



Hygiene Cost Effectiveness Study in Bhutan

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Acknowledgements

The Hygiene Cost Effectiveness Study in Bhutan aims to analyse and compare the costs and outcomes of hygiene promotion interventions. It is based on IRC's WASHCost methodology, designed to help determine the costs and efficacy of WASH-related hygiene promotion interventions. The study was supported by the Australian Government's Department of Foreign Affairs CS WASH Fund as part of SNV Bhutan's Sustainable Sanitation and Hygiene for All (SSH4A) Programme, which provides technical support to the Ministry of Health for the further development and scaling up of the RSAHP. The study is part of the Behaviour Change Communication component of the Rural Sanitation and Hygiene Programme (RSAHP), Public Health Engineering Division, Ministry of Health (MoH).

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List of abbreviations

BBS	Bhutan Broadcasting Service
BCC	Behaviour Change Communication
BHU	Basic Health Unit
CDH	Community Development for Health
CLTS	Community Led Total Sanitation
DHO	Dzongkhag Health Officer
DoPH	Department of Public Health
DPHE	Dzongkhag Public Health Engineering
DPL	Deep pit latrine
FYP	Five-Year Plan
GAO	Gewog Administrative Officer
HES	Hygiene Effectiveness Study
HA	Health Assistant
HHs	Households
HPD	Health Promotion Division
HW	Handwashing
HWWS	Handwashing with soap
LSHTM	London School of Hygiene and Tropical Medicine
MDG	Millennium Development Goal
MHM	Menstrual Hygiene Management
MoE	Ministry of Education
MoH	Ministry of Health
MSS	Middle Secondary School
OD	Open defecation
PF	Pour flush
PHAST	Participatory Hygiene and Sanitation Transformation
PHED	Public Health Engineering Division
REBH	Research Ethics Board of Health
RGoB	Royal Government of Bhutan
RSAHP	Rural Sanitation and Hygiene Programme
RSPN	Royal Society for Protection of Nature
RWSS	Rural Water Supply and Sanitation
SDG	Sustainable Development Goal
SSH4A	Sustainable Sanitation and Hygiene for All
UNICEF	United Nations Children's Fund
VHW	Village Health Worker

Glossary

Chiwog	Sub district
Dzongkhag	District
Dzongkha	National language
Dzongda	Governor
Gewog	Block, sub administrative unit of a district
Gup	Elected block leader
Mangmi	Village representative at the local government level.
Throm	Town

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1. Executive summary

Unless improved water and sanitation services are used and used hygienically, health and socioeconomic benefits will not be realised. To encourage people to improve hygiene behaviour, many hygiene promotion activities are being developed and carried out, yet decision makers have limited knowledge of financial benchmarks for water and sanitation improvement and this is even less so for hygiene improvement.

The Hygiene Cost Effectiveness Study assessed whether the hygiene interventions in Bhutan as part of the governments Rural Sanitation and Hygiene Programme (RSAHP) are successful in encouraging safer hygiene practices and how much these cost. It is based on IRC's WASHCost methodology, designed to help determine the costs and efficacy of WASH-related hygiene promotion interventions.

The study was part of SNV Bhutan's Sustainable Sanitation and Hygiene for All (SSH4A) Programme, which provides technical support to the Ministry of Health for the further development and scaling up of the RSAHP. Based on the SSH4A approach, it includes four components - WASH governance, sanitation demand creation, behaviour change communication and supply chain development, supported by monitoring, knowledge and learning. The Hygiene Cost Effectiveness Study - as part of the behaviour change component - was implemented over a four-year period across two districts. It began in Samtse in 2014 and was extended to Trashigang district in 2016 until 2018. The study in Samtse and Trashigang focused on three behaviours such as Handwashing with soap at critical times; Hygienic usage of a sanitary toilet and Safe water management practices. The three behaviours in these two districts captured behaviour change using an effectiveness ladder, the cost of hygiene interventions and comparison of costs against behaviour change

The hygiene interventions were delivered through the governments health services as part of a district wide approach. They included: two day Community Development for Health workshops to create demand for sanitation and hygiene; home visits and regular follow-ups; review meetings with district and sub-district officials and awareness raising campaigns at annual events like Global Handwashing Day.

The hygiene effectiveness ladder was developed with four levels: from not effective and limited, to basic and improved. Flow charts were developed for each indicator to track progress on intermediate steps and to allow for a change of focus within the intervention where needed.

Costs were collected at household and implementers level. For households, we looked for example at materials and labour cost for building a toilet; cost of soap and cost of water installation and use. For implementers, the following data was collected and calculated: capital expenditure software costs e.g. training of health workers, material development, workshops; and operational costs e.g. transport, salaries.

Before the intervention households mostly scored either Not effective or Basic for all key behaviours on the hygiene practice level ladders. With an investment of USD 3.5 on hygiene interventions per person or USD 17.50 per household we saw a significant increase in safer practices for each of the three hygiene behaviours.

By comparing the three key hygiene practices, the Government of Bhutan and other implementers got a better insight in gaps and they can adapt their promotion and intervention strategies to address the gaps. Although progress was very significant, it remains difficult to tell to what extent the hygiene interventions achieved this progress. It seems that hygiene promotion is effective as integrated approach: when implemented alongside technically appropriate water and sanitation infrastructure improvements.

Recommendations:

- Share findings and cost analysis with decision makers to support further investment in sanitation and hygiene promotion, and seek alignment with the upcoming decentralisation and budgeting processes.
- Rather than implementing “one off” activities, reinforce existing programme approaches and models that institutionalise and integrate efforts within regular activities, once demand has been generated.
- Conduct further studies and monitor and adapt technology options and services to better meet the needs of households that belong to the poorest wealth quintiles.
- In programme design, planning and budgeting, place emphasis on ensuring personal contact and adequate frequency of follow-up to promote safe practices, particularly for handwashing practices, which progressed at a slower pace. The current two-year phase of the RSAHP cycle supports this, but continuous efforts are needed to accelerate progress.
- Using this methodology to periodically monitor and evaluate progress and sustainability of hygiene practices over time will enable the Government and other implementers to design follow-up support more effectively, targeting gaps in safe hygiene practices.
- Reduce the costs of monitoring by harmonising water, sanitation and health indicators; this also contributes to better integrated and coordinated promotion of safe hygiene practices.

2. Background and Rationale

2.1 Contextual Background

Bhutan is a small land-locked country between China in the north and India in the south, with a population of about 779,666¹. Administratively, Bhutan is divided into 20 Dzongkhags (districts) and 205 Gewogs (blocks) and has largely an agrarian economy. Bhutan's development policies and programmes are guided by the overall developmental philosophy of the Gross National Happiness (GNH). The country aims to balance spiritual and material advancement with high health and education investments and outcomes. Sanitation and hygiene fall within the domain of two of the four GNH pillars, being "conservation of environment" and "socio-economic development" as reflected in its indicators.

Bhutan met its Millennium Development Goal (MDG) targets for water (99.5%) but failed to achieve its sanitation targets. However through its national rural sanitation programme led by the Public Health Engineering Division (PHED), there has been an encouraging increase from 66% in 2012 to 71% in 2015 in rural areas. Aligned to the SDGs service levels in 2015, the JMP data indicates that in rural areas, 57% have access to basic sanitation services, 39% have unimproved services and 4%² have limited service levels. The Bhutan Multiple Indicator survey shows households with access to handwashing stations (access to water and soap) at 77.8% in rural areas. Poor hygiene practice, however, still results in diarrhoea being among the top five communicable diseases (Annual Household Bulletin 2016) with stunting rates remaining high (nationally 21.2%; rural 26.1%)³.

2.2 Rural Sanitation and Hygiene Programme

The Ministry of Health (MoH), through the PHED, is responsible for the Rural Sanitation and Hygiene Programme. Since 2008, SNV has provided technical assistance to PHED to support the development of the approach. In June 2010, a pilot phase was scaled-up district wide in Lhuentse as part of SNV's SSH4A programme. In the following year, the programme was extended to Pemagatshel district. The programme has now scaled up to 10 out of 20 districts funded by different organisations such as UNICEF, RSPN and SNV through the Australian Government's Civil Society WASH Fund.

The programme approach is based on SNV's Sustainable Sanitation and Hygiene for All focusing on four components; WASH governance, sanitation demand creation, behaviour change communication and supply chain development supported by performance monitoring and learning.

The overall mandates of the national programme are:

- Preparing, implementing and advocacy of sound policies, strategies and procedures to support sustainable provision and coverage of rural water supply and environmental sanitation facilities
- Coordinating the RWSS programme at national level, including networking at national, regional and global levels
- Technical backstopping to Dzongkhags/Gewogs in design, material procurement and testing and development of appropriate and affordable technologies
- Identifying and using the capacity of all relevant stakeholders to implement and maintain RWSS facilities
- Developing and supporting implementation of relevant human resource development and training, with emphasis on training of trainers at central level and capacity building at Dzongkhag level
- Coordinating, managing and monitoring of donor-supported programmes and projects in the sector
- Monitoring and supervising RWSS project implementation, maintaining design standards and construction quality.

1 Bhutan at a Glance 2017, National Statistical Bureau

2 <https://washdata.org/data>

3 National Nutritional Survey 2015



Figure 1: The programme cycle

Specifically, the vision, mission and the objectives of the Rural Sanitation and Hygiene Programme (RSAHP) are as follows:

Vision: To ensure that all Bhutanese citizens (present and future) living in rural areas have access to adequate, safe and affordable sanitation services, and adopt safe hygiene practices.

Mission: Promote sustainable sanitation and hygiene to bring about improved health and quality of life for rural population through access to sanitary toilet, hygienic use of toilet and adequate facilities for handwashing with soap.

2.3 Behaviour Change Communication

Behaviour change communication (BCC) is one of the four components of SNV's SSH4A framework. In Bhutan, as part of the BCC component under the national rural sanitation and hygiene programme, interventions were developed along with the Ministry of Health. At the national level, the Public Health Engineering division has been taking the lead and at the district level activities are led by the health assistants based in the communities. Over the years the BCC interventions were more focused on changing the handwashing with soap behaviour as progress was slow compared to sanitation. Approaches developed are based on findings from formative studies to understand the behavioural determinants. The formative studies in 2011 and 2014 focused on behaviour such as ceasing to defecate in the open targeting rural householders who currently practice open defecation, improving (or upgrading) one's toilet to a sanitary and hygienic facility targeting rural householders who currently use unimproved and unhygienic toilets and handwashing with soap behaviour with a focus on mothers of children under 5 and primary school children to wash hands with soap during 4 critical junctures. The national formative study also collected baseline information on menstrual hygiene with regard to current practices, encompassing access to sanitary pads, knowledge, social norms and support.

Apart from the studies, the effort taken to improve the handwashing behaviour are better messaging targeted to different audiences both male and female through behaviour change strategies; applying appropriate communication

channels and contacts, and avoiding stereotypical messages that serve to reinforce gender inequality/inequity. A growing consensus that more sustained effort in hygiene promotion is needed, an innovative approach was developed in 2016-17 with the London School of Hygiene and Tropical Medicine (LSHTM), MoH, SNV and the creative agency, Upward Spiral. The approach was developed based on the SuperAmma intervention in India which was then revised to fit the Bhutan context and within the RSAHP delivery mechanisms and capacity. It used universal human emotional drivers of nurture, disgust and social affiliation to produce positive outcomes. The new approach is now part of the national programme and it has been scaled up to a new RSAHP district.

2.3.1 Sanitation and Hygiene interventions within the rural sanitation and hygiene programme

At the national level: formative studies on sanitation and hygiene behaviours (handwashing with soap, ceasing to defecate in the open, improving or upgrading one's toilet to a sanitary and hygienic facility, menstrual hygiene management). PHED and SNV carried out formative research in two districts, Lhuntse October 2011, Pemagatshel December 2011 and a national formative study in November 2014 to better understand the barriers motivation and conditions for behavioural change and to better target messaging through behaviour change strategies.

Linked to the national programme, the following activities were carried out in Samtse and Trashigang from 2014-2018:

- Conducting community development for health (CDH) workshops⁴: 211 in Samtse and 214 in Trashigang. The community development for health workshop is the demand creation workshop, which was originally based on Participation Hygiene and Sanitation Transformation (PHAST) and incorporates elements of Community-Led Total sanitation (CLTS). It emphasises adequate participation of all groups, community ownership and community self-discovery of the causes of poor health/poor child-health and subsequent solutions that can reduce under-fives child morbidity reaching those in greatest need through additional activities, and avoiding marginalisation of the poorest in the community.
- Training of trainers for CDH workshops: 84 (38 F/46 M) Basic Health Unit (BHU) health staff trained in sanitation demand creation facilitation and methodology and assessed against key competencies through on the job coaching and mentoring in line with a capacity development plan.
- Regular follow-up on the action plans developed during the CDH workshops by health assistants, natural leaders and Gewog officials.
- Home visits and outreach clinics by health assistants who allocated an estimated 50% and 10% respectively of their time on hygiene promotion.
- Annual events like Global Handwashing Day, World Toilet Day, Menstrual Hygiene Day and the Sanitation Fair are used as other channels to convey hygiene messages.
- Joint monitoring activity (PHED and SNV) which includes household visits.
- Gewog and Dzongkhag level review meetings with district and sub- district officials. During these meetings various discussions are initiated. For example how some local leaders mobilise resources to encourage people from the towns to send money to their families in the village to construct a toilet.
- The approach in Trashigang with the London School of Hygiene and Tropical Medicine which aimed at testing changes to the current handwashing with soap activities within CDH and RSAHP, using universal human emotional drivers such as nurture, disgust and social affiliation.

4 See for details on content of these workshops the facilitator's guide prepared by the Government of Bhutan: Community Development for Health (CDH) Improving Sanitation, Hygiene in the Rural Areas of Bhutan Workshop Facilitators' Guide (Revised 2012). Available at <http://www.health.gov.bt/wp-content/uploads/moh-files/CommunityDevelopmentforHealth.pdf> [last accessed at 8 July 2018]

3. Hygiene Cost Effectiveness Study

The Hygiene Cost Effectiveness Study was designed in partnership with PHED, IRC and SNV, under the Rural Sanitation and Hygiene Programme (globally Sustainable Sanitation and Hygiene for All (SSH4A)). The study was to assess whether the hygiene interventions in Bhutan were successful in encouraging safe hygiene practices and how much these cost. The methodology was applied and tested in Samtse district first in 2014 and extended to Trashigang district in 2016. The SSH4A programme is implemented over a four-year period across two districts; commencing with an initial two-year phase in each district.

3.1 Why look at hygiene promotion cost effectiveness?

Since hygiene, and more broadly behaviour change, is seen as a core component of the RSAHP, it seemed logical to take a deeper look into the hygiene activities, their costs and whether they are influencing behavioural change and thus resulting in better hygiene practices. We know that unless improved water and sanitation services are used and used hygienically, health and socio-economic benefits will not be realised. We don't know much about financial benchmarks for water and sanitation improvements, and even less so for hygiene improvements.

This study aimed to guide the programme, offer improvements and support decisions on where to adapt or refine hygiene interventions and where best to allocate financial resources. It also⁵ aimed to support decision makers at the Ministry of Health by providing a greater insight on current costs and effectiveness of behaviour change communication interventions. The hygiene cost effectiveness study began by collecting hygiene effectiveness data at household level as part of the baseline data collection exercise of the RSAHP in Samtse in 2014 and Trashigang in 2015. As much of the information needed to assess hygiene data was already provided by the existing baseline questions of the SSH4A programme, it was relatively inexpensive in both time and money. A number of additional questions specifically related to hygiene interventions and costs at household level were collected at the same time (see annex).

The following steps were taken to carry out the study from initial workshop to intervention to endline findings for potential take up by government and large programme implementers:

- Designing and contextualising the study methodology through a stakeholder inception workshop
- Study site selection
- Data collection and analysis
- Contextualising the indicators and definitions
- Contextualising the practice levels
- Decide on relevant cost items and design process for collection and analysis
- Sharing of study findings from each district to relevant stakeholders

This study commenced with a two-day workshop in 2013⁶ in Bhutan in consultation with the key stakeholders working on hygiene promotion. The workshop encouraged the exchange of ideas on hygiene promotion activities and jointly established the focus behaviours, indicators and cost related items for hygiene promotion activities.

⁵ This is the survey used at the endline round in February 2018 which had a few revised answer options to allow for easier analysis.

⁶ See report at: <https://www.ircwash.org/resources/how-design-study-%E2%80%98cost-effectiveness-hygiene-promotion%E2%80%99-%E2%80%93-workshop-report>

3.2 Methodology

The Hygiene Effectiveness Study adopted both quantitative and a qualitative design. The aim of the study was to contribute to more effective hygiene programming and to improve the ability to budget for these interventions and to maximise long term benefits arising from the water and sanitation services provided in Bhutan.

To assess the cost-effectiveness of hygiene promotion interventions, the following was included:

- Determine hygiene practice levels before and after the hygiene promotion intervention
- Determine the total costs of the intervention (households, implementers, government, etc.)
- Compare the costs of the intervention to the changes achieved in the hygiene practice levels

Hygiene practice levels are used to analyse and compare the costs and outcomes of a number of hygiene promotion interventions. For that purpose hygiene practice levels were developed for the three agreed key hygiene interventions related to water and sanitation:

1. Sanitary toilet and use;
2. Handwashing with soap;
3. Safe (drinking) water management.

The costing analysis included the full costs associated with the hygiene promotion interventions:

- **At various stages:** before (start-up), during (implementation) and after (follow-up and maintenance) completion of the intervention
- **By different stakeholders:** households, implementers, government (district and national)

3.2.1 Location site selection

Samtse Dzongkhag (district) is one of the twenty Dzongkhag's of Bhutan. The district is made up of 15 Gewogs (village clusters) which are sub-divided into around five to six Chiwogs per Gewog. The total number of Chiwogs in Samtse district is 77 and these are again sub-divided into villages.

Samtse is located in the south western region of Bhutan bordered by India and is the largest Dzongkhag with an approximate population of 55,755 people. At the time of the baseline, the district had one of the highest poverty rates in the country: 47%, and the lowest improved sanitation coverage at 41% (BMIS⁷ 2010). At the endline, the poverty rate was decreased to 12.3% according to the Bhutan Poverty Analysis report 2017⁸. The region has two Drungkhags (sub-districts), Sibsoo and Dorokha, with diverse ethnic communities and there are four different languages.

Trashigang is 551 km away from Thimphu, the capital city and is one of the largest Dzongkhags in the Kingdom. The altitude elevation ranges from 600 m to over 4500 m above sea level. Trashigang Dzongkhag has a total area of 2204.5 square kilometres. It has a total of 8,610 households with population of 71,768. The density of population is 33 per sq. km. The forest cover accounts for 77.87% of the total. The Dzongkhag has arable land which is 3.64% of its total area⁹. The RSAHP baseline carried out by SNV in 2016 shows that, 73% in Trashigang Dzongkhag owns a toilet of which 42% owns a pour flush, followed by 17% with pit without slab and 14% have pit with slab. 22% do not have toilets at all. And 5% are sharing.

Trashigang has 15 Gewogs and the respondents in the sampled 6 Gewogs were more or less homogeneous in culture and ethnicity except for Sakten where people are nomadic and have a different culture, way of living and traditions. The poverty rate at the endline was 10.7% for the whole of Trashigang district according to the Bhutan Poverty Analysis report 2017.

⁷ Bhutan Multi Indicator Survey

⁸ Bhutan Poverty Analysis Report, 2017, p.11. Available at: http://www.nsb.gov.bt/publication/files/2017_PAR_Report.pdf [last accessed at 8 July 2018]

⁹ <http://www.trashigang.gov.bt/node/1>



Figure 2: Map showing the present RSAHP (Samtse) district and the next district (Trashigang)

3.2.2 Sampling

The hygiene data was collected as part of the annual performance monitoring for the SSH4A programme. The sample frame for the baseline study was agreed upon through the use of the Krejcie-Morgan table¹⁰, whereby the required sample size for Samtse district was determined as 370 households, equal to 3% of the total rural target population. Due to the diversity within the district, the sampling methodology followed stratified proportional sampling.

5 of the 15 Gewogs in Samtse were chosen for data collection due to their diversity and were to represent all the strata in the Samtse region. As there is little expected variation between villages within a Gewog, the villages were selected via random sampling. The table below shows some more information on the selected Gewogs.

	Gewog	Sanitation Coverage	Accessibility	# of Chiwog's
1	Dungtse	2%	Difficult	5
2	Bara	37%	Far away	6
3	Sipsu	64%	Easy	5
4	Tading	15%	Reasonable	5
5	Lhareni	Unknown	Somewhat difficult	5

Table 1: Information on selected Gewogs

There is a large variation in size and sanitation coverage between the Gewogs, ranging from 2% to 64% coverage and from 285 to 921 HHs.

10 Krejcie, R.V. & Morgan, D.W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610

Gewog	Total # of HH in Gewog	Sample size per Gewog		As % of total sample
		In # of HH	In %	
Dungtse	285	33	11.6%	8.9%
Bara	653	76	11.6%	20.4%
Sipsu	921	107	11.6%	28.8%
Tading	824	95	11.6%	25.8%
Lhareni	514	59	11.6%	16.1%
	3,197	370	11.6%	100.0%

Table 2: Sample size of Gewogs (IRC and SNV, 2014¹¹)

In Trashigang, the sampled Gewogs were homogeneous in nature. The households were predominantly farming households with few local shop owners. The type of houses and the composition of households were similar in all most all the Gewogs¹².

The sample sizes for the six Gewogs were determined proportionally on the basis of the total number of households in the Gewog which are provided in the following table.

	Gewog	Total # of HH in Gewog	Sample size per Gewog		As % of total sample
			In # of HH	In %	
1	Kanglung	1067	102	9.56%	26.84%
2	Kangpara	440	42	9.55%	11.05%
3	Yangner	547	52	9.51%	13.68%
4	Sakten	420	40	9.52%	10.53%
5	Radhi	610	59	9.67%	15.53%
6	Lumang	888	85	9.57%	22.37%
7	Totals	3972	380	9.57%	100.00%

Table 3: Number of households in the Gewog

In line with SNV's global programme, additional data was collected to enable wealth ranking and monitoring by wealth quintiles, using a principle component analysis. Wealth rankings were made following the DHS wealth index¹³. For the endline, the same procedure was followed¹⁴.

11 SNV Asia and IRC, .Baseline Preparations Workshop In Bhutan. The Hague, The Netherlands: IRC and SNV, 2014. Web. 2 Aug. 2016

12 Performance Monitoring Baseline Report Trashigang: Bhutan (Report written in July 2016)

13 SNV (April 2014) Guidance Note: Wealth disaggregated impact monitoring in SNV's WASH sector

14 The analysis of the hygiene data as reflected in this report is dependent on that methodology



Figure 3: Map of Trashigang

3.2.3 Data collection and analysis

The hygiene data was collected as part of the annual performance monitoring for the SSH4A programme. This monitoring activity was conducted in the four districts where SNV works with the government on the Rural Sanitation and Hygiene Programme. Samtse and Trashigang are the districts where SNV specifically focuses on hygiene interventions by working with the government and development partners.

The assumption was that combining it with a regular exercise may avoid survey fatigue at the household level, and reduces the data collection, processing and analysing costs by making use of a well-trained team and trained enumerators.

In Samtse, the hygiene data was collected at the baseline in 2014, mid-term in 2016 and endline in 2018. In Trashigang, the hygiene data were collected in 2016 (baseline) and 2018 (endline). The findings in this report are from the baseline and endline findings.

3.3.4 How was data collected?

Data were collected at different levels: households, government & implementers and non-government players. Household data was collected as part of the performance monitoring surveys; data from implementers were collected during and after the intervention.

Before interventions commenced, baseline data was collected from 370 households in Samtse in 2014 and 381 households in Trashigang in 2016. In 2018, an endline assessment was carried out to measure the progress made in both districts: among 390 out of 11,967 households in Samtse and 386 out of 10,954 households in Trashigang.

The Figure 4 below shows the process.

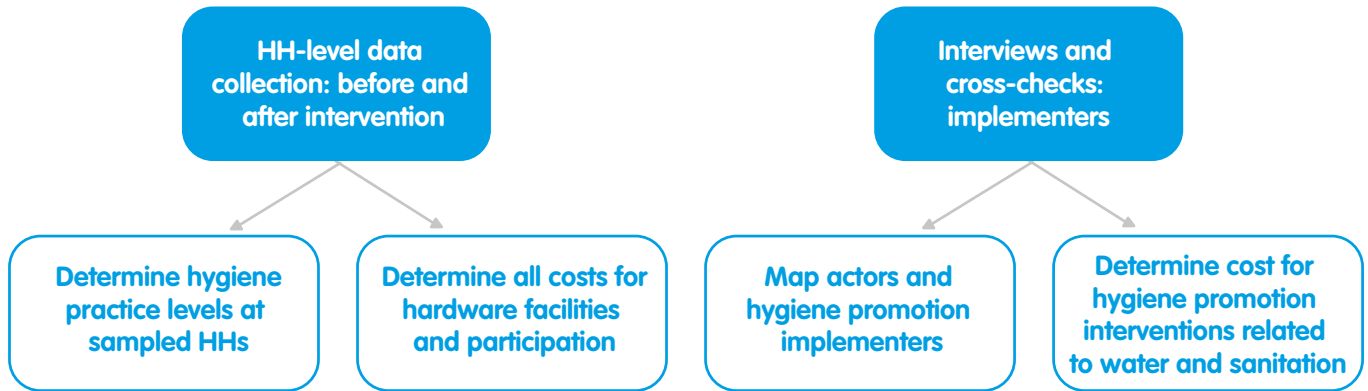


Figure 4: Process of the data collection

The full performance monitoring survey contained 204 questions or data entry options – including capturing pictures of toilets and handwashing stations. See the annex for the full survey.

For the study we used about 35 questions of the full survey and added hygiene specific questions - mainly related to cost - to the standard survey. For the analysis, we have used the following fields from the survey:

General	Practice level Indicator 1: sanitary toilet and toilet use	Practice level Indicator 2: handwashing with soap	Practice level Indicator 3:
Unique identifier	Having a toilet	Handwashing station within 10m from the toilet	Main source of drinking water
Wealth quintile	Toilet in use	Water available	If spring, protected or unprotected
Female/male headed household	Type of toilet	Soap available	Having a storage method
Name of district	Where do faeces go	Recontamination of water	Drawn method
	Can rats reach faeces?	Knowledge of critical times for handwashing	Treated before consuming
	Pan/slap: can flies go in/out the pit		
	Toilets accessible for all (distance, slope, time of day)		
	How are stools of children <3 disposed of		
	Toilet free from faecal smears and free from used cleansing materials		

Table 4: Fields used in the survey

In addition, the following cost-related questions were added:

158. F1. How long have you had this toilet?
159. F2. Was there any direct contribution by the household for construction of this toilet (material and labour)
160. F3. How much time was spent? (in days)
161. F4. Do you know how much money was spent for construction of this toilet (initial construction costs)?
162. F4a. How much money was spent on direct cost for materials?
163. F4b. How much money was spent on direct cost for labour?
164. F5. How did you pay for this toilet?
166. F7. Is there any direct contribution by the household (material and labour)?
167. F8. How much time was spent on repairing and or improving the toilet? (in days)
168. F9. How much money was spent on repairing and or improving the toilet?
169. F10. Was the pit emptied in the last two years?
170. F11. How much money was spent to empty the pit?

Data was collected using Akvo Flow loaded on smart phones.

3.2.5 Key Indicators

Key indicators were jointly agreed upon at the design workshop in 2013¹⁵ which was attended by participants from the Public Health Engineering Division and the Health Promotion Division under the Ministry of Health, Bhutan, UNICEF Bhutan, and SNV Bhutan.

This study focuses on three key indicators: toilet use, handwashing with soap and safe water handling. Each of these indicators relate to multiple behaviours, all of which need to be safely practiced:

1. Having a sanitary toilet, using it and keeping it clean
2. Handwashing with soap at critical times (after defecation and before eating)
3. Having and using a safe drinking water source, and the safe storage and management of drinking water at household level

To assess the effectiveness of the hygiene promotion interventions, Hygiene Practice Level Ladders were developed. The ladders used in Bhutan have been adapted and developed from the IRC WASHCost programme¹⁶. The practice level ladder model is used to rank the households in the three key hygiene practices, so that any progression that has been made during an intervention can be seen easily.

The practice levels stand at: **Not Effective, Limited, Basic and Improved**; whereby Not Effective indicates that the household's current hygiene practice is of a standard that offers no hygienic practice, through to Improved that indicates that the household has a high enough standard of hygienic practices that it causes very little threat to their health.

The hygiene practice ladders for the three key hygiene practices are shown in Table 5.

15 How to design a study on 'cost-effectiveness of hygiene promotion' – workshop report, 2013, <https://www.ircwash.org/resources/how-design-study-%E2%80%98cost-effectiveness-hygiene-promotion%E2%80%99-%E2%80%93-workshop-report>

16 McIntyre, Peter et al. (2014). Priceless! : uncovering the real costs of water and sanitation, <https://www.ircwash.org/resources/how-design-study-%E2%80%98cost-effectiveness-hygiene-promotion%E2%80%99-%E2%80%93-workshop-report>

	Sanitary toilet and use	Handwashing with soap	Safe drinking water management
Improved	Household (HH) has own toilet that: <ul style="list-style-type: none"> • is used, • separates users from faecal matter, • is accessible by all HH members, and • is hygienic (free from faecal matter). 	There is a handwashing facility within 10 m of toilet facility that: <ul style="list-style-type: none"> • has water available, • has soap available, and • prevents contamination of the water by hands. HH members know two critical times for hand-washing (before eating and after defecation).	Drinking water always comes from an improved source (piped or protected spring) and is: <ul style="list-style-type: none"> • collected safely, • stored safely, • drawn in a safe manner, and • treated before use.
Basic	HH has own toilet or use of shared toilet: <ul style="list-style-type: none"> • that is used as toilet, • separates users from faecal matter, but • is NOT accessible by all HH members, nor • hygienic (free from faecal matter). 	There is a hand-washing facility within 10 m of toilet facility that: <ul style="list-style-type: none"> • has water available, • has soap available, and • does not prevent contamination of the water by hands. But HH members do NOT know two critical times for hand-washing (before eating and after defecation).	Drinking water always comes from an improved source (piped or protected spring) and is: <ul style="list-style-type: none"> • collected safely, • stored safely, • drawn in a safe manner, but • is NOT treated before use.
Limited	HH has own toilet or use of shared toilet that: <ul style="list-style-type: none"> • is used as toilet, but • does NOT separate user from faecal matter. 	There is a hand-washing facility within 10 m of toilet facility that: <ul style="list-style-type: none"> • has water, but • does NOT have soap or substitute available. 	Drinking water sometimes comes from an improved source (piped or protected spring) but is not: <ul style="list-style-type: none"> • treated before use, • collected safely, • stored safely, nor • drawn in a safe manner.
Not Effective	No toilet or toilet not used (HH practice open defecation).	There is no hand-washing facility within 10 m of toilet facility OR water is not available (at present).	Drinking water comes from unimproved source: surface water OR unprotected spring OR unprotected dug well.

Table 5: Hygiene practice ladders used for the study

Using a flow diagram to identify areas for improvement in practice levels

In combination with the hygiene practice ladder a flow diagram was used to categorize the 3 key indicators into one of these levels. These flowcharts describe a logical chain of events or practices and this allows implementing organisations to identify points for improvement in the chain of events, resulting in certain behaviours. It supports adaptive management: adapt the intervention based on these points for improvements.

For indicator 1: sanitary toilet and toilet use, the flow was described as follows:

1. For the practice to be effective, the toilet must be used,
2. Then for it to be classified as "Basic or above" it must separate the user from faecal material AND be accessible by all members of the HH. In the survey, the interviewee was asked if the toilet was accessible at all times, and if there were members of the HH having difficulties in accessing the toilet; they also asked about the children <5 specifically. In addition, the enumerators also observed the location of the toilet.
3. And finally to be Improved, the toilet must also be hygienically clean, that is: free from faecal matter.

The practice level score is thus a composite score. The barriers between preventing a household from achieving a basic level from a limited one are whether the toilet is being 'shared' (used by other households) or whether or not the toilet provides adequate separation of the user from faecal material.

Only if all the barriers are removed – if all linked components can be answered positively - the practice is seen as 'improved'. The process of assigning practice levels is indicated in the flow chart in the subsequent page.

3.2.6 Costs

Whilst outcomes on hygiene behaviour is one part of the hygiene cost-effectiveness study, the other part is costs. When the hygiene intervention appears to be effective; would it be possible to replicate the same intervention in all other districts or is it too costly? To be able to answer that question we need to know about the costs. The study looked at all the costs that could be linked to a hygiene intervention at various stages of the intervention. It looked at different types of costs, disaggregated by different stakeholders: household members and implementing partners: government and non-government.

Household

- Costs related to hygiene practices, like costs for toilet construction and improvement; costs for soap.

Implementer costs:

- Operation cost – transport, salaries
- Capital expenditure hardware cost – tapstands for handwashing
- Capital expenditure soft ware cost – training of health workers, workshops



Source: IRC and SNV, 2014

Figure 5: Flow diagram

3.2.7 Limitations of the study

The study was a long process, starting in 2013. Some of the key challenges were:

- A lack of knowledge on the location of the poorest households which led to a skewed sample with few households belonging to the poorest and second poorest quintiles.
- Cost data is complex and sensitive. Hygiene intervention cost is not a separate budget item. Getting reliable data is not only based on the availability of the data but also on trust and on people with in-depth knowledge of programmes and activities in order to estimate the costs of hygiene. Costing tools were fine tuned along the way; it is a continuous process of development and keeping track of costs on the go.
- The methodology does not analyse the link between the cost of hygiene interventions and impact on health – it only links investment with behavioural changes. However, also keeping in mind that these could have been influenced as well by other investments, such as sanitation or water hardware components. Therefore the methodology can perhaps only “frame” how to measure the influence of these other components of the WASH programme.
- The findings do not give insight in the value for each intervention separately in that we cannot conclude which intervention is better value or which one could be skipped. We assume it is actually the whole mix of activities, that a district wide approach brings economies of scale and a combination of intensity and frequency.

4. Findings from Samtse and Trashigang

4.1 Results per indicator and wealth quintile

Baseline data collection was carried out in 2014 (Samtse) and 2016 (Trashigang) before starting interventions in either district. Parameters for wealth quintiles were developed following the Demographic and Health Survey wealth index¹⁷ and the hygiene effectiveness ladder was developed with the four levels mentioned: improved, basic, limited and not effective.

The number of households in the poorest and second poorest quintile are too small to be taken into account for statistically significant comparison. See tables below. For Trashigang the number of household decreased from 138 out of 381 to 5 out of 386; while for Samtse the number of poorest and second poorest households decreased from out 163 out of 370 to 4 out of 390. The households at the endline were randomly selected using the same sampling method as in the baseline.

Reasons for progress might be:

- Although the sample area was the same, the households within the sample area might have changed
- District-wide connection to electricity (which leads to people buying water boilers, rice cookers, curry cookers etc.)
- Economic growth (there is an increase in people owning small trucks because of the business boom in cardamom, especially in areas of Samtse where data was collected)

District	Wealth Quintile	Baseline (2014)	Endline (2018)
Samtse	Poor & 2nd poorest	163	4
	Middle	121	71
	4th and richest	86	315

Table 6: Wealth quintile movements in Samtse

District	Wealth Quintile	Baseline (2014)	Endline (2018)
Samtse	Poor & 2nd poorest	163	4
	Middle	121	71
	4th and richest	86	315

Table 7: Wealth quintile movements in Trashigang

In Samtse, findings showed more than 50% of households practiced hygiene behaviour that was below the basic level of effectiveness. In Trashigang, similar findings showed 50% of households practiced behaviour that was below the basic effectiveness levels in both handwashing with soap at critical times and hygienic usage of a sanitary toilet. Only in safe drinking water management was the baseline score above 50%

4.1.1 Gender

Out of the total respondents from Samtse and Trashigang, 60% of the respondents in Samtse and 63% in Trashigang were female. Both men and women attended hygiene promotion meetings and there was no significant difference as to who attended more in both the districts. In both Samtse and Trashigang, there is an equal percentage of male and female headed households across the quintiles (female headed households are not poorer than male headed households). The study also showed that there is no significant difference in practice levels for female headed households and male headed households. Both seem to be doing equally well.

17 SNV (April 2014) Guidance Note: Wealth disaggregated impact monitoring in SNV's WASH sector

4.1.2 Hygiene practice level 1: Sanitary toilet and use

This hygiene practice indicator assesses whether a toilet is in use as a toilet and if it separates users from faeces. It assesses cleanliness (no faeces) of the toilet and access for all household members.

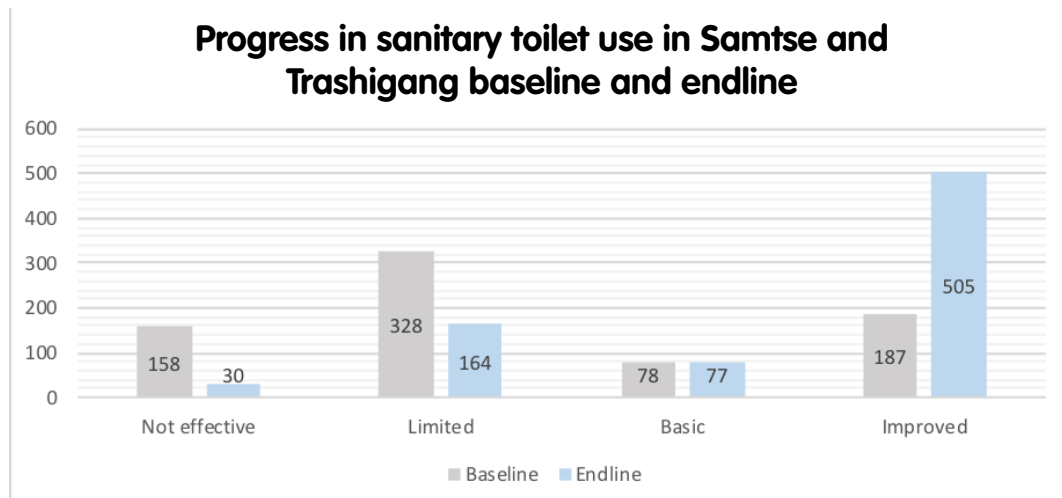


Figure 6: Comparison of toilet use

Households in Trashigang and Samtse significantly shifted their access to sanitary toilets during the programme. This seems mainly due to the fact that new toilets are built closer to the house. A closer look into the reasons will allow for adaptation and better targeting of interventions. Access to toilets classed as not effective or limited was considerably reduced, whilst households increasingly gained access to improved toilets, from 187 households in the baseline to over 500 in the endline. Looking at the flow diagram we see that a huge improvement was made with providing access for all members of the household: 622 vs. 194 in the baseline.

We also see an increase in households with a toilet that safely contains waste: 675 vs. 443 in the baseline. Looking at the type of toilet we see that most toilets that were newly built are flush or pour flush latrines.

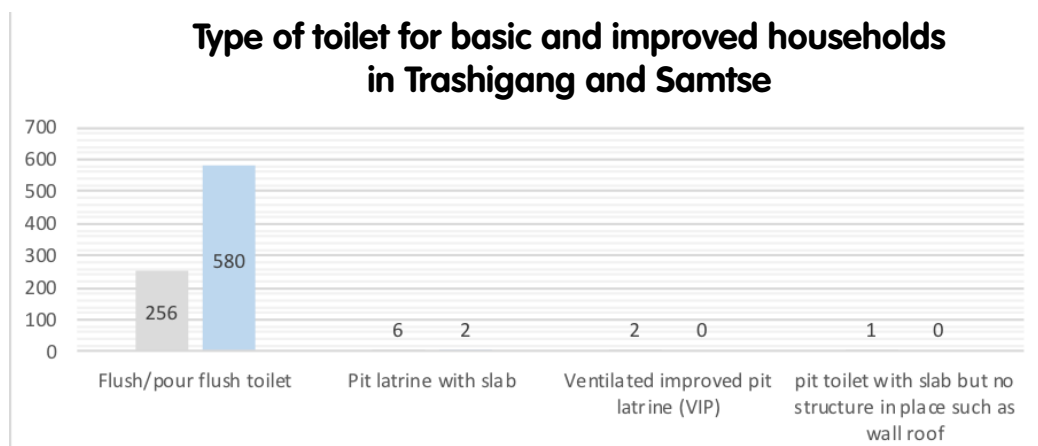


Figure 7: Comparison of toilet types in basic and improved households

Access to flush or pour flush toilets more than doubled during the programme. A total of 324 households gained access to a flush or pour flush toilet in the study period.

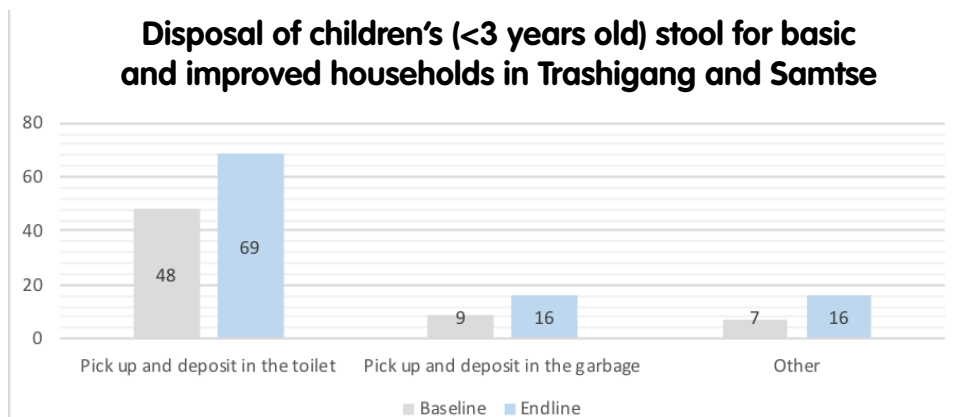


Figure 8: Comparison of children's stool disposal practices

The description in the hygiene practice ladder of "use of toilets by all" implies that everyone's faeces are disposed of safely. If some household members practice open defecation, or if children's faeces are not picked up and disposed of safely, then there is not yet "use by all". In the above figure, the results show an increase of improved practices around disposal of children's stools, with disposal in the toilet as the dominant practice.

4.1.2a Sanitary toilets and use in Samtse

After three years of intervention:

- Basic and improved level of hygiene practice related to sanitary toilet and use increased from 46% to 79%.
- The number of households without a toilet, a shared toilet or a toilet that is not containing waste in a safe manner decreased by more than half: from 54% to 21%.

If we look at the details of the hygiene practice levels we see that:

- Only 1% of the households lack a toilet after 3 years of intervention
- Households with an improved hygiene practice level increased in the middle quintile from 40% to 71% and from 55% to 75% in the fourth and richest quintiles

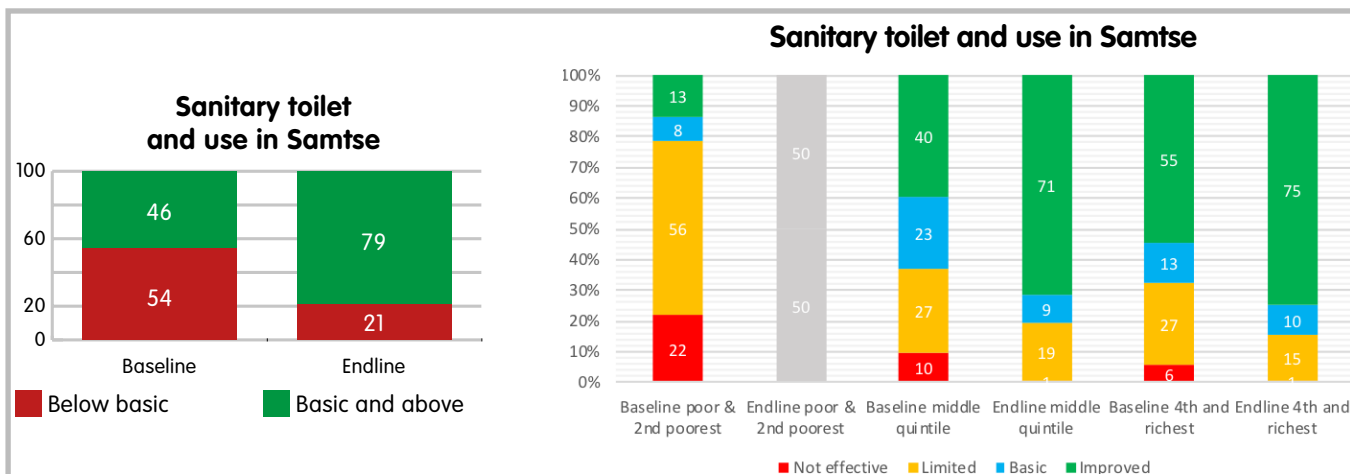


Figure 9: Sanitary toilet and use in Samtse

Figure 10: Comparison of sanitary toilet and use practices across wealth quintiles in Trashigang

Note: as mentioned above: the number of households in the poorest and second poorest quintile are too small to be taken into account for statistically significant comparison. Therefore this column is grey. This will be the case throughout the rest of this report.

4.1.2b Sanitary toilet and use in Trashigang

In Trashigang results show that basic and improved levels of hygiene practice related to sanitary toilet and use increased from 25% to 71%.

- The number of households without a toilet, a shared toilet or a toilet that is not containing waste in a safe manner decreased by more than half: from 75% to 29%.

Details show the following:

- 10% of the households in the middle quintile and 1% of the households in the fourth and richest quintile lack a toilet after 1 year of intervention
- Households with improved hygiene practice level increased among the middle quintile from 2% to 48% and from 5% to 74% among the fourth and richest quintiles.

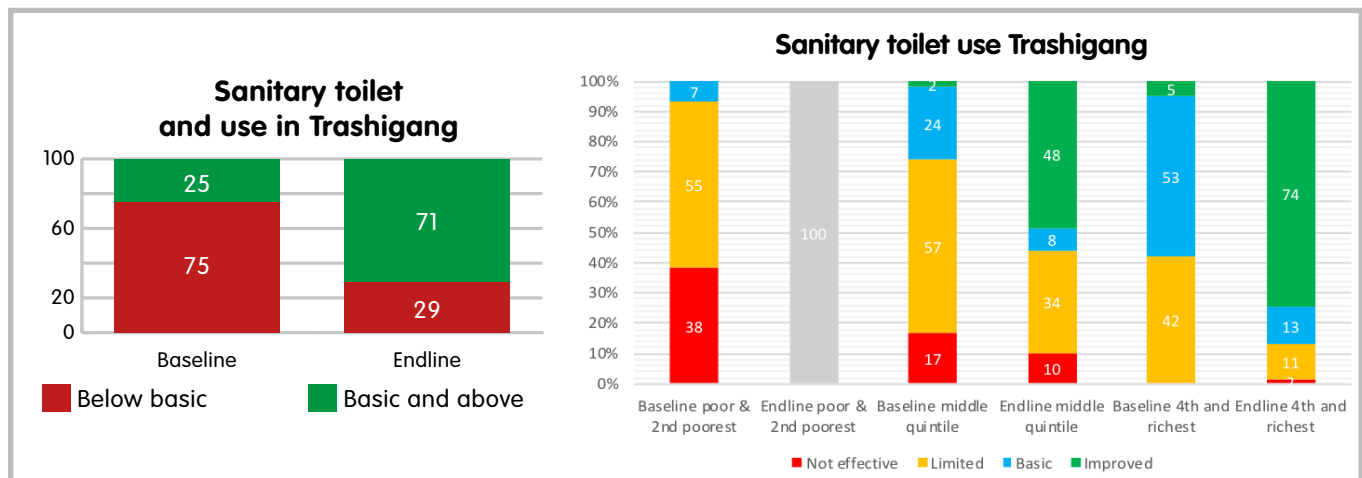


Figure 11: Sanitary toilet and use in Trashigang

Figure 12: Comparison of sanitary toilet and use practices across wealth quintiles in Trashigang

4.1.3 Hygiene practice level 2: Handwashing with soap

This hygiene practice indicator assesses whether household members have a handwashing facility with water and soap close to the toilet – within 10 meters –and whether household members know the two critical times for handwashing: before eating and after defecation.

Knowledge of handwashing times in Samtse and Trashigang

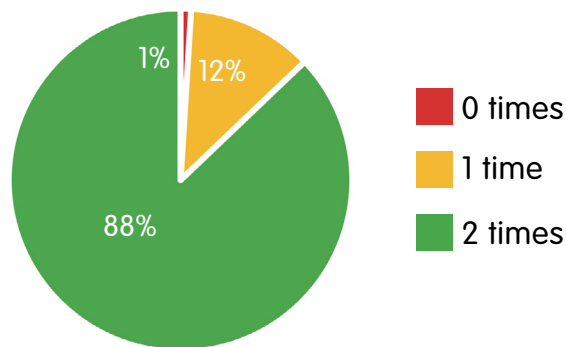


Figure 13: Knowledge of critical times for handwashing in Samtse and Trashigang.

In the endline, 88% of respondents correctly identified two critical times for handwashing.



Figure 14: Flow chart for handwashing at critical junctures

Results for progress in handwashing practice during the study period show significant movement of households away from not-effective, limited and basic facilities, adopting improved facilities. In total 251 households gained access to an improved handwashing facility.

Improvements can be seen at all steps: more handwashing stations, more with water and soap present and more people knowing the two critical times for handwashing. See Table 14: the first number is the endline, the second number is the baseline.

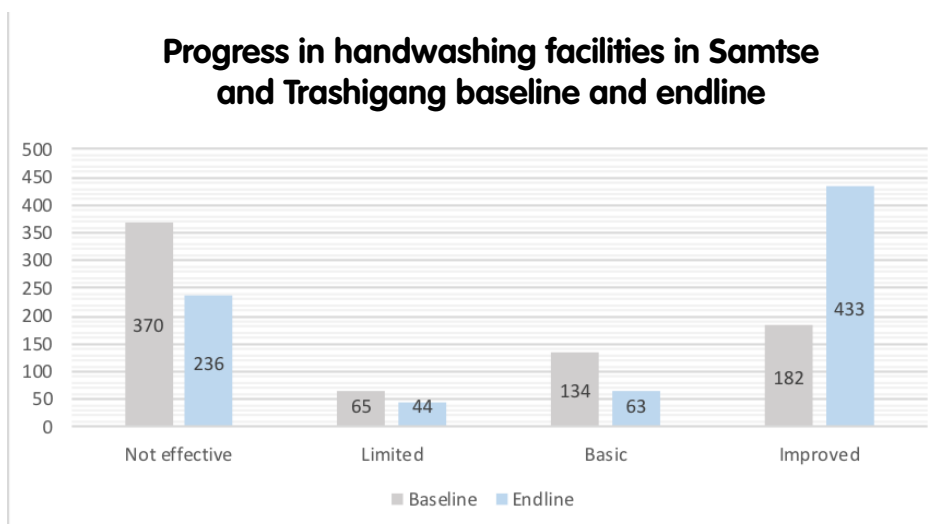


Figure 15: Progress towards improved handwashing facilities in Samtse and Trashigang

The criteria for 'not effective' is to have a handwashing station within 10 meters of the toilet. In the sample 558 households meet that criteria. 115 Households did have a handwashing station but more than 10 meters away. The survey design logic did not allow further analysis for this group, so we do not have further details on water and soap for this group. We expect that the number of households with an improved handwashing facility would increase if these households were included.

This made us look into the potential relation between infrastructure and improved practice and found that there was an increase in piped water into the house since the baseline (tap with running water).

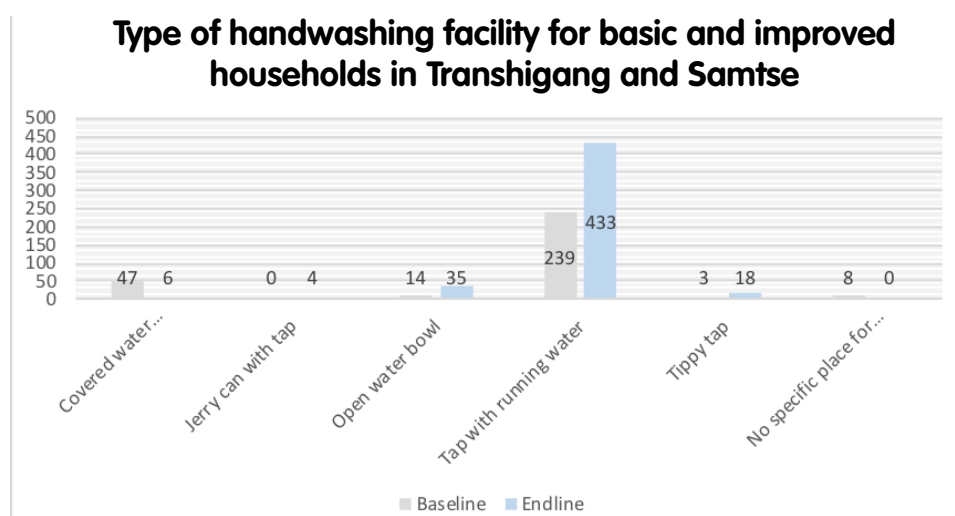


Figure 16: Type of basic and improved handwashing facilities in Samtse and Trashigang.

The results show a significant dominance of households accessing piped water, with a total of 194 households using a tap with running water for handwashing practice during the study period.

This combined with the fact that new toilets are built close to the house led to more households meeting the criteria “within 10 meters of the toilet”.

4.1.3a Handwashing with soap in Samtse

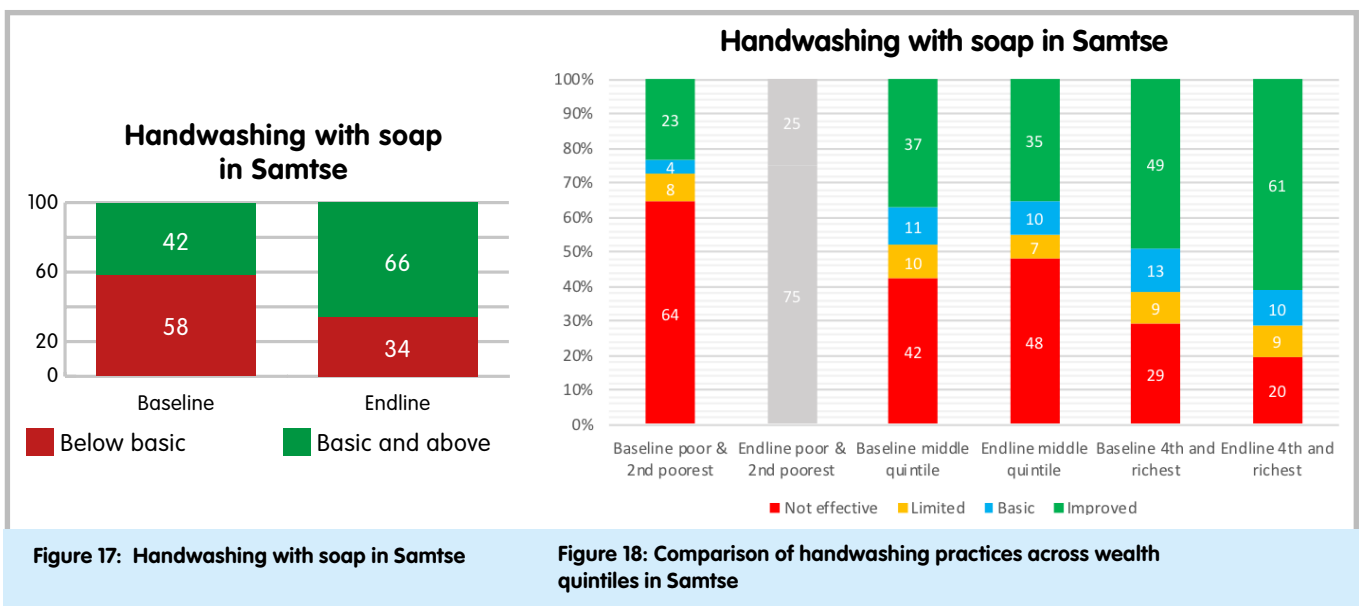
One of the recommendations from the baseline in Samtse was: focus should be on making it easy (easier) for household members to wash hands. For example, encourage them to invest in handwashing stations inside or near their toilets¹⁸.

After three years of intervention in Samtse district:

- The number of households with a handwashing facility near the toilet, with water and soap available increased from 42% to 66%.

Looking at the details:

- All households improved, although the fourth and richest households (from 49% to 61%) do better than the middle quintile households; in fact the middle quintiles did not seem to improve compared to the higher quintiles. This may have to do with the ability to pay which is due to the fact that most households from the poorest and second poorest quintiles have moved to the middle quintile and most households of the middle quintile to the highest quintile.



18 Hygiene effectiveness and costs in Samtse district, Bhutan - baseline report, June 2014, <https://www.ircwash.org/resources/hygiene-effectiveness-and-costs-samtse-district-bhutan>

4.1.3b Handwashing with soap in Trashigang

In Trashigang, a similar trend can be seen: the number of households with a handwashing facility near the toilet, with water and soap available increased from 42% to 62%.

Looking at the details:

- In Trashigang, the improved practice level of the middle quintile households increased by 27%, from 15% to 42%, while the richest quintiles increased by 38%, from 31% to 69%.
- The number of households with not-effective handwashing practice increased in the middle quintiles from 42% to 48%. As mentioned for Samtse, we assume this may be due to the fact that most households from the poorest and second poorest quintiles have moved to the middle quintile. We would then read the figures as a decrease in not-effective practices from 64% (in the poorest quintile) to 48% in the middle quintile. However, since we cannot compare these households this cannot be verified unfortunately. In Trashigang, innovations in promoting handwashing with soap were tested in clusters covered by eight BHUs, the approach aimed at testing adaptations to the messaging, CDH+ workshops and outreach activities to include human emotional drivers such as nurture, disgust and social affiliation.

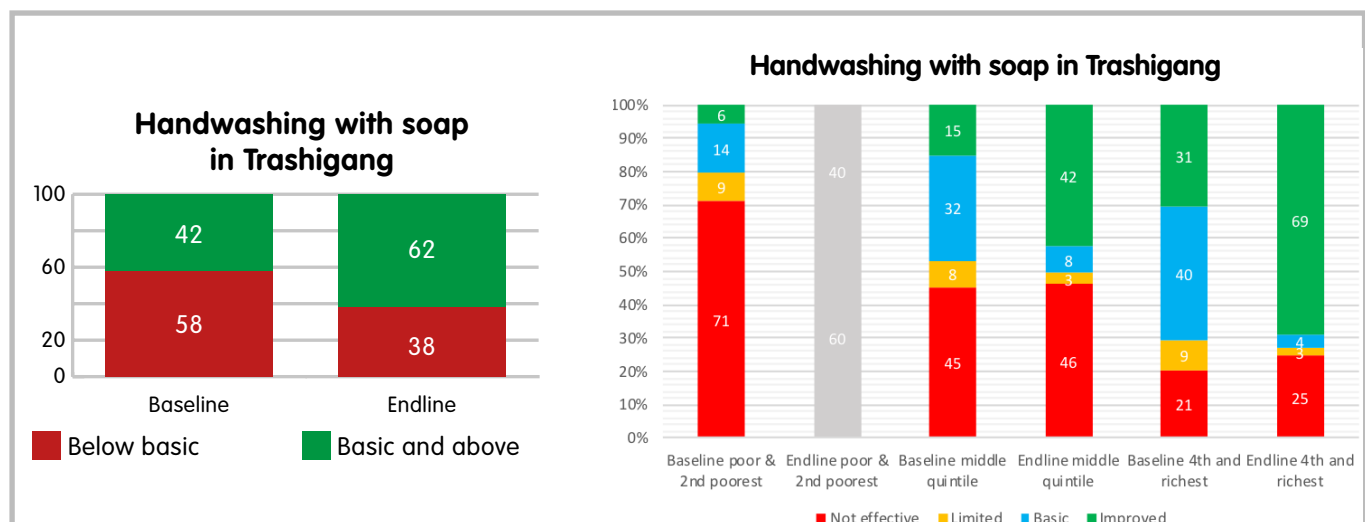


Figure 19: Comparison of below and above basic handwashing practices in Trashigang

Figure 20: Comparison of handwashing practices across wealth quintiles in Trashigang

Going beyond knowledge and health messages to promote handwashing with soap:

In Trashigang, innovations in promoting handwashing with soap were tested in clusters covered by eight BHUs, the approach aimed at testing adaptations to the messaging, CDH+ workshops and outreach activities to include human emotional drivers such as nurture, disgust and social affiliation.

The intervention (CDH+) comprised of various activities which also included workshops with mothers of children under five and household visits by health assistants. The cost of the materials for the activities to be printed and purchased was approximately 6000 IDR per 100 households, which is less than 1 USD per household. This excludes the creative research and development process and the training of facilitators. Additional costs for delivery at the district level involved the travel costs for follow-up by health staff (approximately 5,200 USD) and the workshop costs for the outreach clinics (approximately 3000 USD for 34 workshops reaching 1000 mothers and care givers).

Figure 21 shows two areas covered by the CDH+ that was included in the sample size of the performance monitoring evaluation.

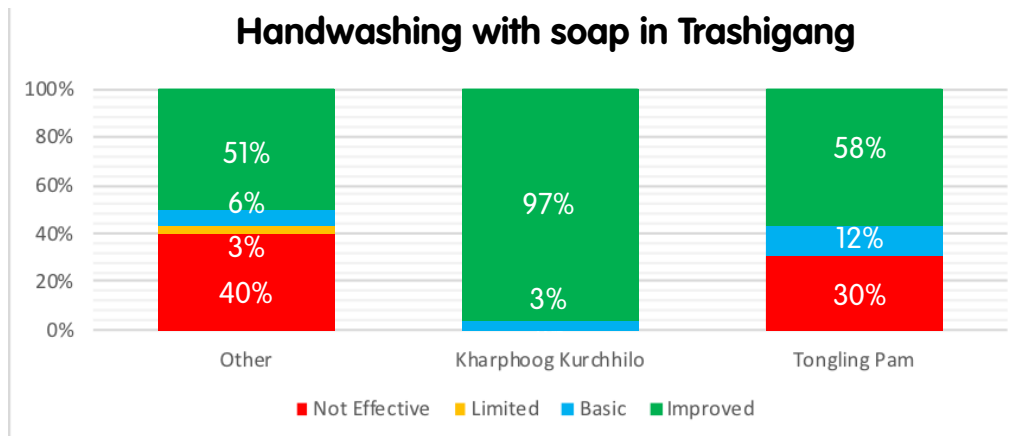


Figure 21: Impact of innovative hygiene programming in Kharphoog Kurchhilo and Tongling Pam

Results show positive impact of the innovative hygiene programming in both Kharphoog Kurchhilo and Tongling Pam¹⁹. The results for Kharphoog Kurchhilo showed remarkable progress in eliminating not-effective and limited hygiene practices where the innovative practices were not piloted. Results for Tongling Pam also showed progress towards improved practices.

4.1.4 Hygiene practice level 3: Safe drinking water

This hygiene practice indicator assesses if the water used for drinking water comes from an improved source – which is either piped water or water from a protected spring – which is treated at point of use, and which is collected, stored and drawn safely at point of use. Although the topic is discussed occasionally and on demand at CDH workshops and house-to-house visits, it is noted that these outcomes relate to the government’s expansion of the rural water supply as the RSAH interventions are not focusing specifically on safe drinking water management.

During the study, a total of 286 households achieved improved status of safe water management, and corresponding significant reduction in not-effective, limited and basic water management practices. This can also be clearly seen in Figure 27: the first number is the endline, the second number is the baseline.

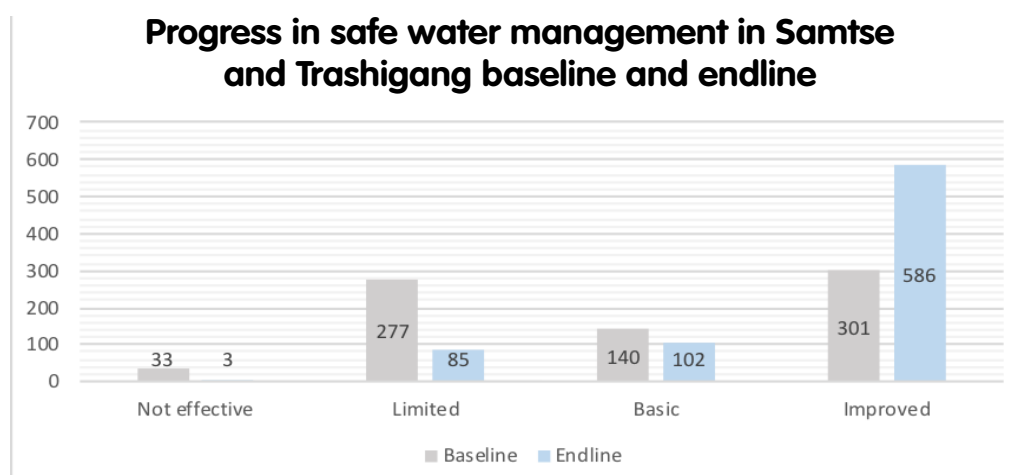


Figure 22: Progress towards reaching safe water management in Samtse and Trashigang

¹⁹ Note: these findings come from a sample which includes only two districts that also took part in the CDH+ activities. The baseline and endline survey looked at availability of a facility, water and soap as part of a larger survey. These findings cannot be compared as is with the findings from an evaluation early 2017 on the CDH+ activities – which show only a slight increase in handwashing. In that study, carried out by the London School of Hygiene and Tropical Medicine, the intervention was evaluated using a cluster randomised intervention trial. See learning brief on CDH+ at

http://www.snv.org/public/cms/sites/default/files/explore/download/snv_bhutan_research_brief_bcc_2017_0.pdf

4.1.4a Safe drinking water in Samtse

The number of households with improved safe drinking water management practices increased from 48 to 93%. This is in line with the national figures from JMP: 97% of the population of Bhutan having access to basic or safely managed water services²⁰. Middle quintiles and fourth and richest households show similar progress in improved practice levels.

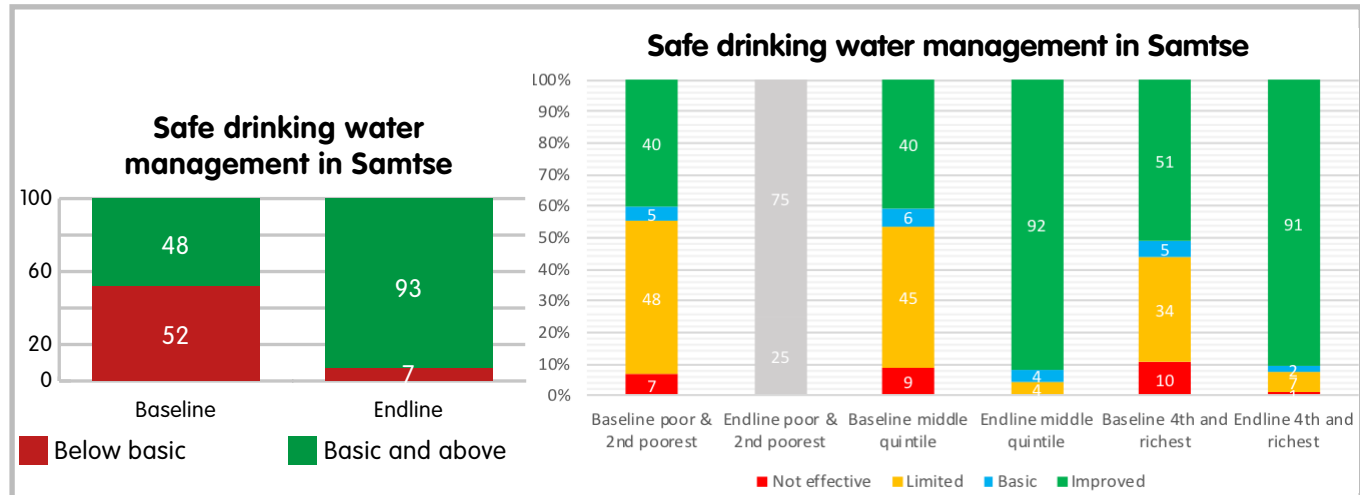


Figure 23: Comparison of below and above basic safe water management practices in Samtse

Figure 24: Comparison of safe water management practices across wealth quintiles in Samtse

4.1.4b Safe drinking water in Trashigang

In Trashigang, the number of households with improved safe drinking water management practice increased from 69% to 84%. There seems to be a clear link between improvement of behaviour for this indicator and the government's ongoing efforts to improve household access to the rural water supply scheme. The RSAHP does not include intentional promotion interventions around safe drinking water since the focus shifted to sanitation and hygiene over the years, although parts of the triggering workshop do touch upon the safe consumption of water. The interventions on water are developed by the rural water supply scheme, under the PHED at the national level and district engineers at district level.

Looking at the improved practice more in detail, the middle quintiles are doing less well (52%) than the fourth and richest quintiles (70%). Treatment of drinking water, which is the criteria to move from a basic to an improved level of practice, is apparently less common in the middle quintiles.

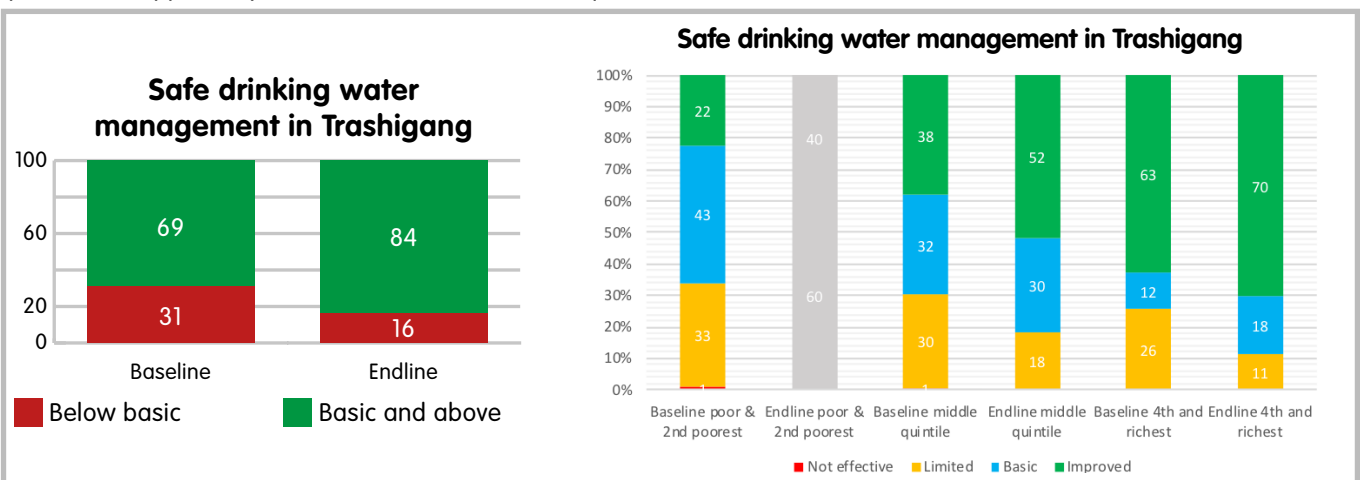


Figure 25: Comparison of below and above basic safe water management practices in Trashigang

Figure 26: Comparison of safe water management practices across wealth quintiles in Trashigang

20 See country file Bhutan, July 2017 JMP, accessible at <https://washdata.org/data>



Figure 27: Flow chart for safe water

4.2 What costs are captured?

The hygiene effectiveness study compares the hygiene practice levels against costs. And costs were collected at two levels:

Households

- Materials and labour cost for building a toilet
- Cost of soap
- Cost of water installation and use

Implementers

- Capital expenditure hardware costs e.g. tap stands for handwashing
- Capital expenditure software costs e.g. training of health workers, material development, workshops
- Operational costs e.g. transport, salaries

Households in Trashigang and Samtse increasingly gained access to toilets and to improved toilets in particular: from 187 households in the baseline to over 500 in the endline. However, we have only collected cost data from households that built their toilet in the past 2 years as HHs are likely to have forgotten the true costs if it is too long ago. In total 185 households with a toilet for up to two years said they had spent money on their toilet either for toilet materials only or also for labour.

Cost of toilet

Average amount households (with a toilet for up to two years) are spending on:

- Toilet materials BTN 15,750 (USD 237)
- Labour BTN 5,750 (USD 87)

Cost of handwashing facility

- For those households who said they spent money an average of BTN 1,925 (USD 29) was spent on a handwashing facility.
- Capital expenditure software costs e.g. training of health workers, material development, workshops

Cost of soap

- On average a household spends BTN 15 (USD 0.23) to buy a piece of soap. On average a household uses 9 pieces of soap per month, so the average HH cost for soap/month: $9 \times 15 = 135$ BTN (USD 2).

Cost for water

- 12% of households in Trashigang and 21% in Samtse paid for the connection or installation of the water system, with average cost of BTN 9,950 (USD 150). 7% of households in Trashigang and 53% in Samtse paid for water supply.

4.2.1 Average income of Samtse and Trashigang

The average income in the Samtse region in 2012 was approximately BTN 45,897 (USD 691) per year. This was calculated based on the Bhutan Living Standards Survey 2012²¹, which gives information on average income by salary, agricultural and non-agricultural activities, whereby the following calculations (in BTN unless otherwise indicated) were made:

²¹ The 2012 survey was used as indication, it provides data per Dzongkhag which allowed us to use data from Samtse and Trashigang, while the 2017 version does not. See <https://www.adb.org/sites/default/files/publication/30221/bhutan-living-standards-survey-2012.pdf> [last accessed on 8 July 2018]

	Samtse	% of income source	Trashigang	% of income	Average income Samtse	Average income Trashigang	Average income Samtse & Trashigang	USD
Average HH income from a wage/salary	61852	60%	58979	73%	37049	43114		26.84%
Average HH income from agriculture	16020	16%	9623	12%	2483	1145		11.05%
Average HH income from non-agricultural activities	25335	25%	12055	15%	6207	1796		13.68%
Total average income					45740	46055	45897	691

Table 8: Income calculations

The average inflation rate is 5.86% for the years 2001 until 2018²², bringing the average monthly income in Samtse and Trashigang to BTN 4,959 (USD 65²³). By calculating the average earnings per year we have a relative benchmark to look at the household costs of hygiene practices. From baseline to endline we see a high increase of costs of materials: from BTN 9981 (USD 150) to BTN 15750 (USD 237).

HH costs for new toilets constructed (< 2 years)

	Baseline		Endline	
	BTN	USD	BTN	USD
Average				
Materials	9981	150	15750	237
Labour	4482	67	5750	87
Total	14463	218	21500	324

Table 9: Income calculations

This is probably due to the fact that newly built toilets are almost all flush or pour flush toilets as was shown above. By looking at the average cost of a flush/pour flush toilet BTN 21,500 (USD 324) for material and labour, it is evident that this is very costly to the people in the region as it equates to almost half of the average (annual) income of an individual (47%).

4.2.2 Operation and maintenance costs of toilet

Less than ten households indicated they carried out repair, which is too small to analyse sensibly. We have seen a similar low response for pit emptying. The fact that almost nobody spent any money on operation and maintenance is worth reporting.

4.2.3 Costs of handwashing station

The first step in the hygiene practice for handwashing with soap is to have a handwashing station. For those who said

²² See <https://tradingeconomics.com/bhutan/inflation-cpi>; Conversion rate by oanda.com, 31 Dec 2017

²³ Average inflation rate is 5,86% for the years 2001 until 2018 (see <https://tradingeconomics.com/bhutan/inflation-cpi>); monthly income is taken from Bhutan Living Standards Survey 2012, calculating income from wage, agriculture and non-agricultural activities and extrapolated with 5 years of inflation to come to figure for 2017; Conversion rate by oanda.com, 31 Dec 2017 (See <https://www.adb.org/sites/default/files/publication/30221/bhutan-living-standards-survey-2012.pdf> [last accessed on 8 July 2018],

they spent money, an average of BTN 1,925 (USD 29) was spent on a handwashing facility compared to BTN 2,289 (USD 34) in the baseline.

In addition to water stations provided by the government near the roadside, households either construct something themselves with local materials at no cost or they go to a shop to buy a bucket/container with a tap or a more expensive one. The wide range of costs showed this: from 15 up to 75000 which makes it difficult to use averages, let alone compare them.

4.2.4 Costs of soap

On average a household spends BTN 15 (USD 0.23) to buy a piece of soap which is similar to the baseline. On average a household uses 9 pieces of soap/month, so the average household cost for soap/month: $9 \times 15 = 135$ BTN (USD 2).

4.2.5 Costs of drinking water connection

The Government of Bhutan pays for the connection costs of water sources and we may see this reflected in the findings as the majority of the HHs do not spend money on the water facility; 12% of households in Trashigang and 21% in Samtse paid for the connection or installation of the water system, with average cost of BTN 9,950 (USD 150). There are two main reasons why HHs pay for water, one is for the caretaker; the other reason can be because households construct or invest in extra tap stands or tap points other than what the government has provided.

4.2.6 Costs for drinking water supply

Although there are no charges for water across the rural areas of Bhutan, households are asked to pay between BTN 100 – 200 (USD 1.5 - 3) per month for compensation of the caretaker of the water source. While only 7% of households in Trashigang pay for the water supply, more than half of the households in Samtse (53%) paid for water supply caretakers.

4.1.7 Costs of implementers

Spending on hygiene promotion calculated from the interventions in both districts averages approximately 3.50 USD per person / 17.50 USD per household. Expenses were calculated for both districts for each of the interventions, from the two-day intensive CDH workshops to participation in campaigns like the Global Handwashing Day.

Costs include the government spending through RSAHP and SNV's support to the national programme through SSH4A. Cost items calculated are not only travel costs and out-of-pocket costs like printing materials, but also time – and thus salaries - of programme advisors, government officials, NGOs and consultants for specific tasks like the formative study design; staff time actually formed the largest part of the total costs (68%).

Cost items included were:

- Time (and thus salary) spent on planning, preparation, coordination and facilitation
- Travel costs: driver costs, allowances, fuel, car rent
- Daily allowances (DSA)
- Other costs, like printing materials

Costs of one-off activities such as the workshops, studies and fairs come up to 66%. All interventions were weighted, according to the focus on hygiene. The CDH workshop for example covers various topics; half of it was seen as closely related to hygiene promotion and therefore it is weighted as 50% HP. See the Table 10.

Hygiene intervention	In %	% charged to HP
Testing new way of promoting HWWS Trashigang	21%	100%
CDH – TOT	30%	50%
CDH workshops	12%	50%
Follow-up visits	21%	100%
Home visits by HA	1%	50%
Outreach clinics by HA 2015 (Samtse)	0.5%	10%
Outreach clinics by HA 2016 (Samtse)	0.5%	10%
Outreach clinics by HA 2017 (Trashigang)	1%	10%
Sanitation fairs, Menstrual Hygiene Day, World Toilet Day	3%	100%
Formative research	1%	20%
Joint monitoring	5%	100%

Table 10: Weighting of hygiene interventions

The cost of improving hygiene practices was calculated to be BTN 240 (3.5 USD) per person, or BTN 1,155 (17.5 USD) per household. Costs include all related implementation costs, including staff time, travel, DSA, workshops, research activities, meetings, reviews and more. It is important to note that these costs are a minimum: it does not include the hardware costs spent by the government on piped schemes or on drinking water stations.

5. Conclusion and Recommendations

Before the hygiene intervention, households mostly scored Not effective or Basic for all key behaviours on the hygiene effectiveness ladders. Following the interventions, strong progress was evidenced in each of these measures. Planned and follow-up activities resulted in an increase of 33% for sanitary toilet access in Samtse and 46% in Trashigang. Regular follow-up by implementers at national and district levels, integrated within the broader RSAHP programme, complemented by the motivation and enthusiasm of district health officials contributed to this success.

With an investment of 3.5 USD on hygiene interventions per person district wide, we saw a significant increase in safer practices:

Achieving basic and above

Samtse
Sanitary toilet and use went from 46 to 79%
Handwashing with soap went from 42 to 66%
Safe drinking water went from 48 to 93%
Trashigang
Sanitary toilet and use went from 25 to 71%
Handwashing with soap went from 42 to 62%
Safe drinking water went from 69 to 84%

Table 11: Overview of increase of safer practices

From baseline to endline, we also saw a high increase of costs of materials: from BTN 9,981 (USD 150) to BTN 15,750 (USD 207)²⁴, which is probably due to the fact that most of the newly built toilets are flush or pour flush toilets. With an average monthly income in Samtse and Trashigang of BTN 4,959 (USD 65²⁵) this may become a problem for the poorer segment of the population.

For handwashing with soap, both Samtse and Trashigang show a similar progress at 24% and 20% increase. Further Trashigang shows good progress within a shorter period of time, factors such as the innovations in behaviour change communications in collaboration with the London School of Hygiene and Tropical Medicine rolled out in areas covered by 8 basic health units may have contributed to this increase²⁶. The adaptations integrated within the CDH workshops used the universal human emotional drivers of nurture, disgust and social affiliation to produce positive outcomes. It had great emphasis on the critical junctures and settings of the handwashing facility.

The safe drinking water management indicator shows that Samtse has a total of 45% and Trashigang a 15% increase when compared with the baseline. The RSAHP consists of less or no implementations around safe drinking water, however part of the triggering workshop does touch upon the safe consumption of water. The effort put in and implementations designed by the government’s rural water supply scheme have shown a significant improvement.

24 Baseline conversion rate by oanda.com, 31 Dec 2015 and endline by oanda.com, 31 Dec 2017

25 Average inflation rate is 5,86% for the years 2001 until 2018 (see <https://tradingeconomics.com/bhutan/inflation-cpi>); monthly income is taken from Bhutan Living Standards Survey 2012, calculating income from wage, agriculture and non-agricultural activities and extrapolated with 5 years of inflation to come to figure for 2017; Conversion rate by oanda.com, 31 Dec 2017 (See <https://www.adb.org/sites/default/files/publication/30221/bhutan-living-standards-survey-2012.pdf> [last accessed on 8 July 2018],

26 http://www.snv.org/public/cms/sites/default/files/explore/download/snv_bhutan_research_brief_bcc_2017_0.pdf

Based on the improvement reflected above it may mean that an intervention over a course of two years and regular follow-up after that indicates good progress in hygiene practices. This also seems to prevent slippage and increases the chance of long-lasting changed behaviour. Two-thirds of the total costs calculated for these hygiene interventions are staff time, which may indicate the importance of personal contact and frequency of follow-up to promote safe practices. The findings do not give insight in the value for each intervention separately: we cannot conclude which intervention is better value or which one could be skipped - we assume it is actually the whole mix of activities, and a combination of intensity and frequency.

Recommendations:

- Share findings and cost analysis with decision makers to support further investment in sanitation and hygiene promotion, and seek alignment with the upcoming decentralisation and budgeting processes.
- Rather than implementing "one off" activities, reinforce existing programme approaches and models that institutionalise and integrate efforts within regular activities, once demand has been generated.
- Conduct further studies and monitor and adapt technology options and services to better meet the needs of households that belong to the poorest wealth quintiles.
- In programme design, planning and budgeting, place emphasis on ensuring personal contact and adequate frequency of follow-up to promote safe practices, particularly for handwashing practices, which progressed at a slower pace. The current two-year phase of the RSAHP cycle supports this, but continuous efforts are needed to accelerate progress.
- Using this methodology to periodically monitor and evaluate progress and sustainability of hygiene practices over time will enable the Government of Bhutan and other implementers to design follow-up support more effectively, targeting gaps in safe hygiene practices.
- Reduce the costs of monitoring by harmonising water, sanitation and health indicators; this also contributes to better integrated and coordinated promotion of safe hygiene practices.

6. Annex: Questionnaire used for the Hygiene Cost effectiveness study

HES

Only answer if you responded Use own household toilet to Q98

158. F1. How long have you had this toilet?

- Up to two years_____
- More than two and up to five years_____
- More than five and up to ten years_____
- More than ten years_____
- Don't know_____

Only answer if you responded Up to two years|More than two and up to five years|More than five and up to ten years|More than ten years to Q158

159. F2. Was there any direct contribution by the household for construction of this toilet (material and labour)

- Yes_____
- No_____
- Don't know_____

Only answer if you responded Yes to Q159

160. F3. How much time was spent ? (in days)

- Up to 1 week (7 days)_____
- Up to 1 month (30 days)_____
- Up to 3 month (90 days)_____
- More than 3 months_____
- Don't know_____

Only answer if you responded Use own household toilet to Q98

161. F4. Do you know how much money was spent for construction of this toilet (initial construction costs)?

- Yes_____
- No_____

Only answer if you responded Yes to Q161

162. F4a. How much money was spent on direct cost for materials ? _____

Only answer if you responded Use own household toilet to Q98

163. F4b. How much money was spent on direct cost for labour ? _____

Only answer if you responded Yes to Q161

164. F5. How did you pay for this toilet?

Not paid _____
Paid by self _____
Paid by others _____
Loan and Installments _____
Borrowing (friends) _____
Combination _____
Don't know _____

Only answer if you responded Up to two years|More than two and up to five years|More than five and up to ten years|More than ten years to Q158

165. F6. Did you carry out any repairs or improvements to your toilet in the last 12 months?

Yes _____
No _____
Don't know _____

Only answer if you responded Yes to Q165

166. F7. Is there any direct contribution by the household (material and labour)?

Yes _____
No _____
Don't know _____

Only answer if you responded Yes to Q165

167. F8. How much time was spent on repairing and or improving the toilet? (in days)

0 days _____
1-3 days _____
4-5 days _____
6 days and above _____
Don't know _____

Only answer if you responded Yes to Q165

168. F9. How much money was spent on repairing and or improving the toilet ? _____

Only answer if you responded Up to two years|More than two and up to five years|More than five and up to ten years|More than ten years to Q158

169. F10. Was the pit emptied in the last two years ?

Yes _____
No _____
Don't know _____

Only answer if you responded Yes to Q169

170. F11. How much money was spent to empty the pit ? _____

171. H1. What is the main place you use to wash your hands?
No specific place for hand washing with soap _____
Open bowl or container that does not prevent contamination _____
Water container with tap, ladle or tippy tap that prevents contamination _____
Running water with soap _____

172. H2. Did you spend money on the hand washing facility ?
Yes _____
Nothing (used locally available materials) _____
Others paid for it _____
Don't know _____

Only answer if you responded Yes to Q172

173. H2a. How much money did you spent on the hand washing facility ? _____

174. H3. What type of soap is used for hand washing?
No soap _____
Handwashing/bathing soap _____
Detergent _____

175. H3a. Do you know the number of soaps purchased for hand washing last month ?
Yes _____
Don't know _____

Only answer if you responded Yes to Q175

176. H4. Number of this type of soap purchased per month? _____

177. H5. How much does it cost each time you buy this soap (per soap)? _____

178. W1. Did you pay for connection or installation of the water source/system?
Yes _____
No _____
Don't know _____

Only answer if you responded Yes to Q178

179. W1a. How much did you pay for connection or installation of the water source/system? _____

180. W2. How long have you used this water source/system?
No tap _____
Less than 2 years _____
2 to 5 years _____
5 to 10 years _____
More than 10 years _____
Don't know _____

181. W5. Do you pay for the water?
Yes _____
No _____
Don't know _____

Only answer if you responded Yes to Q181

182. W6. How much do you normally pay each month for the water that the household uses?

183. W7. How is drinking water collected?
Open container _____
Closed container _____
Tap, direct from tap _____

184. W9. Do you treat your drinking water?
Yes, always _____
Yes, sometimes _____
No _____
Don't know _____

Only answer if you responded Yes, sometimes to Q184

185. W9a. If sometimes, specify, when?

186. W10. How do you treat your drinking water?
Boiling _____
Use chlorine _____
SODIS _____
Use (ceramic) filter _____
Don't know _____

187. W8. Do you store drinking water in or near the house?
Yes _____
No _____
Don't know _____

188. W11. How is (treated) drinking water stored? (observe)
Open container _____
Closed container _____
Don't know _____

189. W12. How is stored drinking water consumed? (observe if there is a tap or dipper)

Tap_____

Tippy Tap_____

Dipper / ladle_____

Don't know_____

190. HP1. Has any household member(s) attended any hygiene promotion activities, what was the content of the hygiene promotion activities?

Toilet construction_____

Toilet hygiene and use_____

Hand washing with soap_____

Safe drinking water handling_____

Don't know_____

Only answer if you responded Toilet construction|Toilet hygiene and use|Hand washing with soap to Q190

191. HP2a. Who attended hygiene promotion activities

None_____

Male_____

Female_____

Don't know_____

Only answer if you responded Male|Female to Q191

192. HP3b. Total number of hours (estimated) that the household members who attended hygiene promotion activities

|