ZHWC

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Additional costs (USD)						
- Initial investment						
- Recurrent donor costs						
- Recurrent local costs						
Additional benefits (USD)						
- Reduced cases of diarrhea						
- Value of reduced absenteeism						
- Other benefits						
Additional Cash Flow						

4.2 Financial vs economic analysis

When conducting an economic (also called social) analysis, it is mandatory to verify that the prices considered are shadow prices and not market prices, the difference lying in external factors that may affect the prices such as exchange rates, policy interventions (subsidies or taxes), etc. This is to ensure that the costs and the benefits considered really reflect their value to the society. In the current analysis, this may apply to the following items:

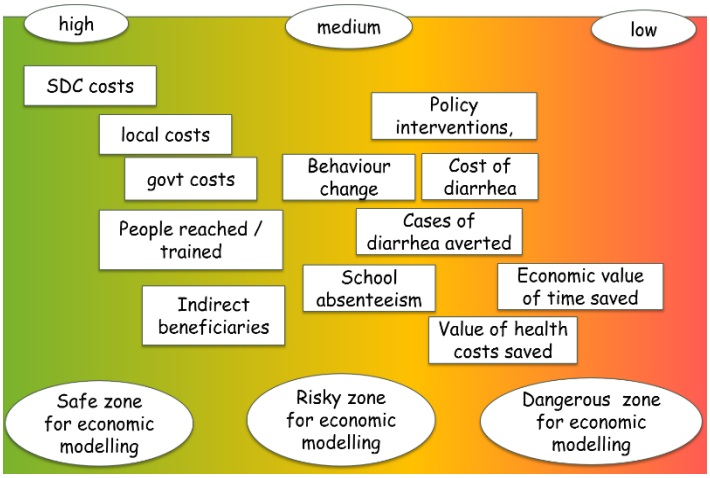
- Cost of a case of diarrhea: if a family must pay a certain amount for treatment costs, this may well not be the full amount, the remaining costs being borne by the State. In this case, the real costs to the society are the total private + State costs.
- Hardware and other inputs for handwashing: as far as we know, there is no State intervention on these elements in Zimbabwe. As there are no goods or services that are imported or exported with the handwashing campaign, no correction is needed.
- Water and energy costs: public subsidies need to be taken into account to obtain the real value of these items.

4.3 Quality of the data

As shown in the present report, the data used to analyse the ZHWC are diverse. In the following, we provide an overview of the data quality assessed ex-post (Figure 5). This figure shows that the data on costs is generally reliable. The data on people reached (direct, indirect beneficiaries) is also in the green zone.

When we look at the outcomes and impacts, the data quality is moving to the

Figure 5 Overview of the data used and assessment of its quality



[4] In a society where unemployment is very high (as in Zimbabwe at the moment of the study), what is the value of the times saved? Probably close to zero!

right, and when it comes to assess the monetary value of the time saved, but also of one case of diarrhea averted, the data is in the red zone. Calculating effectiveness indicators with such poor-quality data will provide unreliable models and results. Therefore, we renounced to calculate a full Cost Benefit Analysis for the ZHWC.

5 Conclusion and recommendations for the use of economic assessments in SDC's Global Programme Water projects

After completion of the economic assessment of the ZHWC, the following chapter presents a set of recommendations addressed to the GPW to make decisions regarding economic assessments of their programmes in the future.

When reviewing the literature and the experience gained through the ZHWC, the research team developed two sets of recommendations: Those which are important for programme managers and those for the implementers of the economic assessment (if this is separate).

5.1 General recommendations

On the one hand, the assessment of cost effectiveness of a project or programme provides key information to managers and key stakeholders, on the other hand, it is an opportunity to look at project components and parameters in a different light, and this process is highly instructive and valuable for the future performances of the project. The ZHWC has confirmed that it is very important to:

- Involve the local stakeholders in the study. A purely external study is less likely to benefit the project implementers.
- Allocate enough time for studies where new approaches are expected, especially for the development of the study concept, validation, data collection, etc.
- Plan for extensive interaction between the contracting parties.

5.2 For programme management

The purpose of the economic assessment is not only to provide a set of indicators (cost-effectiveness and cost-benefit ratios), but it should lead to improved programme management. The following recommendations support the integration of the economic assessment into the overall programme management to maximize benefits of the analysis.

- Plan a CBA / CEA early enough so that project stakeholders can benefit from the study during project implementation, and to allow the integration of the critical data and indicators in existing systems (i.e. M&E, accounting).
- Agree on the level of details that is required, agree on standards that the study needs to reach (quick and dirty vs scientific); specify the length and the type of the expected report.
- Integrate in the TORs the preparation of a short version that is meant for a broader audience.
- Make sure that project data is available and accessible in a condensed and clear format to the assessors. This avoids duplicating efforts, for example in organising data and coordinating program evaluations (including database, M&E information, evaluation reports and other documents).
- We encourage the GPW to do more such studies within the projects contained in its portfolio, allowing comparisons between different SDC funded projects. This type of comparison is probably the most useful application of such studies

5.3 For implementation of economic assessments

There are not many references on evidence based economic assessments of software interventions in the WASH and health sectors. This does not mean that economic assessments should not be conducted for software interventions, but that they require even more considerations when designing and conducting the analyses. The following recommendations can support assessors:

Setting boundaries

- Invest enough time in the beginning to clearly design the analysis by defining its boundaries and purpose. This will save time (and costs) in the research design and data collection.

Research design and data collection

- Consider not only inputs and outputs, but also (mainly) outcomes and impacts. Do not get lost in details, emphasize important aspects and components.
- Integrate questions on sustainability of results and processes among stakeholders.
- In the case of the ZHWC, the use of Datawinners proved useful and adequate.
- Design and test data collection carefully to ensure the data management and analysis stays within reasonable limits.

Data analysis

- Combining data from various sources is sometimes difficult (e.g. baseline information with ex-post information, especially when the collection methods are different.

Interpretation of results

- Pay sufficient attention to the attribution of benefits. Do not overestimate the contribution of the intervention to the measured benefits.
- Measuring the output is often easiest, but does not yet constitute a benefit, the outcome does. While it is recommended to integrate the health impact into the assessment, it is important to discuss the different assumptions and uncertainties underlying the health impact and include this as a parameter in the sensitivity analysis, or even a probabilistic simulation.
- We encourage the GPW to utilise similar indexes such as
- The Quality-Frequency Index (using the “adoption ladder”) to measure outcomes was appreciated by specialists (Brown Bag session, UNICEF, December 2017); we recommend using such tools in further studies and refining them.
- Although the use of DALY’s is tempting as it increases comparability of studies and programmes, it is often too complex at programme level as they require large amounts of data, know-how in calculating and combining impacts on different levels
- Communicate the context, assumptions and evidence that underlie the data and in which case they are true (incl. how what was calculated, what was included or excluded in the analysis etc.). This makes comparison of effectiveness across different programmes more complicated, but more reliable.

5.4 Limitations of the study

Besides the data quality that was already mentioned in section 4.3, the following elements should be mentioned as limitations of the present study:

5.4.1 Attribution of benefits

ZHWC is not the first software campaign to promote handwashing in Zimbabwe. In fact, reports about such campaigns refer to 1988[5]. Therefore, we cannot assume that the present campaign is solely responsible for the people's behaviour towards handwashing. However, assuming a reliable baseline survey, the difference between the present situation and the baseline situation should be attributable to the ZHWC.

Hardware is a precondition for outcomes, but was not part of the project. Hardware was provided by other stakeholders (Government, donors), therefore benefits cannot be attributed to the ZHWC only. Potentially, attribution to the ZHWC may be overestimated.

The rather high research costs may be shared with other project, assuming that similar campaigns will be developed based on the same concepts and research results, which would lead to reduces costs for the ZHWC.

5.4.2 Data availability and uncertainties

Health benefit: the reported reduction of diarrhea is based on very loose estimates, not consistent with literature (30% higher!). So, it could be that the number of cases averted was overestimated in the survey, which would lead to over-optimistic indicators.

Self-reporting: the big gap between self-reporting and observed behaviour highlights the uncertainty of the data. In the survey, the method used (assessment of the learners' behaviour by the teachers and assessment of the household members behaviour by the caregivers) is somewhere between self-reported and observed, but probably closer to self-reported. This may also lead to an overoptimistic assessment of the results.

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[5] Even if 58% of rural caregivers said in the survey that they learned about handwashing for the first time with this campaign